



The Second International Conference on
Materials, Energy & Environment
(MEE'2023)

El Oued – Algeria
October 23-24, 2023



PROCEEDING ABSTRACT



El Oued – Algeria

MEE'2023

The Second International Conference on
Materials, Energy & Environment

October 23-24, 2023

جامعة الشهيد حمه لخضر - الوادي TEL/+213-32-12-07-41/40 . Adresse/PO Box 789 EL-OUED - ALGERIE
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The Second International Conference on
Materials, Energy & Environment
(MEE'2023)

El Oued – Algeria
October 23-24, 2023



Honorary Chair

Prof.
Omar Ferhati
President of the
University



General Chair

Prof.
Mohammed
El Hadi Attia



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PREFACE

The Second International Conference on Materials, Energy and Environment will be held at El Oued University on October 23-24, 2023. Its goal is to bring together researchers, professors and industrialists concerned by technological and scientific advances in the Materials, Energy and Environment sciences. This first international edition is intended to be open to industrial concerns and the transfer of technology between universities and industries. This is why applied themes are programmed to better meet the needs of the industrial community.



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TOPICS

TOPIC 1: ENERGY

- Renewable Energy and Environment
- Phase Change, Flows and Energy Transfer Processes
- Optimization of Energy Systems
- Fuel Cells
- Drying and Porous Media
- Energy Storage
- Thermal and Mass Transfers
- Energy Management.

TOPIC 2: MATERIALS

- Material Modeling
- Material Valuation
- Material Characterization and Behavior
- Nanotechnology
- Materials for Energy
- Biomaterials and the Environment
- Energy Storage and Conversion

TOPIC 3: ENVIRONMENT

- Air pollution and treatment
- Biofuels
- Desalination
- Environmental Protection
- Environmental Sustainability and Development



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- Greenhouse Effect, Global Warming, and Climate Change
- Groundwater Issues
- Soil Pollution and Treatment
- Wastewater Management and Treatment
- Water Pollution and Treatment

TOPIC 4: MATHEMATICS IN PHYSICS

- Application of Quantum Mechanics on Materials
- Numerical Methods and Simulations Applied in Technology
- Theory of Operators and Their Applications in Science
- Mathematical Physics and Limit Problems
- Plasma Physics



SCIENTIFIC COMMITTEE



**The Second International Conference on
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Pr. Zied DRISS (ENIS, Sfax University, Tunisia)

Pr. Zoubir AOULMI (Tebessa University, Algeria)



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**The First International Conference on
Materials, Energy & Environment
(MEE'2020)
El Oued – Algeria
January 20-21, 2020**



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Ms. Souhila ASKRI (El Oued University, Algeria)

Mr. Younes MOUSSAOUI (Gafsa University, Tunisia)



PLENARY SPEAKERS



People's Democratic Republic of Algeria
Ministry of Higher Education & Scientific Research
University of Echahid Hamma Lakhdar – El Oued
Faculty of Exact Sciences
Department of Physics



**The Second International Conference on Materials,
Energy & Environment (MEE'2023)**

Featured Speakers



Pr. Mosbah Zidani



**The technological
and scientific
interest in the
advanced
characterization of
industrial and
innovative materials**



**Pr. Hany Farhat
Abd-Elhamid**



**Climate change
causes, impacts and
possible solutions
(Climate change
impacts and possible
solutions in the
MENA region)**



Pr. Zelenáková Martina



**Climate change causes,
impacts and possible
solutions (Climate
change impacts on EU
countries)**



Pr. Müslüm Arıcı



**Role of phase change
materials in energy
consumption reduction
of buildings**



Pr. Lassaad El Mir



**Nanoscaled
materials for
innovative**



HONORARY GUESTS



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Pr. Abd Elnaby KABEEL
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Pr. Ammar HIDOURI
(Gafsa University,
Tunisia)

Pr. Hany F. Abd-Elhamid
(TUKE, Košice
University, Slovakia)

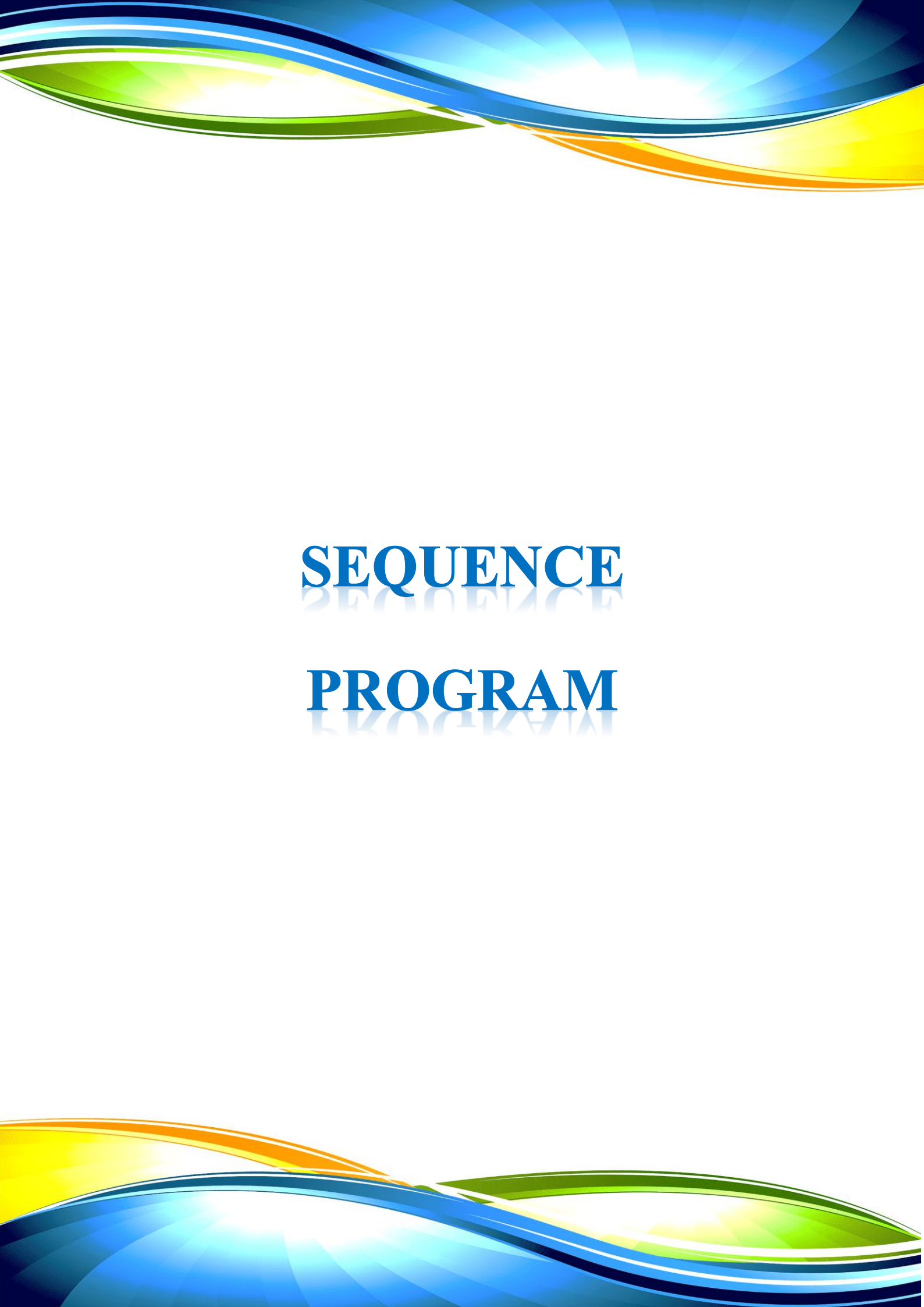
Pr. Lassaad ELMIR
(Gabes University,
Tunisia)

Pr. Martina Zeleňáková
(TUKE, Košice
University, Slovakia)

Pr. Müslüm ARICI
(Kocaeli University,
Turkey)

Pr. Ridha ENNETTA
(Gabes University,
Tunisia)

Pr. Zied DRISS (Sfax
University, Tunisia)



SEQUENCE PROGRAM



People's Democratic Republic of Algeria
Ministry of Higher Education & Scientific Research
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Faculty of Exact Sciences
Department of Physics



The Second International Conference on Materials, Energy & Environment (MEE'2023)

General Program Schedule

Eve		Sunday October 22 nd , 2023	
Registration fees (13h00) (Souf Hotel – El Oued, Algeria)			
First Day		Monday October 23 rd , 2023	
Registration fees (08h00) (Central Library - University of El Oued)			
09.00 – 09.30		Opening Ceremony	
09.00 – 09.45	Plenary 1 Pr. Martina Zelenáková " Climate change causes, impacts and possible solutions (Climate change impacts on EU countries) "	President(s)	Pr. AbdElnaby Kabeel
			Pr. Zied Driss
09.45 – 10.30	Plenary 2 Pr. Hany Farhat Abd-Elhamid " Climate change causes, impacts and possible solutions (Climate change impacts and possible solutions in the MENA region) "	President(s)	Pr. AbdElnaby Kabeel
			Pr. Zied Driss
10.30 – 11.15	Plenary 3 Pr. Lassaad El Mir " Nanoscaled materials for innovative applications "	President(s)	Pr. Boubaker Benhaoua
			Pr. Fayçal Chemam
11.15 – 11.45	Poster Session + Coffee Break	President(s)	Pr. Yamina Benkrima
			Pr. Dilmi Samia

11.45 – 12.45	Oral Session	President(s)	Mat.	Pr. Mohammed Sadok Mahboub Dr. Mourad Mimouni
			Env/Enc	Pr. Fethi Bouras Pr. Ridha Ennetta
			Math-Phy	Pr. Abdelmalek Boumali Pr. Mosbah Difallah
13.00 – 14.00	Lunch			
15.00	Excursion			
Second Day		Tuesday October 24 th , 2023		
Registration fees (08h00) (Central Library - University of El Oued)				
09.00 – 09.45	Plenary 4 Pr. Müslüm Arici " Role of phase change materials in energy consumption reduction of buildings "	President(s)	Pr. Zied Driss	
			Pr. Farhat Rehouma	
09.45 – 10.30	Plenary 5 Pr. Mosbah Zidani " The technological and scientific interest in the advanced characterization of industrial and innovative materials "	President(s)	Pr. Ridha Ennetta	
			Pr. Abdelmalek Boumali	
10.00 – 10.30	Poster Session + Coffee Break	President(s)	Pr. Zoubir Aoulmi	
			Pr. Belhi Guerira	
10.30 – 11.30	Oral Session	President(s)	Mat.	Pr. Soria Zeroual Dr. Belkhir Tioua
			Env/Enc	Pr. Nourredine Belghar Pr. Abdelmalek Atia
12.00 – 12.30	Closing Ceremony			
13.00 – 14.00	Lunch			

Plenary Speakers & Subjects

Plenary	Speaker	Subject
Plenary 1	Pr. Martina Zelenáková (Technical University of Košice, Slovakia)	Climate change causes, impacts and possible solutions (Climate change impacts on EU countries)
Plenary 2	Pr. Hany Farhat Abd-Elhamid (Technical University of Košice, Slovakia)	Climate change causes, impacts and possible solutions (Climate change impacts and possible solutions in the MENA region)
Plenary 3	Pr. Lassaad El Mir (Faculty of Sciences, Gabes University, Tunisia)	Nanoscaled materials for innovative applications
Plenary 4	Pr. Müslüm Arıcı (Engineering Faculty, Kocaeli University, Turkey)	Role of phase change materials in energy consumption reduction of buildings
Plenary 5	Pr. Mosbah Zidani (Faculty of Technology, University Batna 2, Algeria)	The technological and scientific interest in the advanced characterization of industrial and innovative materials



PROCESS OF PARTICIPATION



People's Democratic Republic of Algeria
Ministry of Higher Education & Scientific Research
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Faculty of Exact Sciences
Department of Physics



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Process of participation

First Day

Materials				Math & physics	
Mat-O-01	Mat-P-01	Mat-P-28	Mat-P-57	MPh-O-01	MPh-P-01
Mat-O-04	Mat-P-02	Mat-P-29	Mat-P-58	MPh-O-02	MPh-P-02
Mat-O-05	Mat-P-03	Mat-P-30	Mat-P-60	MPh-O-03	MPh-P-03
Mat-O-06	Mat-P-04	Mat-P-32	Mat-P-61	MPh-O-05	MPh-P-04
Mat-O-08	Mat-P-05	Mat-P-33	Mat-P-62	MPh-O-06	MPh-P-05
Mat-O-11	Mat-P-06	Mat-P-34	Mat-P-63	MPh-O-07	MPh-P-06
Mat-O-12	Mat-P-07	Mat-P-35	Mat-P-64	MPh-O-08	MPh-P-09
Mat-O-13	Mat-P-09	Mat-P-36		MPh-O-09	MPh-P-11
	Mat-P-10	Mat-P-37		MPh-O-10	MPh-P-12
	Mat-P-11	Mat-P-38		MPh-O-11	MPh-P-13
	Mat-P-12	Mat-P-39		MPh-O-12	MPh-P-15
	Mat-P-14	Mat-P-40		MPh-O-13	MPh-P-16
	Mat-P-16	Mat-P-42		MPh-O-14	
	Mat-P-18	Mat-P-44			
	Mat-p-20	Mat-P-45			
	Mat-P-21	Mat-P-47			
	Mat-P-22	Mat-P-48			
	Mat-P-24	Mat-P-50			
	Mat-P-25	Mat-P-52			
	Mat-P-27	Mat-P-56			

First Day

Environment			Energy		
Env-O-01	Env-P-01	Env-P-27	Ene-O-02	Ene-P-04	Ene-P-26
Env-O-02	Env-P-02	Env-P-30	Ene-O-03	Ene-P-05	Ene-P-27
Env-O-05	Env-P-03	Env-P-31	Ene-O-04	Ene-P-06	Ene-P-28
Env-O-06	Env-P-05		Ene-O-05	Ene-P-07	Ene-P-29
Env-O-07	Env-P-06		Ene-O-06	Ene-P-09	Ene-P-30
Env-O-08	Env-P-07		Ene-O-07	Ene-P-10	Ene-P-31
Env-O-09	Env-P-08		Ene-O-08	Ene-P-11	Ene-P-32
Env-O-11	Env-P-10		Ene-O-09	Ene-P-12	Ene-P-33
	Env-P-12		Ene-O-10	Ene-P-13	Ene-P-34
	Env-P-13		Ene-O-11	Ene-P-14	Ene-P-36
	Env-P-14		Ene-O-12	Ene-P-15	Ene-P-37
	Env-P-15		Ene-O-13	Ene-P-16	Ene-P-39
	Env-P-16		Ene-O-14	Ene-P-17	Ene-P-42
	Env-P-17		Ene-O-15	Ene-P-18	Ene-P-44
	Env-P-18		Ene-O-16	Ene-P-19	Ene-P-45
	Env-P-19			Ene-P-20	
	Env-P-20			Ene-P-21	
	Env-P-22			Ene-P-22	
	Env-P-25			Ene-P-23	
	Env-P-26			Ene-P-24	



Second Day

Materials			
Mat-O-14	Mat-P-67	Mat-P-95	Mat-P-128
Mat-O-15	Mat-P-68	Mat-P-96	Mat-P-129
Mat-O-16	Mat-P-69	Mat-P-101	Mat-P-132
Mat-O-17	Mat-P-73	Mat-P-102	Mat-P-134
Mat-O-18	Mat-P-75	Mat-P-103	Mat-P-135
Mat-O-21	Mat-P-76	Mat-P-106	Mat-P-136
Mat-O-23	Mat-P-77	Mat-P-107	Mat-P-137
Mat-O-24	Mat-P-78	Mat-P-108	Mat-P-138
Mat-O-25	Mat-P-79	Mat-P-110	Mat-P-139
Mat-O-26	Mat-P-81	Mat-P-111	Mat-P-140
	Mat-P-82	Mat-P-112	Mat-P-141
	Mat-P-83	Mat-P-113	Mat-P-142
	Mat-P-84	Mat-P-114	Mat-P-143
	Mat-P-85	Mat-P-115	Mat-P-144
	Mat-P-88	Mat-P-117	Mat-P-145
	Mat-P-91	Mat-P-120	
	Mat-P-92	Mat-P-123	
	Mat-P-94	Mat-P-126	

Second Day

Environment			Energy		
Env-O-11	Env-P-33	Env-P-66	Ene-O-17	Ene-P-46	Ene-P-70
Env-O-19	Env-P-34	Env-P-67	Ene-O-18	Ene-P-47	Ene-P-71
Env-O-20	Env-P-35	Env-P-68	Ene-O-19	Ene-P-48	Ene-P-73
Env-O-21	Env-P-38	Env-P-69	Ene-O-20	Ene-P-50	Ene-P-74
Env-O-23	Env-P-40	Env-P-70	Ene-O-21	Ene-P-51	Ene-P-75
	Env-P-41	Env-P-71	Ene-O-23	Ene-P-53	Ene-P-76
	Env-P-42		Ene-O-25	Ene-P-56	Ene-P-77
	Env-P-43		Ene-O-26	Ene-P-57	Ene-P-78
	Env-P-44		Ene-O-27	Ene-P-58	Ene-P-79
	Env-P-45		Ene-O-28	Ene-P-59	Ene-P-80
	Env-P-48		Ene-O-29	Ene-P-60	Ene-P-81
	Env-P-49		Ene-O-30	Ene-P-61	Ene-P-82
	Env-P-51		Ene-O-31	Ene-P-62	Ene-P-83
	Env-P-52		Ene-O-32	Ene-P-63	Ene-P-86
	Env-P-53		Ene-O-33	Ene-P-64	Ene-P-87
	Env-P-54			Ene-P-65	Ene-P-88
	Env-P-58			Ene-P-66	Ene-P-89
	Env-P-59			Ene-P-67	Ene-P-90
	Env-P-63			Ene-P-68	Ene-P-91
	Env-P-65			Ene-P-69	



GLOBAL PARTICIPATIONS



GLOBAL PARTICIPATIONS LISTING

ID	Participant	Title
Ene-O-02	Louki Hichem	A microgrid energy management system based on PV panel batteries and supercapacitors
Ene-O-03	Yousra Bouteria	A Parametric Analysis of Thermal Performance of An Earth- Air Heat Exchanger and The Surrounding Soil Over Time
Ene-O-04	Mourad Guediri	Active and Reactive Power Control PI- Fuzzy regulators of speed Control of DFIG for supply of power to the electrical grid
Ene-O-05	Faiza Brahimi	Analyse de l'amélioration des performances énergétiques des moteurs à combustion interne par intégration du cycle de Brayton inversé pour la récupération des gaz d'échappement
Ene-O-06	Fatih Bouzeffour	Artificial Neural Network Analysis of Rotary Desiccant Wheel System
Ene-O-07	Beldjani Charafeddine	CFD simulation on the performance of Hybrid Photovoltaic Thermal system (PV/T) using hybrid nanofluids.
Ene-O-08	Fillali Romaissa	Comparative analysis of thermal performance of date palm concrete and traditional building materials
Ene-O-09	Mourad Guediri	Control of a wind system by adaptive fuzzy logic based on DFIG
Ene-O-10	Abdelhak Keddouda	Data-Driven Models for Power Output Prediction of Photovoltaic Modules: Machine Learning Algorithms' Evaluation and Comparison
Ene-O-11	Meziani Samir	Laser Processing in Solar cells manufacturing
Ene-O-12	Mohammed El Hadi Attia	Enhancing the productivity of solar distillers using porous materials
Ene-O-13	Hachelef Hakima	Evaluation of the effect of metal oxides on the ballistic properties of an energetic material by Explo-5 Software
Ene-O-15	Hafsa Benmakhlouf	Minimum Reactive Power For Isolated Bidirectional DC-DC Converter using Novel control
Ene-O-16	Mohandi Samy	Modeling and numerical simulation of supercritical CO ₂ flow in a centrifugal compressor
Ene-O-17	Mohammed Benkhedda	Numerical analysis of heat transfer and laminar flow behavior of hybrid nanofluids in a uniformly heated horizontal tube
Ene-O-18	Boukaraoun Racha	Numerical Analysis of the Efficacy of Turbulence Models in Predicting Aerodynamic Performance of Asymmetric Profiles
Ene-O-19	Lehmil Sabrina	Numerical simulation of the optimal position of a thin layer based on PCM within the building.
Ene-O-20	Abderahmane Mehallou	Optimal energy management and sizing of renewable energy and battery systems in residential sectors via a stochastic MILP model
Ene-O-21	Khaled Fettah	Optimal Location and Size of Photovoltaic and Wind in Distribution Network Considering Uncertainties
Ene-O-23	Ahmed A. Kabeel	Review of Energy Harvesting System based on transparent microstrip patch antenna combined with solar cell system
Ene-O-25	Hadjar Bechka	Thermal performance of date palm concrete and PCM
Ene-O-26	Hamza Rihab	The impact of fuel mixture composition on NO _x emissions in a Non-premixed LPG-Syngas Sydney Bluff Body Burner flame
Ene-O-27	Assia Benkherrou	Valorisation énergétique du biogaz du CET de Batna pour l'incinération des déchets spéciaux
Ene-O-28	Abdelkrim Khelifa	Enhancement of heat transfer in hybrid photovoltaic thermal solar collector with flax fibers as natural porous materials
Ene-O-29	Mohammed Aissa	The Impact of Free Stream Velocity on Pressure Coefficients and Air velocity in the Greenhouse Environment



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Ene-O-30	Shahjahan Murshitha	Thermal management of solar panel using activated nano carbon fabric material: Experimental Study
Ene-O-31	A. Muthu Manokar	An experimental study of air-cooled MONO perc solar panel equipped with activated carbon pellet fins: performance and environmental analysis
Ene-O-32	Aruldoss Wesley Jeevadason	Experimental investigation on the performance enhancement of Twin Wedge Solar Still using PV-powered Induction heating system
Ene-O-33	Emmanuel Agbo Tei	An experimental investigation on the effects of water depth on the thermal efficiency, exergy efficiency, and exergy losses of solar still with and without silicon carbide
Ene-P-04	Ayache Boultif	Application of stochastic and deterministic algorithms for interaction parameters estimation in the liquid-liquid equilibrium modeling of ternary systems 1-Butanol (1), 3-methyl, 1, 3- butane diol (2), Water (3) at 348k and 293k.
Ene-P-05	Kaddouri Nawal	Biomass Valorisation and Recycling for Bioenergy Production via an Eco-friendly Technique
Ene-P-06	Khelaifa Khaoula	CFD Investigation of Cooling Plate Channels and Nanofluid Coolant Effects on Thermal Performance of PEM Fuel Cell
Ene-P-07	Bouaziz Imadeddine	CFD SIMULATION OF THE FLOW AIR PERFORMANCE OF AN HUMIDIFICATION SYSTEM USED IN A POULTRY HOUSE
Ene-P-08	Abdelouahab Benseddik	Comparative Study of Solar Drying Processes for Beetroot in Semi-Arid Regions: Experimental Kinetics and Modeling
Ene-P-09	Noureddine Cherrad	Correlated numerical model to control the condensing temperature of refrigerant for solar adsorption refrigerator
Ene-P-10	Noureddine Cherrad	Developing a Comprehensive Heat and Mass Transfer Model to Enhance the Efficiency of an Activated Carbon-Methanol Adsorption Refrigeration System
Ene-P-11	Rachad Moumni	Electric vehicle battery explosion solutions
Ene-P-13	Fatma Zohra Tighilt	Flexible Counter electrode materials based on ITO/ Polypyrrole for dye-sensitized solar cells.
Ene-P-14	Badache Hacene	L ilot de chaleur urbain, enjeu à la fois écologique et sanitaire
Ene-P-15	Souheyla Gagui	Influence of alloying yttrium concentration on structural, mechanical, electronic, and optical properties of scandium nitride
Ene-P-16	Belhousse Samia	Influence of deposition parameters on PProDOT based CE efficiency for Dye sensitized solar cells
Ene-P-17	Mokhtaria Derkaoui	Integrated Hexagonal On-Chip Inductor in DC-DC Buck Converter for Photovoltaic Applications
Ene-P-18	Khadidja Allahoum	MADA Vector Control in Motor Mode
Ene-P-19	Mourad Guediri	Modeling and genetic algorithm control of a wind energy system based on double-fed asynchronous machine for supply of power to the electrical grid
Ene-P-21	Oudrane Abdellatif	Numerical Modelling of Heat Transfers for a Habitable Space in an Arid Zone
Ene-P-22	Abdallaoui Doua	Numerical simulation of perovskite solar cell
Ene-P-23	Ouzani Riadh	Numerical study of supersonic air intake flow in scramjet propulsion
Ene-P-24	Kamel Chadi	Numerical study of the impact of the shape and direction of ventilation of a heat sink on the cooling of an electronic chip
Ene-P-26	Ouzani Riadh	Stability analysis of Rayleigh-Bénard-Poiseuille flow in the presence of density inversion
Ene-P-27	Lamia Talbi	Study of the Catalytic Performance towards Carbon Dioxide Photoelectrochemical Conversion to Methanol by Doped PANI/Graphite Photocathode
Ene-P-28	Abdelkader Belilla	Studying the effect of using sponge pieces in a traditional solar still.
Ene-P-29	Amine Mefoued	Synthesis and Characterisation of Rare-earth (Nd) Thin Films Deposited on PECVD-designed Silicon Nanostructures for Photovoltaic Applications



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Ene-P-30	Kamel Chadi	The influence of the movement of a wall of a trapezoidal cavity containing an inlet and an outlet of the cooling of a hot source located inside the cavity in the presence of a nanofluid
Ene-P-31	Merazga Saloua	Thermal annealing Effect in the hydrothermal $\text{Li}_4\text{Ti}_5\text{O}_{12}$ (LTO) nano-particles grow used as Li-Ion Electrode
Ene-P-32	Habala Bendifallah	Two-Dimensional Materials for Hydrogen Storage: A Modern Approach
Ene-P-33	Assia Benkherrou	Conception et réalisation d'un incinérateur pour déchets spéciaux à biogaz et à l'échelle laboratoire
Ene-P-34	Houssam Eddine Djaballah	Numerical simulation of combustion in compression ignition engine fueled with diesel only and diesel with biogas
Ene-P-37	M. A. Hadj Ammar	Experimental Study on Novel Design of Solar Dryer with Forced Airflow in Sahara Algeria Climate
Ene-P-39	Bakhaled Nassima	Numerical Study of an adsorption refrigeration system
Ene-P-42	Azzedine Nahoui	Experimental study of a greenhouse solar dryer
Ene-P-44	Bouguergour Yassine	ETUDE EXPERIMENTALE DES PERFORMANCES ENERGETIQUES D'UN SYSTEME SOLAIRE THERMIQUE DE PRODUCTION D'EAU CHAUDE A USAGE SANITAIRE
Ene-P-45	Nadir Benalia	Analysis Study Design for Wireless Charging of Electric vehicle.
Ene-P-46	Goucem Mahdi	INFLUENCE OF THE AMBIENT TEMPERATURE ON THE EFFICIENCY OF GAS TURBINES
Ene-P-47	Laissaoui Mohammed	Optimization of solar CSP plant for algerian climate
Ene-P-48	Yassmin Touhami	A CFD computation of a simple pass solar air heater
Ene-P-50	Abdallah Bouchaala	Amélioration des Performances de Séchoirs Solaires Indirects par l'Intégration de Chicane: Une Étude Expérimentale avec la Menthe
Ene-P-51	Zarrit Rida	Aspect Ratio Effects on Two-dimensional Laminar Rayleigh-Bénard-Convection within Rectangular Enclosures
Ene-P-53	Zenkhri Djamel Eddine	Calculation of inelastic cross section in hot plasma properties
Ene-P-57	Mouna Rekaik	Élaboration et caractérisation des matériaux Pr_2NiO_4 et $\text{Pr}_{1.95}\text{Sr}_{0.05}\text{Ni}_{0.95}\text{Co}_{0.05}\text{O}_4$ comme cathode de pile alcalin.
Ene-P-56	Haddad Zakaria	DUNCLE model evaluation for a conventional solar still made in Algeria
Ene-P-58	Fayçal Mehedi	Enhanced control of multiphase permanent magnet synchronous motor drive using an adaptive neuro-fuzzy controller
Ene-P-59	Moussa Attia	Enhancing Energy Efficiency in Earth Air Heat Exchangers using Grasshopper Optimization
Ene-P-60	Dadda Bachir	Heat transfer enhancement in a metal hydride reactor
Ene-P-61	CHADOULI Rachid	How to improve heat transfer between two solids in rough contact numerical study
Ene-P-62	Sofiane Kherrou	The effect of the integration of porous ribs on thermal- hydrodynamic performance of a solar air heater
Ene-P-63	Mohammed Lamine Ouassa	The enhancement of energy quality is being studied using the shunt compensation system SVC
Ene-P-64	Mohammed Lamine Ouassa	The TCSC series compensation system's technical and financial effects on the energy system
Ene-P-65	Abdelaziz Begag	The thermo-hydraulic characterization of a mini heat exchanger equipped with corrugated walls
Ene-P-66	Zenkhri Djamel Eddine	The use of machine learning for the prediction of plasma properties
Ene-P-67	Messaoud Zelaci	Thin-layer mathematical modeling of tomato slices in new solar greenhouse dryer under semi-arid climate



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Ene-P-68	Fadila Djouadi Belkada	Development and Characterization of a Bio-adsorbent for the Reduction of Organic Matter from Photovoltaic Industries Discharges
Ene-P-69	Mansouri Zineb	Smart Irrigation Foggara System
Ene-P-70	Ketfi Omar	Using MAX Phases Materials in Heat Transfer Applications
Ene-P-71	Elbar Chaima Yasmine	Sliding Mode Control and PI Controller for Wind Power Generation Systems with PMSG
Ene-P-73	Mourad Guediri	Control of a wind system by adaptive fuzzy logic based on DFIG
Ene-P-74	Ketata Ahmed	Numerical and experimental analyses of solar still productivity and exergy under Sfax climate conditions
Ene-P-76	Fetita Hanane Fatima Zohra	Multiple reflections of laser beam during welding
Ene-P-78	Chafiaa Yaddaden	New Materials Based Poursous Silicon Nanowires for Lithium Ion Battery Anode
Ene-P-77	Ketata Ahmed	Start of injection effect on performance and emissions of combustion engines fed with diesel-waste oil biodiesel blend
Ene-P-79	Benfadel Karima	Electrochemical stability of carbon/Cu ₂ S based photocathode used for CO ₂ reduction
Ene-P-80	Mehida Hicham	Intelligent controller of non-isolated interleaved DC/DC converter for Fuel Cell applications
Ene-P-81	Labdelli Boutaleb	Investigation of Surface Passivation Layers (SiO ₂) for n-type Mono-Crystalline Silicon
Ene-P-83	Mohammed Abdelbassit Kherrafi	Modeling and drying kinetics of eucalyptus leaves under a forced convection direct solar dryer
Ene-P-86	Fayçal Mehedi	Neuro-second order sliding mode control of a five-phase induction motor drive supplied by a three-level five-phase inverter
Ene-P-87	Hossam Eddine BECHA	Numerical investigation of how hole number affects natural frequencies of woven composite planar beams
Ene-P-88	BELLABAC Anouar	Allocation an independent photovoltaic station and determining its dimensions to supply a school in the state of El Oued
Ene-P-89	Abderrahim Lanani	Influence of N ₂ content on the mechanical properties of CrZrN film
Ene-P-90	Nacima Oubouzid	Enhancing the Performance of Smart Metering Systems
Ene-P-91	Nadia ANNANE	Analytical study of energy storage by the integration of PCM in old and new buildings and new buildings
Env-O-02	Sami Melik	Architectural Innovations for Clean Air: Integrating Air Pollution Treatment Technologies into Building Design
Env-O-05	Salah Eddine Khetta	Le Ghout de Souf face au modernes agricultures
Env-O-06	Oulhaci Dalila	Contribution og a Sand filtrer ton doil and water conservation
Env-O-08	Amara Nail	Efficient Phosphorus Removal from Water Using Modified Biochar: Investigating Adsorption Performance and Temperature Effects
Env-O-11	Sami Melik	Green Building Certifications and Wastewater Management: A Comprehensive Analysis
Env-O-14	Fateh Afoufou	NOUVELLES VISIONS SUR L'UTILISATION DE KMnO ₄ EN PREOXYDATION POUR L'OPTIMISATION DU PROCEDE OXYDATION/FLOCCULATION ET LA REDUCTION DE LA FORMATION DES (THM) DANS LES EAUX POTABLES.
Env-O-19	Bouhentala Bigeud	The impact of fuel mixture composition on the structure of C ₃ H ₈ / Syngas diffusion flame and its CO/CO ₂ emissions
Env-O-20	Gheraissa Nadjet	Thermo-Chemical Properties of Alternative Fuels in Internal Combustion.
Env-O-21	Larbi Haddad	Studying the effect of treating water contaminated with methylene blue dye using Deglet Nour date pits as a low-cost material and applying the treated water to the germination of some plant species
Env-O-23	Hany F. Abd-Elhamid	Mitigation of global warming and climate change impacts on the evaporation losses from open lakes using FPV, A Case Study of Lake Réghaïa, Algeria



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Env-P-01	Benahmed Khadidja	A physiochemical and microbiological study to compare some drinking water from mobile reservoirs in Touggourt
Env-P-02	Souhaila Meneceur	Antimicrobial dégradation with high efficiency through biosynthesis of CN nanocomposites
Env-P-03	Mohamed Faouzi Lachheb	Avenir des Ghouts dans la vallée du Souf sous l'impact de la qualité des eaux souterraines à l'aide de l'intelligence artificielle
Env-P-05	Bouaziz Oualid	Élimination de bleu de méthylène de l'eau par l'échange ionique
Env-P-06	Raouia Lebibi	Enhancing Sustainable Wastewater Treatment with Muscovite Mineral Clay for Methylene Blue Removal: Optimization via Box-Behnken Design and a Novel AI-Guided Comparison of Conventional and Techno-Economic Methods
Env-P-07	Kherifi Wahida	Etude De L'évolution De La Qualité Des Eaux Usées De La STEP D'el-Kala Dans Différents Stades De Traitement (Nord-Est Algérien)
Env-P-10	Bounedjar Nourelhouda	Gravimetric Investigation of Zinc Oxide Nanoparticles as Effective Corrosion Inhibitors for XC70 Mild Steel in 1M HCl Acidic Environment
Env-P-12	Zaiter Abdallah	Le Traitement des effluents colorés
Env-P-13	Bellakehal Hizia	Mechanical performance of recycled aggregate concrete
Env-P-14	Djaber Sabah	Surface Chemistry, Texture, and Adsorption Properties of Activated Carbons Derived from Agricultural Waste for the Removal of the anionic dyes : an application study
Env-P-15	Latra Benkhira	Preparation and analysis of zinc oxide nanoparticles, and their application in the treatment of contaminated water
Env-P-16	Souhail Nesri	The Comparison of different mathematical methods for the estimation of BOD parameters of domestic wastewater at different pollution levels
Env-P-17	Akhrib Kenza	Treatment of Dye Textile by Calcined Layered Double Hydroxides in Aqueous Solution using solar irradiation
Env-P-18	Lounas Oualid	Treatment of polluting oil drilling waste, proposal of a green economy process , drill cuttings case
Env-P-19	Baghlad Faddia	Using the balconies for Improve Air Quality in the Symmetrical Built Environment
Env-p-25	Belahcene Samira	The bioplastic is the solution from the pollution of the environment by traditional plastic
Env-P-26	Abdessalam Laoufi	Impact of agricultural activity on the quality of groundwater in the Hennaya plain, Tlemcen (NW Algeria)
Env-P-27	Mohammed Ilias Boulifa	Effect of combustible material nature on the CO and CO ₂ emission in gasoline engines
Env-P-30	Nabila Djadi	Photodegradation of organic contaminants in aqueous solution by low-pressure ultraviolet irradiation: kinetic modeling
Env-P-31	Nesrine Lenchi	Biodegradation of Pollutants in wastewater by bacterial strains
Env-P-32	Chergui Yamina	RÉGLAGE DE TURBIDITÉ DES EAUX
Env-P-34	Hamli Benzahar Hamid	Analysis of the strain energy during the interaction crack/dislocation
Env-P-35	Ad Saliha	Vacuum diagram contributions reformulated for strongly correlated systems
Env-P-37	Ayache Boulouf	Study and modeling of interaction parameters in liquid-liquid equilibrium using genetic and threshold acceptance algorithms for the ternary system 1-Butanol (1), Acetic acid (2), Water (3) at 299.8 K.
Env-P-40	Djani Meriem	APPLICATION DE L'ÉLIMINATION DES MÉTAUX LOURDS (ZN (II), Pb (II) ET Cu (II)) DES EAUX USÉES DE LA RÉGION DE GHARDAIA PAR L'ARGILE BRUTE D'EL MENIA
Env-P-41	Akhrib Kenza	Applications of calcined sugar scum for dye removal from aqueous solutions: isotherm studies
Env-P-42	Later Faissal	Apport de méthode géophysique électrique à la détermination de l'origine des eaux souterraines de la nappe alluviale de Oued Biskra (Algérie)



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Env-P-43	Abdelmalek Drouiche	Assessment of groundwater quality through heavy metal contamination indices in Biskra, North-East Algeria
Env-P-44	Zine Ali	CONCEPTION ET REALISATION D'UN SECHOIR PASSIF ASSISTE PAR UN CAPTEUR SOLAIRE PLAN
Env-P-45	Naima Belmihoub	Decontamination of secondary effluents from the East WWTP of Tizi-Ouzou (Algeria) with the aqueous extract of the green pod of the carob tree
Env-P-48	Kouadri Sameut Moussa	Etude des paramètres physicochimiques des eaux souterraines de la région du Bas Chéiff « wilaya de Relizane » et leur influence sur le sol et la végétation
Env-P-49	Laiz Aya	Etudes des isothermes d'équilibre, de la cinétique et de la thermodynamique de l'adsorption du bleu de méthylène sur les déchets de biomasse (PT) en tant que biosorbant naturel à faible coût
Env-P-50	Tabet Amina	Green synthesis of metal oxide nanoparticles using Common Rue extract
Env-P-51	Khelkhal Amina	Suivi de la minéralisation et aptitude à l'irrigation des eaux de la nappe superficielle de la plaine de Chemora wilaya de Batna Nord Est Algeria
Env-P-52	Cherfi Inasse	Terpenoids from the Genus Artemisia as Potential Pesticides
Env-P-53	Adel Khiouani	Treatment of water polluted by methylene blue using the method of adsorption by activated carbon prepared from the nucleus of the Peach
Env-P-54	Amar Mezidi	Comparative study of experimental mixture design methods and artificial neural networks for the workability of self-compacting concrete
Env-P-58	Benzaidi Orkia	Removal anionic dye, acid orange 7 from aqueous solutions by adsorbant based from Wood waste
Env-P-59	Zahra Bentaleb	Preparation of Biofuel by Hydrothermal Carbonization of Agricultural Wastes.
Env-P-63	Hecini Lynda	Removal Of 4-Nitrophenol From Aqueous Solution By Electrocoagulation
Env-P-65	Lamya Bouziane	Adsorption mechanism of heavy metals and nitrate on prepared biochar and activated carbons
Env-P-66	Mohammed Seffari	Remediation of Emerging Pollutants from Water Using Natural Mineral Clay: Physicochemical Characterization and preliminary Study
Env-P-67	Zahra Itim	Removal of Water Pollutants with Agricultural Waste: Analysis of Physical and Chemical Properties and initial Investigation
Env-P-68	Maroua Chenaker	Mitigation of Newly Identified Water Contaminants via Local Microalgae: Analyzing Physicochemical Traits and initial Examination
Env-P-69	Rabie Besserni	Synthesis of Chitosan-EDTA /Clay/ Sodium Hexametaphosphate Composite for Adsorption of Remazol Brilliant Orange Dye
Env-P-70	Zarah ALQARNI	Green synthesis of NiO nanoparticles: Characterization and application
Env-P-71	Bachir Gherbi	Green Synthesis of ZnO Nanoparticles: Effect of pH on Optical and Morphological Properties, and Photocatalytic Activity
Mat-O-01	Benguelil Amina	A New Experimental Protocol applied on three point bending tests [concrete behavior characterization using steel contours]
Mat-O-04	Yazid Goutal	Analysis of Transient Time-of-Flight Photo-Currents in Amorphous Semiconductors in the presence of a Linear Field
Mat-O-05	Bounab Sabrina	Comparative first-principles calculations of structural, electronic and elastic properties of LiCdP Half Heusler alloy and GaSb III-V semiconductor
Mat-O-06	Logbi Abdelaziz	Contribution à l'élaboration d'un sable normalisé à partir du sable alluvionnaire local
Mat-O-12	Moussa Aidi	Enhancing building energy efficiency by incorporating phase change materials and nanoparticle
Mat-O-13	Toufik Kheffache	Etude de la variation des résistances à la rupture des grains dans les matériaux granulaires cas de la rupture fragile.
Mat-O-14	Mohammed Riad Kired	Finite element method study of the homogenization of nano-composites
Mat-O-15	Hammiche Mohamed Sief	Influence of Aluminum on Chromium Nitride Films
Mat-O-16	Rouiha Zohra	Photocatalytic degradation of carcinogenic Congo red dye by nanoparticles



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Mat-O-17	Boudjemaa Bouaouina	Structural and Optical Features of Nitrogen Plasma Treatment on TiO ₂ Thin Films for Photocatalytic Application
Mat-O-18	Dehimi Nour El-Houda	Structural, elastic, electronic and magnetic properties of novel Fe-based full Heusler alloys for spintronic applications.
Mat-O-21	Taguida Nesrine	The optical properties of CdSnP ₂ chalcopyrite
Mat-O-23	Bouzeroura Mansour	Potential of replacing clay soil with industrial by-product materials (CKD) in enhancing the properties of compressed earth blocks (CEBs)
Mat-O-24	Beggas Azzeddine	Glasses doped with rare earth ions
Mat-O-25	Z. BECER	Characterization of Nickel Oxide Films Enhanced with Silver doping: Optical and Structural Analysis
Mat-O-26	Askri Souhaila	Numerical study of argon spectra generated induced by LIBS technique
Mat-P-01	Hamidane Nesrine	Ab Initio Full-Potential Study of the Structural, Electronic, and thermodynamic Properties of the Cubic YS ₁ -xSex Ternary Alloys
Mat-P-02	Houssem Soltani	An Investigation into Hardening Parameters and Anisotropy Effects on Mechanical Behavior of AA2024 Aluminum Alloy and Ferritic Stainless Steel DIN-St14.
Mat-P-03	Rouiha Zohra	An investigation on the bandgap energy and particle size for biosynthetic nanoparticles
Mat-P-04	Mohamed Mokhnache	Antimicrobial activity of silver nanoparticles (AgNPs) green synthesized using a pigment of Actinobacteria isolated from bee pollen
Mat-P-05	Benhabib Bensalah	Boron and nitrogen effects of diffusion on microstructure in a low-alloyed steel
Mat-P-06	Imene Abid	Caracterisation of Cupric Oxide (CuO) thin Films obtained by Electrodeposition
Mat-P-07	Tarek Zeribi	Ceramic waste: a resource for sustainable and ecological construction
Mat-P-09	Ahmed Benmoussa	Concrete Integrity Assessment using Acoustic Emission Techniques and Machine Learning
Mat-P-10	Djamel Amari	Consequences of thermal aging of low alloy steel used in mechanical construction on resilience, hardness and corrosion
Mat-P-11	Rahmouni Khaoula	Corrosion resistance of Zr thin films deposited by GLAD PVD for biomedical application.
Mat-P-12	Abderrahmane Sahraoui	Digmat modeling of sandwiches with core honeycomb forms reinforced by woven date palm fibers in Gypsum layers with different weights and varied orientations
Mat-P-14	Sara Fares	Effect of Carbon content on microstructure and properties of Cr/XC100 system
Mat-P-16	Rahmouni Khaoula	Effects of PVD glancing angle: Comparison of TaN and ZrN thin films.
Mat-P-18	Taoufik Dib	Ellipsometric study on electrical properties of AZO thin films deposited by DC reactive sputtering in oxygen concentration
Mat-P-20	Mohammed Riad Kired	Experimental study of cracked orthotropic materials
Mat-P-21	Ouafa Hamidane	First Principal Calculations of Structural, Electronic and Magnetic Properties of Ca _{0.75} Fe _{0.25} S Compounds Using GGA and mbj-GGA: FP-LAPW Calculations
Mat-P-22	Khedidja BENAMEUR	First principles study on half-metallic properties of Heusler compounds RhCoSb
Mat-P-24	Abir Ben Aissa	Harnessing the Potential of Schiff Bases for Corrosion Control
Mat-P-27	Oussama Smaal	Impact de l'ajout poudre carbonate calcium sur les propriétés mécaniques du matériau biocomposite (fibres de palmier-dattier/époxy)
Mat-P-28	Bedadi Laid	Influence des différents milieux agressive sur le béton de sable à base de sable d'oued Rtem
Mat-P-29	Esam Saleh	Investigating the interrelation of fluidization parameters concerning both spherical and non-spherical solid particles within a cylindrical fluidized bed through the utilization of artificial intelligence methodologies.



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Mat-P-30	Ouarda Ben Ali	LaFeO ₃ , a competitive material for wastewater treatment
Mat-P-32	Abdelhafid Boukellouda	Modélisation statistique de la variabilité de la résistance à la compression
Mat-P-33	Rabhi Chaima	Monomer Effect on the structural properties of the Bi-2223 superconducting phase using photo-polymerization based method
Mat-P-34	Zeradni Amina	New nanomaterials preparation
Mat-P-35	Ahmed Yassine Boukounacha	Particle Shape Effect on the Thermal Conductivity of Transformer Oil-Based Nanofluids: Modeling Using COMSOL Multiphysics Software
Mat-P-36	Assia Boukezzata	Photoelectrochemical conversion of CO ₂ with a-SiC nanowires photoelectrode
Mat-P-37	Brik Afaf	Photoluminescence of silicon nitride co-doped with erbium and ytterbium
Mat-P-38	Ali Benamer	Physical properties of ternary anti-perovskites ScBX ₃ , (X=Rh, Pd)
Mat-P-39	Belouadah Rabah	Polarization and Strain phenomena in uni-axially stretched beta-form Polyvinylidene fluoride at low frequency electric field: experiments and modeling
Mat-P-40	Sehili Ammar	Simulation and Analysis of Lead-Free Hybrid High-Performance Perovskite Solar Cell CH ₃ NH ₃ SnI ₃ with different ETM Using SCAPS-1D
Mat-P-42	Kerbiche Hind	structural,elastic and electric properties of Na ₃ BrO
Mat-P-44	Kamel Mokeddem	Study by spectroscopic ellipsometry of the optical properties of hydrogenated amorphous silicon nitride deposited by DC magnetron sputtering
Mat-P-45	Abdellatif Laib	Study of the optical properties of Li-doped NiO
Mat-P-47	Naama Sabrina	Synthesis and characterization of ZnCo ₂ O ₄ spinel-modified silicon nanowires
Mat-P-48	Oulad Saad Sofiane	The effects of boriding thermochemical treatments on the microstructure and high temperature oxidation resistance of XC38 steel
Mat-P-50	Guenfoud Mohammed	Thermal Conductivity and Lattice Dynamics of Thermoelectric Oxychalcogenide BiCuTeO
Mat-P-52	Lalmi Rahmani	Utilization of Algerian Desert Plant Species for the Development of High-Quality Composite Materials
Mat-P-56	Belaid Fayçal	Waste Foundry Sand as a Sustainable Alternative to Natural Sand in Concrete Production
Mat-P-57	Mekahlia Mahira	Ab-initio calculations of the distribution of charge density of t-Se and t-Se(D).
Mat-P-58	Mekahlia Mahira	Ab-initio calculations of the optical properties of the t-Se _{1-x} Te _x system for x = 0.03, 0.04 and 0.08.
Mat-P-60	Lamaa Aouissi	The effect of Mn concentration on Zn-Ni-Mn coating nucleation and corrosion behavior
Mat-P-61	Maache Ahmed	Elaboration of Co-Fe powders by a new chemical process
Mat-P-62	Guenfoud Mohammed	First-principles studies of the structural, elastic, phonon, and thermodynamic properties of nonlinear chalcogenide LiGaTe ₂ under pressure
Mat-P-63	Sana Mihi	Luminescence features of Pr ³⁺ doped Sb ₂ O ₃ -M ₂ O-WO ₃ (M=Na and Li) glasses for photonic applications
Mat-P-64	Trad Meriem	Modeling 2DEG Density and Capacitances in AlGa _N /Ga _N HEMTs: A Physical Simulation Study
Mat-P-67	Mouna Rekaik	Revêtements composites Nickel-Alumine sur substrat d'acier
Mat-P-68	Tioua Tahar	Effects of water immersion on the fatigue endurance limit of glass/polyester
Mat-P-69	Mohammed Iliasse Boulifa	Alloying elements contribution to the improvement of the mechanical properties and wear resistance of spheroidal graphite cast iron
Mat-P-73	Smahat Amine	Numerical simulation of impact in functional gradient materials: A finite element analysis
Mat-P-76	Riad Babba	Béton confiné par polymère renforcé de fibres de carbone : Fiabilité des modèles contrainte-déformation



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Mat-P-77	Sidi Mohamed Benhamou	Calculation and Analysis of the Percolation Threshold in Polymer Nanocomposites with Graphite Nanoplatelets
Mat-P-79	Baira Fayçal	Comparative study of the properties of iron and cobalt catalyst cluster
Mat-P-81	Merzougui Amina	COMSOL simulation of interface states in MOS (Metal-Oxide Semiconductor) structures
Mat-P-82	Haroune Benmalek	Crack Investigation In Functionally Graded Materials
Mat-P-83	Mohamed Salah Halati	First principle study of structural, bonding, elastic and isotropy of $AEIn_2As_2$ (AE: Sr and Ca)
Mat-P-85	Ghani Rihia	Effect Of A-Site Gd^{3+} Substitution On Structural And Optical Properties Of $La_{0.8}(Ca_{1-x}Gd_x)_{0.2}MnO_3$ Manganites
Mat-P-87	Merabti Salem	EFFECT OF CONCRETE CLASS, MAXIMUM AGGREGATE SIZE AND SPECIMEN SIZE ON THE COMPRESSIVE STRENGTH OF CORES AND CAST SPECIMENS
Mat-P-88	Hamda Malek	Effect of date palm and Polypropylene fiber in High-Performance Concrete
Mat-P-91	Mohammed Farouk Benatallah	Effect of Sn doping on the structural and optical properties of NiO thin films
Mat-P-92	Oussama Djema	Effects of solution deposition and heat treatments on the Nickel Silicides (NiSi) phase formation in the electrodeposited Nickel (Ni) seed layer for copper solar cell contacts
Mat-P-94	Kenza Ghanem	Study of the Influence of Welding Parameters on the Microstructure and Mechanical Behavior of Steel-Steel Assemblies Obtained by Arc Welding
Mat-P-95	Zakaria Adjou	Experimental investigation of water bypass phenomenon in light oil reservoirs using a glass micromodel and sand cores with a hydrophobic material
Mat-P-96	Hamza Chetioui	Exploring the structural and optical properties of Mg-doped zinc oxide thin films
Mat-P-101	Nedjouda Benchiheb	Influence of Deep levels defects and Auger Recombination on the Silicon Solar Cells' Performances
Mat-P-102	Tahar Zerig	Influence of Dune Sand on the Physico-mechanical Behavior of Eco-mortar after Curing
Mat-P-103	Hadjab Slimane	Synthèse des nanoparticules de SnO_2 par co-précipitation
Mat-P-107	Lamya Bouziane	Synthesis and characterization of char and activated carbons from Jujube tree
Mat-P-110	Abdi Nama	THE EFFET OF SERIES RESISTANCE IN THE MOS STRUCTURES
Mat-P-111	Bekhedda Kheira	The Structural Characteristics Study of Evaporation-Deposited Cerium-Doped Silicon-Rich Nitride
Mat-P-112	Mostefa Hani	The usability of artificial ground freezing (AGF) as a new soil improvement technique in Algeria. Case study: Djebel El-Ouahch tunnel (east-west highway)
Mat-P-113	Riad Babba	Utilisation de matériau polymère renforcé de fibres de carbone dans le confinement spiral du béton
Mat-P-114	Sabrina Sam	Functionalized Cu_2O nanoparticles as hole transport layer for perovskite solar cells
Mat-P-115	Berouaken Malika	$Zn_{0.33}V_2O_5$ nanocomposite materials as cathode for lithium-ion batteries
Mat-P-123	Fatiha Traka	Enhanced finite element for linear analysis of two dimensional thermoelasticity problems
Mat-P-126	Kheira Guira	Study of the structural and electrical properties of the new ceramic system
Mat-P-128	Samah Adjmi	Microstructural Characterization of dental amalgam
Mat-P-129	Ahlam Hacine Gharbi	Removal of Methylene Blue and Rose Bengal Dyes from Water Using $ZnO-SiO_2$ Composite.
Mat-P-132	Alioua Nacereddine	Modeling and simulation of the nonlinear behavior of fiber concrete plane structures
Mat-P-135	Mammadi Nardjess	Synthesis, characterization, antimicrobial activity and BSA interaction of functionalized graphene oxide nanoparticles with N-ferrocenylmethyl-N-phenylacetamide



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Mat-P-136	Sara Chetehouna	An eco-friendly synthesized selenium nanoparticle alleviates lipid metabolism disturbance induced by a high fructose diet in Albinos Wistar rats
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MPh-P-09	Chifa Gadi	Theory of Laser-Matter Interactions in the Strong-Field Regime
MPh-P-10	Moussa Abbad	A study of the motion of boson particles with interaction in the Global Monopole space time
MPh-P-11	Yousra Megdoud	Density functional theory investigation of physical properties of $\text{ScP}_{1-x}\text{As}_x$ ternary Alloys: optoelectronics Application



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MPh-P-12	Fatima Merdj	Analysis of Magneto-Hydrodynamic micromixer for the mixing of two electrolyte solutions
MPh-P-13	Benothmane Safia	Collision Operator for Isolated Ion Lines in Plasma: with Applications to the Quantum Effect in the Lyman-a Transition.
MPh-P-15	Naam Amel	Relativistic Quantum Contribution of Binary Ion-Electron Collisions in the Width of Isolated Lines: Lyman-a Case for Hydrogenic Ions in Plasma.
MPh-P-16	Issaad Mohamed	Modélisation de l'effet de potentiel de confinement sur les configurations les plus stables d'un plasma fortement couplé



ABSTRACTS



ID: Ene-O-02

A microgrid energy management system based on PV panel batteries and supercapacitors

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Abstract: Solar photovoltaic energy exhibits significant potential for electricity generation within the renewable resource sector. Due to the unpredictability of solar irradiation throughout the day, energy storage is required to ensure the autonomy of the PV system. The most prevalent type of energy storage device is a battery. Numerous researchers are currently investigating the potential advantages of hybridising electrical energy storage technologies, such as batteries and supercapacitors. This study examines a particular configuration of an autonomous photovoltaic (PV) system with hybrid energy storage, which includes batteries and supercapacitors. The investigation is conducted by simulating a miniature prototype and subsequently analysing the obtained results.

Keywords: PV panel; Maximum power point tracking MPPT; ANN fuzzy MPPT; Hybrid energy storage system; Batteries; Supercapacitors.



ID: Ene-O-03

A Parametric Analysis of Thermal Performance of An Earth- Air Heat Exchanger and The Surrounding Soil Over Time

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Abstract: Earth-air heat exchanger (EAHE) technology is considered one of the popular and effective solutions to improve thermal comfort inside buildings with the lowest possible energy consumption. This study aims to conduct a comprehensive and in-depth analysis of the various factors affecting the performance of EAHE systems, such as the ambient soil type, ambient weather conditions, and temporal factors. A semi-analytical numerical model was developed and validated through practical experimental reports. The effect of factors such as operating periods, air flow velocity, and soil conductivity on the performance of the heat exchanger and soil was studied. The results showed that the numerical model can provide results that are close to Significant reduction in experimental results with an error of only 2.3%. The performance of EAHE depends mainly on the low airflow velocity and high soil conductivity. In contrast, the operating time does not significantly affect the temperature of the air leaving the exchanger, increasing by 1°C Only within 48 hours compared to the first hour. Finally, the decrease in the temperature of the atmosphere surrounding the building plays an important role in improving the performance of the heat exchanger and contributes to cooling the soil after long periods of operation, which contributes to restoring its cooling capacity.

Keywords: Earth-air heat exchanger; Soil surrounding; Transient thermal performance; Continuous operation; Cooling.



ID: Ene-O-04

Active and Reactive Power Control PI- Fuzzy regulators of speed Control of DFIG for supply of power to the electrical

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Abstract: In this article we will focus on studying a system consisting of a wind turbine operating at a variable wind speed, and a two-feed asynchronous machine (DFIG) connected to the grid by the stator and fed by a transducer at the rotor side. The conductors are separately controlled for active and reactive power flow between the stator (DFIG) and the grid, which is achieved in this article using conventional PI and fuzzy logic. The proposed controllers generate reference voltages for the rotor to ensure that the active and reactive power reaches the required reference values, in order to ensure effective tracking of the optimum operating point and to obtain the maximum electrical power output. System modeling and simulation was examined with Matlab / Simulink. Dynamic analysis of the system is performed under variable wind speed. This analysis is based on active and reactive energy control. The results obtained show the advantages of the proposed intelligent control unit on the basis of fog systems.

Keywords: Variable Speed Wind Turbine, Doubly Fed Induction Generator (DFIG), Active powers, Reactive powers, Conventional PI controller, Fuzzy logic controller.



ID: Ene-O-05

Analyse de l'amélioration des performances énergétiques des moteurs à combustion interne par intégration du cycle de Brayton inversé pour la récupération des gaz d'échappement

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Abstract: Le développement économique et social mondial a entraîné une augmentation de la demande en énergie électrique. Les moteurs à combustion interne tels que les turbines à gaz et les moteurs Diesel jouent un rôle essentiel dans de nombreuses sociétés. A mesure que les besoins en production d'énergie augmentent, la puissance et l'efficacité de ces moteurs doivent également augmenter. De plus l'évolution des moteurs à combustion interne a récemment connu une impulsion supplémentaire en raison de leur impact environnemental sur le réchauffement climatique et la détérioration de la qualité de l'air. Plusieurs technologies innovantes ont été introduites sur le marché et de nombreuses autres sont en cours de développement. Les technologies de récupération de chaleur résiduelle (WHR) font l'objet d'études actives pour trouver leurs applications les plus bénéfiques. La récupération de chaleur résiduelle des moteurs à combustion interne peut garantir une amélioration significative de l'efficacité globale du moteur, entraînant ainsi des économies de carburant et une réduction des émissions de CO₂. Une nouvelle opportunité peut être représentée par l'exploitation directe de la pression et de la température résiduelles des gaz d'échappement grâce à un cycle de Brayton inversé (IBC), dans lequel les gaz se dilatent à une pression inférieure à celle de l'environnement, sont refroidis, puis recompressés à la valeur environnementale. Le cycle de Brayton inversé est considéré comme une technologie prometteuse pour la récupération de la chaleur résiduelle. Afin de démontrer la capacité de récupération de chaleur de l'IBC en tant que système de WHR complémentaire pour un moteur commercial, dans notre travail, nous avons établi une analyse énergétique de deux systèmes énergétiques. Le premier système est le cycle de Brayton combiné avec le cycle de Brayton inversé dans le cas d'une turbine à gaz et le deuxième est le cycle de Diesel combiné avec le cycle de Brayton inversé dans le cas d'un moteur Diesel. Dans une première étape, ce travail présente une validation de l'outil de simulation utilisé où la modélisation des performances de la turbine à gaz et du moteur Diesel ont été développées grâce à un programme élaboré sous environnement MATLAB. Les résultats issus de l'analyse énergétique montrent que, dans les conditions de base choisies, l'IBC installé en série avec une turbine à gaz ou avec un moteur suralimenté présente une solution potentielle de WHR qui peut entraîner une amélioration des performances des deux systèmes énergétiques telles que la puissance et l'efficacité. De plus, une analyse de sensibilité est réalisée pour estimer l'influence de chaque composant majeur sur l'ensemble du système et identifier les optimisations nécessaires. Les principaux facteurs qui influencent la puissance de sortie et l'efficacité du système énergétique sont le rapport de détente de la turbine, la température du liquide de refroidissement, la température d'entrée de la turbine et l'efficacité des turbomachines. Les résultats de la simulation montrent que pour un rapport de détente donné l'augmentation de la température d'entrée et de l'efficacité des turbomachines de l'IBC est bénéfique pour les performances de l'IBC. De plus, il existe un rapport de détente optimal de l'IBC qui fournit la puissance spécifique maximale. Ainsi, le système IBC devrait être optimisé en fonction des conditions de conception. Ce travail contribue ainsi à monter l'intérêt de l'IBC qui offre des perspectives intéressantes pour l'amélioration des performances énergétiques des installations de production d'énergie.

Keywords: turbine à gaz; moteur Diesel; récupération des gaz d'échappement; cycle inversé de Brayton



ID: Ene-O-06

Artificial Neural Network Analysis of Rotary Desiccant Wheel System

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Abstract: This work aims to use the neural network approach to predict the air temperature, the air humidity ratio and the effectiveness parameters at the outlet of the rotary desiccant wheel system. Moreover, the Garson method is used to identify the most important working parameters influencing the performance of the desiccant wheel component. The developed neuronal model uses the MATLAB to obtain a better configuration network, applying multilayer feed-forward, the TANSIG transfer function, and the back-propagation learning algorithm. The performance of ANN model was evaluated using the statistical parameters between the prediction results and experimental values. The performance regression yields R values of 0.99008, 0.97339 and 0.95456, respectively, for the test data set of process air temperature, air humidity ratio and the effectiveness parameter η . The MSE values were found to be 0.0442, 0.0051 and 0.000221, respectively. Finally, the sensitivity analysis showed that all input variables have a significant effect on the performance of the desiccant wheel and, the regeneration air inlet temperature proved to be the most influential parameters with 26%.

Keywords: Artificial Neural Networks (ANN); Rotary desiccant wheel; Dehumidification effectiveness; Solid desiccant.



ID: Ene-O-07

CFD simulation on the performance of Hybrid Photovoltaic Thermal system (PV/T) using hybrid nanofluids.

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Abstract: The optimization of energy consumption relies heavily on improving the electrical efficiency of photovoltaic cells. This paper presents a numerical analysis of the application of a hybrid nanofluid to a hybrid photovoltaic thermal (PV/T) system to enhance its electrical efficiency by reducing the operating temperature of the PV cells. The PV/T system consists of a photovoltaic module (PV) and a thermal collector, which contains a heat dissipator with rectangular fins situated at the back of the PV panel. The study examined the effects of design variables, such as coolant inlet velocities and volume fractions of nanoparticles, on the Nusselt number (Nu), PV cell temperature, and electrical and thermal efficiency under steady-state conditions for a constant value of heat flux of 1000 W/m² and inlet fluid temperature of 26 °C. The ANSYS 19.R3 Fluent software was used for a 3D numerical simulation to study the thermal behavior of a PV/T panel. The research findings indicate that the increase in the volume fractions of nanoparticles enhances the thermal conductivity of the cooling fluid, leading to an improvement in heat transfer by conduction. Moreover, the increase in fluid velocities improves heat transfer by convection, thereby enhancing the heat transfer rate in the PV/T system. Consequently, there is a reduction in operating temperature and an overall improvement in the efficiency of the PV/T hybrid system.

Keywords: Solar energy; Hybrid Photovoltaic Thermal collector; Hybrid nanofluids; Heat transfer; CFD analysis; ANSYS Fluent.



ID: Ene-O-08

Comparative analysis of thermal performance of date palm concrete and traditional building materials

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Abstract: In the context of reducing energy consumption in the field of construction and environmental problems related to climate change, promoting concrete based on date palm wood waste (DPC) in new construction and in the renovation of buildings is proposed. Therefore, a complete characterization of its hydrothermal behavior on a multi-scale (material, wall, and building) is necessary. The results of the literature have shown that this material exhibits an interesting hygrothermal performance thanks to the presence of date palm wood fibers. Furthermore, the objective of this research is to compare building materials based on date palm fibers and traditional materials to develop and validate a predictive model of the thermal behavior of a wall made of this material (DPC). In this paper the thermal behavior of several configurations was studied numerically at a wall scale using COMSOL multiphysics, these configurations combine DPC and ordinary materials (concrete, DPC, multilayers of mortar and brick). The results confirmed that DPC shows excellent thermal insulation performance. In addition, the wall constructed with DPC, and bricks exhibits a better mechanical and thermal resistance compared to the wall made of mortar and bricks.

Keywords: Date palm, insulating material, thermal performance.



ID: Ene-O-09

Control of a wind system by adaptive fuzzy logic based on DFIG

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Abstract: We will look at a system that contains a variable-speed wind turbine and a dual-feed asynchronous machine (DFIG) that is connected to the grid via a stator and fed by a transducer on the rotor's side. In this work, the vectors are controlled individually for the active and reactive power flow between the stator (DFIG) and the grid, which is addressed using classical PI and fuzzy logic. Judo tracking that is useful for achieving the best operating point and maximum power output. The findings proved the advantages of the proposed smart control unit based on fog systems.

Keywords: Doubly Fed Induction Generator (DFIG), Variable Wind Speed, Active and Reactive Power, Maximum Power Point Tracking (MPPT), adaptive fuzzy logic, Proportional Integral (PI).



ID: Ene-O-10

Data-Driven Models for Power Output Prediction of Photovoltaic Modules: Machine Learning Algorithms' Evaluation and Comparison

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Abstract: In this work, data-driven models are proposed for the prediction of photovoltaic module power output, where large experimental dataset and a set of 4 different Machine Learning algorithms are used. Firstly, a data pre-processing stage is performed to clean the data and identify relevant features for the models. With power generation of the module as target to predict, the inputs of each the models have been identified to be solar radiation, ambient temperature, module temperature and wind speed, during implementation of all machine learning algorithms, 10 attempts of cross-validation are performed with 10% of random selections from training dataset. The results indicated that overall, linear models are providing less accurate predictions of PV module power output and may suffer from lack of flexibility and overfitting, regularizing the linear regression using LASSO algorithm does reduce the noise and overfitting, but not much of improvement is introduced in terms of accuracy, non-linear models on the other hand, does provide very accurate results where the best model (Artificial Neural Network) provided an R2 of 0.999, with a low error of 0.882 (MAE) while the best linear model was at 0.978 and 4.680 for R2 and MAE, respectively. The non-linear model proposed in this work provided a comparable performance to the ANN model, providing an R2 of 0.992 and a MAE of 1.967.

Keywords: PV module; Regression; ML; Power output; Prediction.



ID: Ene-O-11

Laser Processing in Solar cells manufacturing

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Abstract: The use of lasers in the processing of solar cell structures has been known for many years both for c-Si and thin-film solar technologies. The most attractive property of laser irradiated silicon is that it absorbs nearly all light that is emitted by the sun. This offers an opportunity to tap into that lost energy and, therefore, appears to be an attractive option for solar cells. The ultra-short pulse laser has the potential to improve the optical properties of different layer of solar cell. The maturity of the laser technology, the increase in scale of solar module production and the pressures to drive down cost of ownership and increase cell efficiencies have all contributed to the adoption of laser processes in industrial manufacturing. The laser modified surface and the nature of dopants and defects in the crystalline grains are crucial to improve the performance of solar cells. Other laser processes are used in the production of advanced high-efficiency c-Si cell designs such as laser grooved buried contacts, emitter wrap-through or metal wrap-through inter-connects, selective emitters and laser fired contacts. In the mission of the solar industry to reduce the cost of electricity generation there are increasing opportunities for laser processing to contribute to the goal of low cost of ownership in industrial manufacturing through improved module efficiencies, higher throughput and reduced process costs.

Keywords: Laser processing, solar cells, laser scribing, laser doping, laser firing.



ID: Ene-O-12

Enhancing the productivity of solar distillers using porous materials

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Abstract: To achieve this idea, the flax fibers were added to a basin of hemispherical distillers as natural porous materials. To find out how dyed flax fibers affect the productivity of hemispherical distillers, we design and constructed three simple hemispherical distillers and their performance is compared under the same climate conditions. The first simple hemispherical distiller (SHD) represents the reference distiller. The second and third simple hemispherical distillers were enhanced with natural yellow flax fibers (SHD-YF) and black dyed flax fibers (SHD-BF), respectively. The results showed that, by employing the natural yellow flax fibers (SHD-YF) and black dyed flax fibers (SHD-BF), the cumulative yield increased by 29.7 and 39.6%, respectively, compared to the reference distiller. Additionally, it was found that the hemispherical distiller utilizing black-dyed flax fibers (SHD-BF) produced distillate water 7.63% more than the hemispherical distiller that used the same material without dyeing (SHD-YF). The SHD-BF has a maximum daily thermal efficiency of 57.31%, which is 39.34% higher than the SHD maximum efficiency. The thermo-economical feasibility showed that using black dyed flax fibers as natural porous materials is a viable option to improve the productivity of solar distillers.

Keywords: Solar Energy; Hemispherical distiller; Flax fiber, Performance improvement.



ID: Ene-O-13

Evaluation of the effect of metal oxides on the ballistic properties of an energetic material by Explo-5 Software

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Abstract: This work is a contribution to the hydrothermal synthesis of metal oxides of iron and zinc; the two oxides are added to a propulsive charge in order to modify their ballistic properties. For the characterization of the two oxides infrared spectroscopy and Raman spectrum were chosen. The effect on these oxides on the ballistic properties of a propulsive charge was studied by numerical software such as, EXPLO-5 is important tool in synthesis, formulation, and numerical modelling of energetic material, all the results obtained were compared with an experimental analysis , validated with a combustion bench rocket Motor measurement (RMM) .

Keywords: Propulsive charge, Metal oxide; hydrothermal method, Characterization techniques, Ballistic, Explo-5.



ID: Ene-O-15

Minimum Reactive Power For Isolated Bidirectional DC-DC Converter using Novel control

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Abstract: to minimise reactive power of isolated bidirectional Dual-Active-Bridge DC–DC (IBCD), various modulation methods are proposed, on of them , extended phase shift (EPS) are study and compared for full-bridge-based isolated bidirectional dc–dc converter with detailed theoretical, analysis of operation mode and demonstrating mathematical models of transmission power, backflow power, and current stress. Finaly simulation results findings attest to superior performance EPS control algorithm.

Keywords: dual active bridge, single phase shift, phase shift, power flow, backflow power, current stress.



ID: Ene-O-16

Modeling and numerical simulation of supercritical CO₂ flow in a centrifugal compressor

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Abstract: The compression of supercritical gas flows is essential in various industrial applications, with supercritical carbon dioxide (CO₂) at the forefront for its environmental benefits. This work concerns the modeling and numerical simulation of supercritical CO₂ flow in a centrifugal compressor, followed by a comparison with air flow.

The aim of this study is to understand the behavior of supercritical CO₂ in a centrifugal compressor, taking into account the complex thermodynamic properties and transport phenomena specific to supercritical conditions. Numerical simulation of this complex flow using ANSYS provided detailed results. The results were compared with those of the air flow simulation, providing an essential basis for comparison. This comparison highlighted significant differences in the behavior of the two fluids, supercritical CO₂ and air, and in the energy performance of the compressor. Key parameters such as pressure, temperature, flow velocity and compressor efficiency were analyzed for both fluids.

This study is crucial to ensure reliable and efficient performance of centrifugal compressors in applications involving supercritical CO₂. The results provide valuable information to guide the design and operation of supercritical CO₂ compression systems.

Keywords: CFD, centrifugal compressor, CO₂ supercritical, energy performance.



ID: Ene-O-17

Numerical analysis of heat transfer and laminar flow behavior of hybrid nanofluids in a uniformly heated horizontal tube

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Abstract: In this paper, fully developed laminar forced convection in a three-dimensional horizontal tube filled with hybrid nanofluid containing binary nanoparticles, Fe₃O₄ and CNT with cylindrical and spherical shapes dispersed in water based fluid are numerically investigated. The tube is heated by a constant and uniform heat flux. The finite volume method with second-order precision is used to discretize the governing equations, continuity, momentum and energy with appropriate boundary conditions, and solved via a FORTRAN program. Thermal equilibrium and single-phase approach is adopted for both nanoparticles and base fluid. The study is carried out for Reynolds number ($500 \leq Re \leq 2000$) and volume fraction ($0 \leq \phi \leq 4\%$). The influences of the pertinent parameters on the heat transfer and pressure drop and performance evaluation criteria (PEC) have been presented graphically. The Nusselt number increases with increasing Reynolds number and volume fraction. The friction factor increases with volume fraction, while decreasing with Reynolds number. Performance evaluation criteria (PEC) show a very high increase with the 4% volume fraction.

Keywords: Hybrid Nanofluid ; forced convection ; tube ; Nusselt number ; friction factor.



ID: Ene-O-18

Numerical Analysis of the Efficacy of Turbulence Models in Predicting Aerodynamic Performance of Asymmetric Profiles

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Abstract: Aerodynamic profiles play a pivotal role in the design and efficiency of energy systems, such as aircraft wings, turbomachine blades, and wind turbine blades. Asymmetric profiles are characterized by their unique features, making them especially intriguing for various applications. While the performance of these profiles has been studied from multiple perspectives, there remain ambiguities related to instabilities that can occur in an airflow, particularly the stall phenomenon at different angles of attack. In this light, the present study undertakes a detailed numerical analysis of asymmetric profiles, with a particular emphasis on the efficacy of various turbulence models, namely $k-\omega$ SST, $k-\omega$, $k-\epsilon$, and Spalart-Allmaras in predicting stall. The numerical investigation is conducted using the ANSYS software, utilizing a specific mesh designed for an asymmetric aerodynamic profile. A comparison of the study's findings with experimental results was carried out. In summary, this study provides an in-depth insight into the behavior of asymmetric profiles in an airflow under various operating conditions and offers a comparative analysis of commonly used turbulence models.

Keywords: aerodynamic performance; asymmetric profile; CFD; stall; airflow.



ID: Ene-O-19

Numerical simulation of the optimal position of a thin layer based on PCM within the building.

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Abstract: This study specifically focuses on evaluating the reduction in energy demand and electricity consumption by improving thermal comfort in buildings. In this context, have been investigate the possibility of enhancing the energy efficiency of buildings by increasing the heat storage capacity in the building envelope. Phase change materials (PCM) that can be incorporated into the building envelope were used to achieve this. These types of materials are known for their low weight and capacity to retain heat. The effect of the position and thickness of the PCM was also studied in this work. For this purpose, three configurations studies were conducted: one without the integration of PCM, while the others incorporated PCM encapsulated in the external and internal envelopes, with one of them having an additional insulating layer made from palm date wood concrete (DPC). The walls were thermally stimulated periodically from the outside. Finally, a study was conducted to examine the effect of integrating PCM into the building's roof. This study was performed using the COMSOL Multiphysics simulation code. The results have shown that for hot regions, placing the layer of PCM on the outside of the wall and the insulation material (DPC) on the inside has been found to substantially reduce energy demand in buildings. Conversely, for cold regions, the arrangement is reversed to achieve the same effect.

Keywords: Phase change materials (PCMs), Thermal performance, Heat storage

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ID: Ene-O-20

Optimal energy management and sizing of renewable energy and battery systems in residential sectors via a stochastic MILP model

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Abstract: Energy supply through integrated renewable energy sources (RESs) and battery systems will be of higher importance for future residential sectors. Optimal energy management and sizing for the components of residential systems can enhance efficiency, self-sufficiency, and meanwhile can be cost-effective by reducing investment as well as operating costs. Accordingly, this paper proposes an exhaustive optimization model for determining the capacity of RESs, namely: wind turbines and photovoltaic (PV) systems. In this study, batteries and electric vehicles (EVs) are utilized in line with other sources to capture fluctuations of RESs. To model the uncertainties of RESs, energy prices, and load demands a linearized stochastic programming framework is applied. The proposed framework involves long-term and efficient resource development alongside with short-term management and utilization of these resources for supplying the demand load. In our study, we utilize the roulette wheel mechanism (RWM) method as well as proper probability distribution functions (PDFs) to generate scenarios for all sources of uncertainties, including wind turbines, PV systems, demand, and electricity market price. The approach is verified in two different cases, including an individual home and a larger micro-grid (MG). The results of multiple numerical simulations demonstrate the effectiveness of the proposed stochastic model.

Keywords: Residential micro-grid, Demand response programs, Electric vehicles, Uncertainty, Mixed-integer linear programming.



ID: Ene-O-21

Optimal Location and Size of Photovoltaic and Wind in Distribution Network Considering Uncertainties

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Abstract: In this research paper, a novel meta-heuristic technique, referred to as the "Human Conception Optimizer" (HCO) algorithm, is introduced for optimizing the allocation of Distributed Generators (DGs) based on photovoltaic (PV) and wind sources within a distribution network (DN). This algorithm takes inspiration from the biology of human conception, mirroring the selective functions of cervical and mucus gels, guiding sperm towards the egg in the Fallopian tube, modeling sperm's distinctive motion, and enhancing fertilization potential through hyperactivation. These biological processes are translated into mathematical models, with the goal of identifying the most suitable DG placement by aligning with the egg's location. The proposed technique is applied to solve optimization problems aimed at minimizing both total power losses and energy losses. These applications are demonstrated using the IEEE 33-bus test system as a case study. To assess the effectiveness of the HCO method, its simulation results are compared with those of other recently developed optimization algorithms in the existing literature.

Keywords: Uncertainties; Photovoltaic; Wind turbine; Human Conception Optimizer algorithm; Distribution system.



ID: Ene-O-23

Review of Energy Harvesting System based on transparent microstrip patch antenna
combined with solar cell system

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Abstract: Energy harvesting technology has gained significant attention due to the widespread use of wireless devices. It has become a highly researched topic globally, as it plays a crucial role in providing convenient and cost-free energy for inaccessible applications. Energy harvesting involves capturing energy from various sources such as solar, light, thermal, wind, and kinetic energy. This technology supports applications with specific quality-of-service requirements. This paper provides an overview of a multi-source energy system that utilizes both radio frequency and solar energy for computing purposes. The radio frequency collection technique relies on a transparent antenna that can be applied on top of solar cells, allowing light to pass through the antenna and reach the cell. This proposed energy harvesting system will provide a dependable source of renewable electrical power that can be used for various applications.

Keywords: Energy Harvesting; Microstrip Patch antenna; solar Panel; transparent Antenna; Nano material.



ID: Ene-O-25

Thermal performance of date palm concrete and PCM

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Abstract: Building with optimum energy efficiency is one of the most promising solutions for ensuring comfortable living. The choice of materials that ensure the best performance and integration in the construction stage of buildings is a well-suited method. In our case, we'll be focusing on materials that ensure thermal insulation and energy storage. In this study, date palm concrete (DPC) was used, with their known insulating properties due to the low thermal conductivity of DPC. The second material studied is phase-change materials (PCMs), which are known for their storage capacity. In this study, we have incorporated these two types of materials into the concrete and insulated both buildings to assess their indoor air quality. To achieve this, the thermal model is used for each type of material studied, using a full building simulation support: ENERGY PLUS. Furthermore, the thermal behavior of these materials is studied under dynamic conditions of temperature to simulate indoor and outdoor conditions. Both DPC and M15 concrete reduce cooling and heating energy consumption, but DPC reduces cooling energy consumption by 71.88% and heating energy consumption by 72.9%, compared to PCM, so it leads to a reduction of energy consumption.

Furthermore, the hygroscopic effect is greater in the case of DPC than that of PCM, which contributes to the improvement of comfort.

Keywords: Thermal; comfort ; Date Palm concrete ; Phase change material.



ID: Ene-O-26

The impact of fuel mixture composition on NO_x emissions in a Non-premixed LPG-Syngas
Sydney Bluff Body Burner flame

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Abstract: This research presents a thorough numerical analysis of turbulent diffusion flames using ANSYS Fluent 19.1, with a specific emphasis on evaluating the influence of fuel composition, namely LPG (which propane is its main component) and syngas, on combustion structure and NO_x emissions (NO and NO₂) of non-premixed LPG-Syngas Sydney Bluff-Body burner turbulent flame. The investigation aimed to provide valuable insights into optimizing combustion processes for reduced environmental impact.

The study's findings reveal a compelling relationship between fuel composition and combustion structure. Notably, as the proportion of propane in the fuel mixture increases, a significant reduction in NO_x emissions is observed, highlighting the potential for more environmentally friendly combustion scenarios. These results underscore the importance of carefully selecting fuel compositions in industrial and energy applications to minimize pollutant emissions while maintaining efficient combustion. That contributes to achieving cleaner and more sustainable combustion processes.

Keywords: Turbulent, non-premixed, combustion, Bluff-Body, LPG-Syngas.



ID: Ene-O-27

Valorisation énergétique du biogaz du CET de Batna pour l'incinération des déchets spéciaux

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Abstract: L'Algérie a une expérience limitée en matière de gestion et d'élimination des déchets, l'augmentation constante du volume de déchets due à la croissance économique et au développement des infrastructures. Plusieurs approches de gestion des déchets sont actuellement utilisées en fonction de considérations sanitaires, environnementales et économiques.

Ce sujet vise à mettre en place un projet pilote pour la collecte, le traitement et la valorisation énergétique du biogaz produit au sein du Centre d'Enfouissement Technique (CET) de Batna. L'objectif est d'utiliser ce biogaz comme carburant pour alimenter l'incinérateur situé dans le même CET.

Keywords: Biogaz; Combustion; Incinération; CET; Incinérateur.



ID: Ene-O-28

Enhancement of heat transfer in hybrid photovoltaic thermal solar collector with flax fibers as natural porous materials

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Abstract: This study aims to propose an effective technology for the thermal regulation of photovoltaic panels by using a porous material on the back side of the photovoltaic panels to improve their performance. To achieve this goal, a cooling channel was formed at the bottom back side of the photovoltaic cells. This channel contains porous materials (flax fiber) installed on the back surface of the photovoltaic panels. This paper dealt with the study of the effects of the thickness of the porous material layer (5 to 50 mm), as well as the flow rate of cooling water (0.4 to 1 m/s), to determine the best thickness of the porous material, as well as the best cooling water flow rate that achieves the highest performance of photovoltaic panels. The simulations are performed using ANSYS software and Navier Stokes equations. The results presented that the optimal design for good cooling of photovoltaic panels is incorporating porous materials with a thickness of 50 mm (channel 100% flax fibers) with cooling water. Incorporating the porous materials with a thickness of 50 mm (channel 100% flax fibers) with cooling water increases the Nusselt number from 18.65 to 51, with an improvement of 173.46 % as compared to only pure cooling water. Also, the average improvement in thermal efficiency reached 44.69% for incorporating the porous materials with the cooling water.

Keywords: PV thermal cooling; Channel cooling; Flax fibers; Mixed convection heat transfer; Simulation CFD.



ID: Ene-O-29

The Impact of Free Stream Velocity on Pressure Coefficients and Air velocity in the Greenhouse Environment

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Abstract: A greenhouse microclimate study present the great challenge in scientist researcher area. A control of the Aero-dynamical parameters variation in inside and outside of the greenhouse can show the most importance, which it associate the temperature variation in greenhouse microclimate. Where, this sensitive parameter is not highlighted in the literature study comparatively to the temperature, humidity, and dioxide of carbon concentration parameters inside greenhouse. A pressure coeffecient variation can be remarkable change under externals factors such as the air velocity and solar-ray intensity.

A computational fluid dynamic study have considered in this work. Where the Fluent software post processing based on the Navier-Stockes fluid dynamics equations that resolved by the finite volume method taken on to account the LES Smagorinsky turbulent model. Focused on the pressure coefficient parameters development on the inside and outside that can be acting considerably in greenhouse materials used on the engineering construction technics, like that a polyethylene or Plexiglas's cover matter kind and stone or aluminum border metal.

Keywords: Pressure, Tunnel green house, Wind velocity.



ID: Ene-O-30

Thermal management of solar panel using activated nano carbon fabric material:
Experimental Study

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Abstract: The amount of power the solar panels generate depends on solar intensity, wind speed, temperature, and soiling. A critical factor in the process of converting electrical power from the solar panel is the panel operating temperature. Solar panel overheating is caused by higher environmental temperature and surface operating temperature, which diminishes the panel's efficiency. The present experimental investigation is based on mono crystalline solar panels with activated nano-carbon fabric material (modified solar panel). The conventional and modified solar panel was researched at crescent university, Chennai, India. According to the experimental findings, the modified solar panel was successful in reducing the panel operating temperature which lead to an increase in power production and electrical efficiency. The result shows that the modified solar panel reduced the solar panel temperature by a maximum of about 5 C during noon (from 52 to 47 C), which increases the solar panel efficiency from 13.71 to 15.43% and increases the power production from 273.6 W to 307.8 W. It was found that payback period of 24.8 and 21.7 years and carbon credit earned of 37 and 72 \$ is obtained for the conventional and modified solar panel, respectively. The integration of activated nano carbon fabric material reduces the solar panel operating temperature and improves power production and efficiency as compared to conventional solar panel.

Keywords: solar panel; temperature management; passive cooling; carbon fabric material.



ID: Ene-O-31

An experimental study of air-cooled MONO perc solar panel equipped with activated carbon pellet fins: performance and environmental analysis

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Abstract: In this work, the performance improvement of Mono PERC solar panel using activated carbon pellet fins is experimentally studied in Chennai, India climatic conditions. The Mono PERC solar panel performances such as panel temperature, power output, electrical efficiency, and environmental analysis were analyzed. When activated carbon pellet fins are used as passive cooling techniques maximum temperature drop of 9 °C is achieved. The highest power output and electrical efficiency of the conventional and activated carbon pellet fins attached to the Mono PERC solar panel were calculated as 284.4 W and 14.26%, and 319.2 W and 16%, respectively. The results show that the use of activated carbon pellet fins has increased the power output by 14.7% and electrical efficiency by 15% as compared to the conventional solar panel. Additionally, the payback period and carbon credit attained for the conventional and activated carbon pellet fins attached to the Mono PERC solar panel have been calculated. It was found that payback periods of 24.5 and 21.3 years and carbon credit earned of 43 and 77 \$ is obtained for the conventional and activated carbon pellet fins attached to the Mono PERC solar panel, respectively. The integration of activated carbon pellet fins reduces the operating temperature of the solar panel and improves power production and efficiency as compared to conventional solar panel.

Keywords: solar panel; temperature management; passive cooling; carbon fins.



ID: Ene-O-32

Experimental investigation on the performance enhancement of Twin Wedge Solar Still using
PV-powered Induction heating system

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Abstract: Solar stills are widely used for water desalination and purification, but their efficiency is often limited by low heat transfer rates and inadequate evaporation. To address these limitations, various enhancement techniques have been incorporated by various researchers. In this work, a Twin Wedge Solar Still performance is enhanced by increasing the evaporation rate through the assistance of PV powered induction heating system. The Twin Wedge Solar Still has the advantage of a large condensation surface area, however, on the other hand, it affects the evaporation rate. Integration of an induction heating system at the bottom of the basin increases the evaporation rate. The experimental evaluation shows that the conventional TWSS delivered freshwater of 1.78 liters/m² per day, whereas the Induction heating-assisted TWSS (IHTWSS) delivered 7.8 liters/m² per day which is 3.4 times more. The induction heating system was powered using a 1 kW solar PV unit. This research contributes to the development of more efficient solar stills for water desalination and purification applications. The integration of PV-powered induction heating enhances the system's heat transfer rates, leading to increased productivity and improved energy utilization.

Keywords: Twin Wedge Solar Still; Induction heating; Active solar still; PV; powered induction heating.



ID: Ene-O-33

An experimental investigation on the effects of water depth on the thermal efficiency, exergy efficiency, and exergy losses of solar still with and without silicon carbide

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Abstract: The exergy analysis and exergy destruction of a Solar Still (SS) with and without silicon carbide at 1, 2, and 3 cm saltwater depth (SWd) are presented in this study. A SS with and without silicon carbide at 1, 2, and 3 cm SWd produced a daily yield of 5.64, 5.1 and 3.06 Kg, 4.68, 3.9 and 3.2 Kg, respectively. The SS with silicon carbide at 1 cm SWd increases the yield by about 20% and at 2 cm SWd increases the yield by about 31% whereas at 3 cm SWd decreases the yield by 4%. The thermal efficiency of the SS with silicon carbide at 1, 2, and 3 cm SWd are 44.2, 39.9 and 23.8%, SS without silicon carbide at 1, 2, and 3 cm SWd are 35.67, 29.69 and 24.3%, respectively. Similarly, the exergy efficiency of the SS with silicon carbide at 1, 2, and 3 cm SWd are 3.99, 3.41, and 1.76%, and SS without silicon carbide at 1, 2, and 3 cm SWd are 2.98, 2.35, and 1.8%, respectively. The maximum exergy loss of the basin of the SS with and without silicon carbide at 1 cm SWd were 4231 and 4459 W/m², respectively. The maximum exergy loss of the saline water of the SS with and without silicon carbide at 3 cm SWd were 1640 and 1546 W/m², respectively. Whereas minimum exergy loss of the saline water of the SS with and without silicon carbide at 1 cm SWd were 1138 and 626 W/m², respectively. The maximum exergy destruction of the SS happens at 3 cm so 3 cm SWd produces a minimum yield as compared to the minimum SWd.

Keywords: solar still; energy storage; silicon carbide; distilled water; distillation; exergy.



ID: Ene-P-04

Application of stochastic and deterministic algorithms for interaction parameters estimation in the liquid–liquid equilibrium modeling of ternary systems 1-Butanol (1), 3-methyl, 1, 3-butane diol (2), Water (3) at 348k and 293k.

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Abstract: The liquid-liquid equilibria are of great importance in chemical process engineering. The interaction parameters are a key element in the study of equilibrium liquid-liquid, optimization methods for these parameters play a significant part. This work aims to study and compare some stochastic and deterministic algorithms for the complex problem of calculating interaction parameters in the ternary system 1-Butanol (1), 3-methyl, 1, 3-butane diol (2), water (3) at 348k and 293k in liquid-liquid equilibrium. Thermodynamic models of coefficients such as NRTL and UNIQUAC can be used. From these models, the solubility of each system can be determined. The performance study of the optimization algorithms considered in this work will be based on preliminary tests (Rosenbrock, Rastrigin, Levy...). Hybridization will allow to propose a new optimization algorithm and thus to improve the intelligent methods that exist.

Keywords: Keywords- Liquid-Liquid Equilibrium; Optimization; stochastic algorithms; deterministic algorithms; hybridization.



ID: Ene-P-05

Biomass Valorisation and Recycling for Bioenergy Production via an Eco-friendly Technique

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Abstract: The usage of renewable energy has expanded along with the rise in global energy demand. There are Studies on renewable energy's contribution to sustainable development, its implications on environmental security and economic growth, and social and political perspectives on renewable energy. Biomass as an energy source has become increasingly popular in recent years. The majority of research has concentrated on using biomass to produce biofuels and Biochar using various thermochemical processes, the Hydrothermal treatment is broadly classified into (carbonization, liquefaction, and gasification). In this work, hydrothermal carbonization HTC will be carried out utilizing various biomass weights at an intermediate temperature of 180–220 °C for 10 hours. The weight percentages of carbon, hydrogen and nitrogen in the Biomass and Hydrochar products, are determined. Functional groups on the surface of Biomass and Hydrochar samples are identified and the surface of Biomass and its derived Hydrochar was analysed.

The results showed that the HTC process increased the carbon content of Hydrochars compared to Biomass. And in the spectra FTIR of Hydrochar, it can be clearly see a wide absorption band around 3500–3000 cm⁻¹, indicating the presence of carboxylic acid and phenol groups.

Keywords: Hydro-char; Biofuels; hydrothermal carbonization; date palm waste; Renewable energy.



ID: Ene-P-06

CFD Investigation of Cooling Plate Channels and Nanofluid Coolant Effects on Thermal Performance of PEM Fuel Cell

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Abstract: Proton exchange membrane (PEM) fuel cell converts The hydrogen fuel's chemical energy into electricity, water and heat. In order to enhance the performance of a PEMFC, the cooling system must be reliable to control the generated heat. In this work, the thermal enhancement for two types of PEMFC cooling channels (one stage and two stages channels) were evaluated. The hybrid $\text{Al}_2\text{O}_3\text{:SiO}_2$ nanofluid was employed as coolant in the cooling plate. The study focuses on (50:50) water:ethylene glycol based 0.5 vol % concentration of single Al_2O_3 , single SiO_2 nanofluids, hybrid 50:50 ($\text{Al}_2\text{O}_3\text{:SiO}_2$) nanofluids. The study assumed that the nanofluid incompressible, steady and laminar. Ansys 23.R2 Fluent is a three dimensional CFD program uses the finite volume method to solve the controlling equations. The results indicated that the two stage cooling channels perform better than the one stage channels in terms of heat transfer (temperature uniformity) and required pumping power (pressure drop). The results also suggested that hybrid nanofluids do enhance the behavior of single nanofluids and have a higher potential for applications in PEMFC thermal control in the future.

Keywords: PEM fuel cell; cooling plate channels; nanofluid; CFD; thermal analysis; temperature uniformity index.



ID: Ene-P-07

CFD SIMULATION OF THE FLOW AIR PERFORMANCE OF AN HUMIDIFICATION SYSTEM USED IN A POULTRY HOUSE

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Abstract: This study utilized computational fluid dynamics (CFD) simulations to investigate the air speed and flow characteristics of an air humidification system employed in poultry houses. In hot climates, poultry houses rely on direct evaporative cooling as the primary ventilation system.

By conducting CFD simulations, We examined the distribution of air speed and flow throughout the facility, assessing various operational factors such as the airflow rate and the impact of the humidifier body's thickness on the air speed and flow patterns. The findings provided important insights into the air speed and flow performance of the air humidification system, contributing to a better understanding of its functionality within the poultry house environment. Considering the airflow characteristics can help poultry farmers optimize the design and operation of the air humidification system, ensuring efficient cooling and creating a comfortable environment for the chickens, particularly in hot weather conditions

Keywords: poultry house, simulation, CFD, evaporative cooling, humidifier.



ID: Ene-P-08

Comparative Study of Solar Drying Processes for Beetroot in Semi-Arid Regions:
Experimental Kinetics and Modeling

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Abstract: This study presents a comparative analysis of solar drying processes for beetroot in the challenging climatic conditions of the semi-arid region of Ghardaïa. Various solar drying methods were applied, and the drying kinetics were thoroughly investigated. Seven mathematical models were employed to describe the thin-layer drying kinetics of beetroot slices. The findings revealed that the Midilli and Kucuk model provided the most suitable representation of the solar drying process for beetroot across different solar drying techniques. The moisture transfer through beetroot samples during drying was elucidated using Fick's diffusive model. Notably, the effective moisture diffusivity in beetroot slices dried within the direct solar dryer with thermal storage ($0.9 \times 10^{-9} \text{ m}^2/\text{s}$) exceeded that of slices dried without thermal storage energy ($0.8 \times 10^{-9} \text{ m}^2/\text{s}$) and surpassed the diffusivity in Open sun drying ($0.6 \times 10^{-9} \text{ m}^2/\text{s}$). This research contributes valuable insights into the optimization of solar drying processes for beetroot, offering potential advancements in sustainable food preservation and energy-efficient agro-processing practices in semi-arid regions.

Keywords: Solar Drying; Beetroot; Drying Kinetics; Mathematical Modeling Model; Moisture Transfer; Effective Moisture Diffusivity.



ID: Ene-P-09

Correlated numerical model to control the condensing temperature of refrigerant for solar adsorption refrigerator

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Abstract: A developed numerical model is to control the refrigerant's condensing temperature in a solar adsorption refrigerator and focus on the AC35-methanol-activated carbon pair. The primary objective is to reduce the energy required for the forced cooling system of the refrigerant during condensation by managing the anticipated temperature of the adsorber at the start of desorption corresponding to a predetermined ambient temperature for condensation. Thus, a forced condensation system is unnecessary in the presence of the solar temperature control system. Consequently, the refrigerant can be condensed based on a straightforward air-cooled condenser, even in regions with exceedingly high ambient temperatures. Additionally, an automated thermostat can regulate the valve that passes the refrigerant from the adsorber to the condenser by detecting the temperature of the adsorber.

Keywords: Correlated numerical model; Condensing temperature; Temperature at start of adsorption; Solar adsorption refrigerator.



ID: Ene-P-10

Developing a Comprehensive Heat and Mass Transfer Model to Enhance the Efficiency of an Activated Carbon-Methanol Adsorption Refrigeration System

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Abstract: This study encompasses numerical and analytical modeling aimed at optimizing the performance of a solar-driven adsorption cooling setup employing AC35-activated carbon/methanol as the working medium. The research adopts a heat and mass transfer approach to regulate cycle temperatures in pursuit of achieving peak Coefficient of Performance (COP) values. Experimental validation of the outcomes demonstrates that the highest COP values, contingent on the generation temperature, are attained when the adsorption, condensation, and evaporation temperatures are in equilibrium. Furthermore, the system can attain maximum COP levels using a low-grade heat source when the ratio between generation and condensation temperatures approximates 1.21. Adherence to these specified conditions signifies that the operational cycle of the system is optimized for superior COP. These findings enable the definition of optimal conditions as a function of two temperatures, constrained by the largest adsorbed mass and the smallest attainable mass. Additionally, control over condensation and evaporation temperatures aligns with ambient temperature regulation.

Keywords: Performance; Heat and Mass; Adsorption Process; Refrigeration Cycle; Optimization; Modeling.



ID: Ene-P-11

Electric vehicle battery explosion solutions

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Abstract: An electric vehicle is a type of vehicles that rely on its operations The electric motor and the battery. The demand for them increased due to the high fuel prices as well as to reduce the risks of global warming. One of the biggest problems that the electric vehicle faces is the high price of the batteries, and the possibility of problems with the battery, which in turn may cause a fire or explosion, which leads to losses Material and human, and this highlights the importance of the battery management system(BMS), to find solutions to this problem. In this research, a comparison between some of the proposed solutions to protect the lithium-ion battery, such as the solid state battery, the explosion valve, and finally the Battery Thermal Management System(BTMS).

Keywords: battery; Electric vehicle; BTMS;BMS; explosion solutions.



ID: Ene-P-13

Flexible Counter electrode materials based on ITO/ Polypyrrole for dye-sensitized solar cells.

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Abstract: In the face of global environmental degradation and a growing world population with ever increasing energy needs, the development of new and environmentally friendly energy sources is necessary. One solution is to develop cheap renewable energy sources. One of the most promising and intensively researched is photovoltaic energy, which is the direct conversion of solar energy into electrical energy. In this context, it is interesting to study polymer based structures that could be used in devices for energy conversion in order to increase efficiency by improving the donor/acceptor interface. To this end, control of the morphology and thickness of the active layer is a key element in this study and involves several parameters to optimize the properties of the interface. Thus, this work consists of developing new hybrid structures based on semiconductors and conjugated polymers. The aim is to study different surfaces of flexible ITO modified by PPy and to characterize the ITO/PPy structures obtained by various techniques such as contact angle measurement, scanning electron microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR) and Elemental Analysis Spectroscopy (EDX).

Finally, this structure will be tested as a counter electrode in a flexible dye solar cell.

Keywords: PPy, DSSC, flexible counter electrode, photoelectric conversion, electrochemical polymerization.



ID: Ene-P-14

Lilot de chaleur urbaine, enjeu à la fois écologique et sanitaire

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Abstract: Améliorer la qualité de l'environnement dans les villes, contribuera non seulement à enrichir la qualité de vie et améliorer la santé des habitants, mais contribuera aussi à résoudre les problèmes mondiaux liés à l'environnement, comme le changement climatique, terme désignant l'ensemble des phénomènes climatiques depuis les années soixante-dix.

Le climat se modifie constamment. Au cours du XX^{ème} siècle, la température moyenne de la planète a augmenté d'environ 0,6°C au niveau mondial et les années les plus chaudes ont été enregistrées après 1991.

L'accélération du rythme de l'urbanisation dans la deuxième moitié du XX^{ème} siècle a ouvert à la climatologie un champ de recherche nouveau, celui des modifications climatiques induites par la ville. La climatologie urbaine s'insère dans les préoccupations de la climatologie locale, qui étudie les relations entre le climat et l'environnement. La manifestation la plus évidente du climat urbain est l'existence de l'îlot de chaleur urbain.

Keywords: Environnement, santé, climat, changement climatique, îlot de chaleur urbain.



ID: Ene-P-15

Influence of alloying yttrium concentration on structural, mechanical, electronic, and optical properties of scandium nitride

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Abstract: Understanding the physical properties of a material is crucial to know its applicability for practical applications. In this study, we investigate the phase stability, elastic, electronic, and optical properties of the ternary alloying of the scandium and yttrium nitrides ($\text{Sc}_{1-x}\text{Y}_x\text{N}$) for different compositions. To do so, we apply a “density functional theory (DFT)” based scheme of calculations named as “full potential (FP) linearized (L) augmented plane wave plus local orbitals (APW+lo) method” realized in the WIEN2k computational package. At first, the phase stability of the investigated compositions of the mentioned alloy is determined. The analysis of our calculations shows that $\text{Sc}_{1-x}\text{Y}_x\text{N}$ alloy is stable in rock salt crystal structure for all investigated compositions. Next to that, the elastic properties of the rock-salt phase of the studied ternary alloy $\text{Sc}_{1-x}\text{Y}_x\text{N}$ at all above said compositions were done at the level of “Wu-Cohen generalized gradient approximation (Wu-GGA)” within DFT. The obtained results for the absorption coefficients, and optical bandgap, represent that the title alloy may be a suitable candidate for solar cell applications and optoelectronic devices.

Keywords: DFT; $\text{Sc}_{1-x}\text{Y}_x\text{N}$; elastic properties; electronic properties; optical properties.



ID: Ene-P-16

Influence of deposition parameters on PProDOT based CE efficiency for Dye sensitized solar cells

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Abstract: The standard counter electrode CE in dye-sensitized solar cells DSSC is constructed from conducting glass substrates coated with platinum films for their good electric conductivity and excellent electrocatalytic activity toward triiodide reduction, however, it is so expensive, corrosive and rare on earth. Therefore, scientists are struggling to develop some cost-effective catalytic materials as an alternative to platinum counter electrode.

The major roles of CE are the electrocatalyst for the reduction of I_3^- to I^- at the electrolyte/CE interface and the collection of electrons from the external circuit. Therefore, it is necessary to investigate the electrocatalytic activity of the CEs.

poly(3,4-propylenedioxythiophene) PProDOT have the potential to replace the Pt counter electrode because of the high conductivity, electrochemical stability, transparency, porosity surface and catalytic ability. the aim of this work is to improve these properties by varying parameters which are: effect of deposition time, effect of PProDOT concentration and effect of scan rate deposition.

Keywords: poly(3,4-propylenedioxythiophene), deposition time, dye-sensitized solar cells, electrochemical deposition



ID: Ene-P-17

Integrated Hexagonal On-Chip Inductor in DC-DC Buck Converter for Photovoltaic Applications

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Abstract: The research of this paper concerns the study of an integrated hexagonal on-chip inductor in a DC-DC Buck converter connected to a photovoltaic module. The topology of the inductor is chosen for its ability to provide improved performance and high inductance value. The paper presents the integrated inductor geometrical and electrical dimensioning. The equivalent electrical circuit of on-chip inductor with different added layers is described. The finite elements method is used to illustrate the current density and temperature distribution in the on-chip spiral inductor. The simulation of the DC-DC Buck converter with PV panel is validated using the integrated inductor to show its performances. The study combines theoretical analysis, modeling and simulation techniques to evaluate the performance and effectiveness of the hexagonal on-chip inductor topology. The results obtained provide valuable insights into the design and operation of the integrated inductor based PV system.

Keywords: DC-DC Buck Converter; Inductor; Integration; On-Chip; PV.



ID: Ene-P-18

MADA Vector Control in Motor Mode

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Abstract: In this paper, we present the mathematical model and the vector control has dual power (MADA), this machine function in motor mode , whose phases of the stator are fed by a three-phase network of sinusoidal voltage a constant frequency and amplitude and phases of the rotor are fed by an inverter of frequency voltage and variable amplitude.

Keywords: Asynchronous; machine; vector; regulator; pi; Simulink.



ID: Ene-P-19

Modeling and genetic algorithm control of a wind energy system based on double-fed asynchronous machine for supply of power to the electrical grid

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Abstract: In this paper, we will be interested in studying a system consisting of a wind turbine operating at variable wind speed, and a two-feed asynchronous machine (DFIG) connected to the grid by the stator and fed by a transducer at the side of the rotor. The conductors are separately controlled for active and reactive power flow between the stator (DFIG) and the grid. The proposed controllers generate reference voltages for the rotor to ensure that the active and reactive power reaches the required reference values, to ensure effective tracking of the optimum operating point and obtaining the maximum electrical power output. Dynamic analysis of the system is performed under the variable wind speed. This analysis is based on active and reactive energy control. The new work in this paper is to introduce theories of genetic algorithms into the control strategy used in the switching chain of wind turbines, to improve performance and efficiency. Simulation results applied to genetic algorithms give greater efficiency, impressive results, and stability to wind turbine systems compared to classic PI regulators. Then, artificial intelligent controls, such as genetic algorithms control, are applied. . Results obtained, in Matlab/Simulink environment, show that the genetic algorithms control is more robust i.e. has a superior dynamic performance and, hence, is found to be a suitable replacement of the conventional PI controller for a high-performance drive applications.

Keywords: DFIG, Variable speed wind turbine, Active powers, Reactive powers, Classic PI regulators, Genetic algorithms, MPPT.



ID: Ene-P-21

Numerical Modelling of Heat Transfers for a Habitable Space in an Arid Zone

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Abstract: The habitable sector bears a significant share of the responsibilities in energy consumption and the pollution it causes. In this work the habitable enclosure is considered as a set of volumes of air of parallelepiped shape limited by horizontal walls and vertical. The walls are thermally coupled by convection and radiation around each zone and are the seat of the conductive flux. The walls are the only capacitive elements of the enclosure. The external faces of the enclosure are the seat of a convective flow with the outside air and radiative exchanges with the. Openings (cracks, joint defects, infiltration orifices, renewal orifices, etc.) allow the air to circulate inside the habitable enclosure and between the inside and the outside. Thermal exchanges are studied from thermal balances established at the level of each component of the enclosure. These equations have been discretized by an implicit finite difference method. The numerical resolution of the obtained systems is carried out using the nodal method in a one-dimensional case and the Gauss algorithm. The effects of the outside ambient temperature and the geographical orientation of the enclosure on the distribution of solar flux at the walls were analyzed for climatic conditions in ADRAR region (Algeria), based on data climatic conditions recently measured at Research Unit in Renewable energies in Saharan Medium of ADRAR.

Keywords: Thermal exchange; Outside ambient; Gauss algorithm; Nodal method; ADRAR region ; Finite Difference method.



ID: Ene-P-22

Numerical simulation of perovskite solar cell

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Abstract: organic-inorganic lead halide perovskite solar cell (PSC), is studied and optimized using SCAPS software. In order to enhance the efficiency and find the best structure, three different hole transport materials (HTL), Pedot, Cu₂O and NiO, and three different electron transport materials (ETL) ; ZnO, TiO₂ and PCBM, are studied using lead halide CH₃NH₃PbI₃ as the absorber layer.

Keywords: hole transport materials , electron transport materials , perovskite solar cell , SCAPS, Numerical simulation, PSCs.



ID: Ene-P-23

Numerical study of supersonic air intake flow in scramjet propulsion

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Abstract: Supersonic intakes are crucial parts of a breathing propulsive system, designed to slow down and compress supersonic airflow to subsonic speeds suitable for combustion in the aircraft engine. One of the key design elements of the supersonic intake is the compression ramps, which is a device used to decelerate and compress the incoming airflow through oblique shock waves. The design and placement of the compression ramp have a significant impact on the performance of the supersonic intake and, consequently, the aircraft.

In this paper, the effects of the compression ramp on the supersonic intake and its performance have been studied in order to improve the performance and capabilities of high-speed aircraft. The computational technique used to solve the unsteady compressible Navier–Stokes equations in space and time is based on the spatially unsplit, predictor-corrector algorithm of Mac-Cormack ‘fourth order’. We have been focused on the behavior of the effects of shock waves, boundary layer separation located at the compression ramp corners, and the complexity of the design. It has been found that the compression ramp angle has a significant impact on the aerodynamic performance of the supersonic intake and its efficiency in compressing the airflow.

Keywords: Compressible flow; Supersonic intake; Shock waves; Scramjet.



ID: Ene-P-24

Numerical study of the impact of the shape and direction of ventilation of a heat sink on the cooling of an electronic chip

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Abstract: In this work, we studied the effect of the heat sink geometry and the direction of air entering the heat sink on the temperature of the electronic chip. For this purpose, we designed two models. The first model is a heat sink with porous media shape, while the second model is a fins heat sink. In this work, we studied the effect of air velocity and the direction of air entry on the value of the temperature of the chip at a Re number between 500 and 1500. We also tested numerically the effect of the geometry and the heat flux on the temperature value of chip by assuming the value of the inlet temperature of air equal to 293 K. The governing equations of the physical phenomenon were solved by the finite volume method. The results showed that the geometric shape or the fins heat sink the contributes to reducing the temperature of the chip in the event that in the case of cooling in the horizontal or vertical direction to the heatsink, unlike the first model, which is considered ineffective when cooling in the vertical direction of the heatsink. Also, the geometric shape of the heatsink affects the air speed and the cooling process inside the heatsink.

Keywords: electronic chip; heat sink ; Reynolds numbers; direction of ventilation.



ID: Ene-P-26

Stability analysis of Rayleigh-Bénard-Poiseuille flow in the presence of density inversion

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Abstract: In the present work, the onset of thermal convection instability in Rayleigh-Bénard-Poiseuille (RBP) flow of cold water limited in the neighborhood of its density maximum is studied. The stability of the flow is investigated on the basis of the linear stability analysis and the resulting eigenvalue problem is solved numerically. The governing equations are the Navier-Stokes equations and the energy equation for the temperature. The density is assumed to depend quadratically on the temperature. We consider the case of a sufficiently small Reynolds number, where the thermoconvective instability has no interplay with the viscosity-driven instability of the Poiseuille flow. The obtained results showed that the onset of instability is strongly affected by the density inversion parameter.

Keywords: Rayleigh Bénard Poiseuille flows; Linear stability; Mixed convection; Density maximum.



ID: Ene-P-27

Study of the Catalytic Performance towards Carbon Dioxide Photoelectrochemical
Conversion to Methanol by Doped PANI/Graphite Photocathode

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Abstract: Polyaniline (PANI) thin films were successfully synthesized using the electrodeposition (ED) technique from a mixed solution of 0.2M aniline and 0.5M HCl on Graphite. The morphological characterizations were carried out by Scanning Electron Microscopy (SEM), while the optical properties were studied using Ultraviolet-Visible Spectroscopy (UV–Vis). The catalytic activity was studied by linear sweep voltammetry (LSV) in dark and under white light irradiation using potentiostat station. Cyclic voltammetry in presence and without purging CO₂ was also conducted, to test the sample's catalytic properties towards CO₂ reduction. The results showed that the Cu-modified HCl-PANI/Cgr speeds up the photocatalytic activity compared to the unmodified. Gas chromatography (GC) showed a concentration of 17% corresponding to methanol production, for a sample tested in a 0.1M K₂CO₃ aqueous solution saturated with CO₂ gas, under -1.2 V applied voltage. From the obtained results, it was shown that Cu/HCl-PANI/Cgr could be useful as a promising candidate for the CO₂RR to Methanol.

Keywords: Polyaniline, Copper, Graphite, photocathode, CO₂RR, Photoelectrocatalysis.



ID: Ene-P-28

Studying the effect of using sponge pieces in a traditional solar still.

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Abstract: Solar distillation is a very effective way to obtain pure water, especially in isolated areas where the water is infected or polluted to obtain drinking water. Two conventional solar stills of the same size (0.5 x 0.5 m) were tested for 8 hours. One still is priced as an SSR reference still and the other still which contains pieces of sponge is SSM and that is the subject of our work. The results show that the use of sponge in winter improves the yield of 10 %.

Keywords: Keywords: Solar energy, Solar distillation, Affected water, Groundwater.



Synthesis and Characterisation of Rare-earth (Nd) Thin Films Deposited on PECVD-designed Silicon Nanostructures for Photovoltaic Applications

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Abstract: We report the morphology, spectroscopic and electrical properties of evaporated neodymium oxide (Nd_2O_3) thin films deposited on silicon nanostructures (ns-Si) for PV applications. by incorporating the Nd_2O_3 layer we aim to optimize optical properties and improve the efficiency of silicon PV cells. Ns-Si were prepared by growing silicon nitride (Si_3N_4) thin films using plasma enhanced chemical vapour deposition (PECVD) with a mixture of NH_3 - SiH_4 as precursor gases in the plasma chamber. Gas ratios $R=\text{NH}_3/\text{SiH}_4$ were varied between 2 and 5. Two sets of samples were analysed comprising samples prepared with gas ratios $R=2.5$; 3; 4 (annealed at $900^\circ\text{C}/15$ min.) and those with $R=2$ and 4 ($1100^\circ\text{C}/1\text{h}$). Nanocrystalline formation and layers thickness were assessed by atomic force microscopy (AFM) and scanning electron microscopy (SEM). The presence of Nd, Si, O and P elements was confirmed by secondary-ion mass spectrometry (SIMS). Existing phases and their crystallographic orientations were identified using x-ray diffraction (XRD). Finally, electrical characterisations consisting of electron mobility and intrinsic carrier concentration (n_i) measurements were determined by Hall effect. Resulting mobility values varied between 22.3 and $29.8 \text{ cm}^2/\text{V.s.}$ and those for the intrinsic carrier concentration were in the range 3.46×10^{15} to $4.01 \times 10^{15} \text{ cm}^{-3}$.

Keywords: PECVD, neodymium, silicon nanostructures, SEM, AFM, SIMS, Photovoltaics.



ID: Ene-P-30

The influence of the movement of a wall of a trapezoidal cavity containing an inlet and an outlet of the cooling of a hot source located inside the cavity in the presence of a nanofluid

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Abstract: The objective of this work is to study the effect of the moving wall of a trapezoidal cavity on the cooling of a hot source using a hybrid nanofluid ($AL_2O_3 + Cu$ -water) with a solid volume fraction of the order of 0.03. the cavity is heated from the right side wall, while the bottom, top and left side walls are adiabatic. four cases to know the effect of the movable wall on the temperature of the heat source are studied. The first case 01: all walls are fixed; case 2: lower wall moving at constant speed and the other walls stationary; case 3: the top wall moves at constant speed and case 4: the bottom and the top part of the walls move. The equations governing the physical phenomenon were solved by the finite volume method. Numerical results are developed for Reynolds numbers equal to 200 to 500 for laminar and unsteady flow regime. According to the results obtained in the study, it was observed that when the Reynolds number increases, the heat transfer increases inside the cavity. We also found that the two moving walls of the fourth case provide the best heat exchange compared to the other cases. We also noticed that the position of the moving wall greatly affects the temperature of the heat source.

Keywords: hybrid nanofluid; moving wall; cavity; heat transfer.



ID: Ene-P-31

Thermal annealing Effect in the hydrothermal $\text{Li}_4\text{Ti}_5\text{O}_{12}$ (LTO) nano-particles grow used as
Li-Ion Electrode

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Abstract: The aim of this work is to synthesize and characterize the nanopowders of titanium dioxide (TiO_2) and lithium titanate ($\text{Li}_4\text{Ti}_5\text{O}_{12}$) by the hydrothermal method and to use them as cathode in a lithium-ion battery.

Keywords: titanium dioxide, LTO, cathode, hydrothermal, lithium-ion battery.



ID: Ene-P- 32

Two-Dimensional Materials for Hydrogen Storage: A Modern Approach

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Abstract: Hydrogen has proven to be a suitable alternative to fuel due to its abundance in nature and its environmental friendliness. However, the world still faces a problem in storing it, as traditional methods of storage and transportation are unsafe. Storing hydrogen physically in solid materials is currently being researched, as most studies are directed towards 2D materials. Two-dimensional materials have shown promising results in storing hydrogen. In this review, we have collected the latest promising two-dimensional materials for hydrogen storage and studied the differences between them. We have also presented some future expectations about these materials.

Keywords: storing, hydrogen, two, dimensional materials.



ID: Ene-P-33

Conception et réalisation d'un incinérateur pour déchets spéciaux à biogaz et à l'échelle laboratoire

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Abstract: Dans ce travail, une étude de cas visant à améliorer la combustion des déchets solides municipaux dans un four à lit fixe, avec la conception d'un incinérateur alimenté au biogaz, composé d'une seule chambre et d'une cheminée. Les expériences ont été menées dans deux digesteurs anaérobies d'une capacité de 500 litres, remplis de bouse de vache, et le biogaz est stocké dans un matelas gonflable. Nous utilisons le BIOGAS 5000, un analyseur de biogaz portable de GEOTECH, pour évaluer la qualité du biogaz produit en mesurant la concentration de gaz tels que le CO₂, l'O₂, le CO, et l'H₂S. Une température élevée est généralement souhaitée dans un incinérateur, car elle favorise une combustion complète des déchets et contribue à réduire les émissions nocives. Elle atteint une valeur de 500°C. Cette approche contribue à la transition vers une économie circulaire où les déchets sont considérés comme des ressources, et où l'énergie est produite de manière plus efficace et respectueuse de l'environnement.

Keywords: Incinérateur ; Digesteur ; Biogaz ; Combustion ; Déchets ; Température..



ID: Ene-P-34

Numerical simulation of combustion in compression ignition engine fueled with diesel only
and diesel with biogas

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Abstract: In this work, we have used the computational fluid dynamics (CFD) code CONVERGE to simulate combustion in the diesel engine operating under dual fuel (diesel/biogas) mode. The CTC combustion model is chosen for the dual fuel engine, and the other simulation models used to capture the different phenomena in the combustion chamber give good results. The results show that the pressure in the engine cylinder in dual fuel mode is higher than that in diesel mode, and we can observe excellent agreement between experimental results and numerical simulations, with a maximum error of 4%. The high rate of Nox has been noted for dual fuel engines; therefore, we rely on a proposal for an EGR system which is a very effective technique for reducing Nox emissions.

Keywords: Numerical simulation; Dual-fuel engine; Combustion; Greenhouse gas; CONVERGE CFD; Biogas.



ID: Ene-P-37

Experimental Study on Novel Design of Solar Dryer with Forced Airflow in Sahara Algeria Climate

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Abstract: In this paper, experimental work has been presented to study the novel design of a solar crop dryer includes inverted absorber perforate type collector with forced airflow. A novel design configuration was constructed and tested in Sahara Algeria climate (El-Oued city) for drying of potatoes. Aim to present a test of the thermal performance of the novel dryer and use only clean energy sources for evaluated of the drying efficiency. Under real Sahara climatic condition, the experimental test indicates that the average air temperature of the drying chamber of 50 °C, and the time required for drying potato starting at the initial moisture contents (MC) of 84.17% until final MC of 12.5% were 6h. Highest specific moisture extraction rate value was obtained as 1.074 g Water/Kwh. The Drying efficiencies ranged from 20.37 to 34.01%, whereas the exergy efficiency ranged from 58.48 to 93.22%. Payback period was estimated as 0.66 years. The proposed novel dryer will dry potato free of cost for almost its entire life period (20 years) and about 555.62 DAZ/day can be saved. Compared with electric oven drying, the advantage of the novel one, the cost of electricity saving and avoiding penalty tax for CO₂ emission, were 68.49 kWh and 487.13 DZD, respectively.

Keywords: Solar dryer; Moisture contents; Experimental; Dryer Efficiency; Sahara Climate



ID: Ene-P-39

Numerical Study of an adsorption refrigeration system

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Abstract: This work presents a numerical study of adsorption refrigerator using the activated carbon AC35-methanol pair. The objective is to optimization of an adsorption refrigeration machine, a study and analysis of the basic Clapeyron cycle associated with this machine are necessary. To do this, we established a numerical model based on the one hand on the equation of state of the Dubinin - Astakhov model and on the other hand on certain considerations aimed at ensuring optimization such as the properties of the adsorbent/adsorbate couple. The basic cycle analysis of Clapeyron associated with this machine with the calculation code developed, made it possible to highlight the influence of the different parameters on the quantity of cold produced and on the thermal coefficient of performance (COP_{th}).

Keywords: Adsorption; solar adsorption refrigerator; Activated carbon AC-35 / methanol; COP_{th}.



ID: Ene-P-42

Experimental study of a greenhouse solar dryer

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Abstract: An experimental study of an indirect solar greenhouse dryer is carried out. Indeed, we were able to build a solar dryer to dry tomatoes, a widely consumed vegetable in the region, using locally available materials. The solar dryer produced includes a greenhouse solar collector, a drying chamber, a connection pipe and some accessories such as thermometers and a thermo-hygrometer. Solar radiation, ambient temperature, wind speed, collector inlet and outlet temperatures, absorber and drying chamber temperatures and relative humidity are recorded and presented. These results are in good agreement with the theoretical results. The dried tomatoes obtained are of good quality.

Keywords: Solar dryer, irradiation, temperature, humidity.



ID: Ene-P-44

ETUDE EXPERIMENTALE DES PERFORMANCES ENERGETIQUES D'UN SYSTEME SOLAIRE THERMIQUE DE PRODUCTION D'EAU CHAUDE A USAGE SANITAIRE

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Abstract: Ce travail porte sur l'étude expérimentale des performances énergétiques d'un système solaire thermique utilisé pour produire l'eau chaude à usage sanitaire (ECS). Il est composé d'un capteur solaire thermique plan 4,46m² de surface et d'un ballon de stockage d'eau chaude d'une capacité de 304 litres. Un réseau hydraulique de tuyau en multicouches assure la liaison des deux composants. Le puisage de l'eau chaude se fait dans un Lavabo, par moyen d'une vanne asservie commandée à distance. Un dispositif de mesure est installé pour suivre l'évolution des températures à différents points (température de l'air extérieure, température de l'eau dans le ballon à une hauteur de 60cm, température d'eau froide. Pour cela une stratégie de régulation et de gestion de l'énergie est utilisée pour gérer le système étudié. Les résultats obtenus montrent que le capteur solaire thermique mis en essai à des niveaux de couverture en besoin d'eau chaude non négligeable avec une moyenne journalier de 5,2 kWh en saison estivale.

Keywords: capteur solaire thermique ; ballon d'eau chaude ; stockage d'énergie ; régulation ; performance énergétique.



ID: Ene-P-45

Analysis Study Design for Wireless Charging of Electric vehicle.

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Abstract: The well-designed receive and transmit coils increase the efficiency of the wireless charging system for electric vehicles. It has been found that adjusting their size, alignment, and amount of turns can enhance performance. This study analyzes the mutual inductance and magnetic field distribution using the Ansys Maxwell approach in order to determine the relationship between the number of turns of two circular spiral coils with various alignment axes. The new design has been validated by simulation results.

Keywords: Wireless charging, Circular coil design, Mutual inductance, Ansys Maxwell



ID: Ene-P-46

INFLUENCE OF THE AMBIENT TEMPERATURE ON THE EFFICIENCY OF GAS TURBINES

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Abstract: The water trickle cooler was chosen to cool and humidify the intake air at the same time because this system is adaptable to hot and dry areas, such as the HASSI MESSAOUD area (Saharan area).

Modeling results show that the trickle cooler allows the air to be conditioned before it enters the compressor. The presence of the cooling system produces a decrease in the ambient air temperature T_0 and an increase in the mass flow rate m . This has a direct influence on the performance improvement (power output P , thermal efficiency η_t) of the gas turbine plant.

Keywords: Gas turbine; humidify; the ambient air temperature; thermal efficiency.



ID: Ene-P-47

Optimization of solar CSP plant for algerian climate

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Abstract: Algeria and the world's use of fossil fuels is unsustainable with Algérie having an abundance of renewable energy sources, particularly solar irradiation. We need to imagine, design and transition to a future where electricity is effectively generated from Renewable Energy (RE) sources. The solution will require a mix of scalable renewable generation technologies. Concentrated Solar Power (CSP) plants are a form of RE generation where solar radiation falling on a large area ranging from a few hundred to hundreds of thousands of square metres is focused or concentrated onto a significantly smaller receiver area, up to several thousand times smaller than the collection area.

In this work we establish an optimization of solar CSP plant in Abadla area in TINDOUF. The analysis is based on the optimal number of hours of thermal storage to produce the kilowatt hour at a price competitive with photovoltaics.

Keywords: solar CSP, parabolic trough collector, levelized cost.



ID : Ene-P-48

A CFD computation of a simple pass solar air heater

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Abstract: This study investigates the turbulent air flow inside a straightforward solar air heater through numerical modeling. Using the CFD computational fluid dynamics techniques, the local properties have been displayed in several transverse and longitudinal planes. The NavierStokes equations are resolved using the conventional SST k- ω model in conjunction with the numerical model under consideration. The finite volume discretization approach was used to solve these equations. The results obtained by the CFD code "ANSYS Fluent" are compared and validated with an experimental result elaborated in Sfax region south-eastern of Tunisia which is considered as a suitable area for the exploitation of solar energy.

Keywords: Simple pass solar air heater; Numerical study; Solar energy; Performance; CFD.



ID: Ene-P-50

Amélioration des Performances de Séchoirs Solaires Indirects par l'Intégration de Chicanes:
Une Étude Expérimentale avec la Menthe

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Abstract: Cette étude expérimentale vise à améliorer un séchoir solaire en Algérie en utilisant des chicanes pour le séchage de la menthe dans des conditions de faible ensoleillement, tout en effectuant une évaluation rigoureuse de sa performance. Dix modèles mathématiques distincts ont été utilisés pour décrire la cinétique de séchage en couche mince de la menthe au sein de cette étude. Les résultats obtenus mettent en évidence que les modèles développés par Verma et al., ainsi que celui de Midilli-Kucuk, se sont révélés les plus appropriés pour décrire respectivement le processus de séchage solaire dans le séchoir solaire indirect muni de chicanes et en plein air. Au cours de cette expérience, la teneur en eau de la menthe a été significativement réduite, passant de 87 % à seulement 11 % en l'espace d'un à deux jours. Plus spécifiquement, l'utilisation du séchoir solaire indirect équipé de chicanes a permis d'atteindre une diffusivité effective de $1,47 \times 10^{-9} \text{ m}^2/\text{s}$ pour la menthe, tandis que le séchage solaire en plein air a conduit à une diffusivité effective de seulement $0,6 \times 10^{-9} \text{ m}^2/\text{s}$. Ces résultats mettent en évidence l'efficacité remarquable du séchoir solaire indirect à convection forcée équipé de chicanes dans le processus de séchage de la menthe, renforçant ainsi son potentiel pour des applications futures dans l'industrie agroalimentaire et la préservation des produits agricoles.

Keywords: Séchoirs solaires indirects ; Chicanes ; Convection forcée ; Séchage de la menthe; Diffusivité effective ; Modèles mathématiques..



ID: Ene-P-51

Aspect Ratio Effects on Two-dimensional Laminar Rayleigh-Bénard-Convection within Rectangular Enclosures

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Abstract: This paper deals with numerical investigation of steady two-dimensional laminar Rayleigh-Bénard-Convection inside an air-filled rectangular enclosure. The effects of aspect ratio AR (ratio between height-to-width of enclosure dimensions) on Rayleigh-Bénard convection heat transfer have been undertaken for the range of aspect ratio $0.25 \leq AR \leq 50$, Rayleigh number range $103 \leq Ra \leq 106$ (Ra defined based on the enclosure width L). Air is considered to be the working fluid with fixed Prandtl number ($Pr = 0.71$). Using Boussinesq approximation, the governing equations (momentum and energy equations) expressing in non-dimensional forms are numerically solved by using finite volume method and the SIMPLEC Algorithm is applied for the solution of the systems of governing equations. The influence of AR and Ra on the flow pattern and on the local temperature field across the enclosure are analyzed and discussed. The results show that the critical Rayleigh numbers (Ra_{cr}) for onsets of a steady convection is found to be largely dependent of AR. Moreover, it has been found that the mean Nusselt number increases with increasing Rayleigh number due to strengthening of convective transport. Suitable correlations, that will be useful for thermal engineering, are proposed for both the mean Nusselt number (Nu) and the critical Rayleigh numbers (Ra_{cr}) for the range of Rayleigh number and aspect ratio considered here.

Keywords: Rayleigh-Bénard convection; aspect ratio; finite volume method; SIMPLEC Algorithm; critical Rayleigh number.



ID: Ene-P-53

Calculation of inelastic cross section in hot plasma properties

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Abstract: When the impact approximation is valid, the half-width of a line broadened by collision is easily deduced from the expressions of the excitation and de-excitation cross sections. For inelastic collision, the cross section is written in terms of the trajectory of the perturber electrons, for an expression of the dipole potential interaction and the first expression of the transition matrix. In high temperatures (hot plasma), the free electrons are affected by these conditions. In this work, we applied the correction on the trajectory of the electrons calculated with relativistic corrections to calculate the inelastic cross sections, which are useful in the calculation of the stark broadening, the obtained results show that the relativistic corrections increase the values of the cross section and therefore the Stark broadening.

Keywords: Plasma, inelastic cross sections.



ID: Ene-P-56

DUNCLE model Evaluation for a conventional solar still made in Algeria

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Abstract: Solar distillation is an efficient and economical process for producing fresh water, especially in arid and semi-arid areas. The aim of this work is to verify and prove the validity of the Dunkle model under the meteorological conditions of the M'sila region for a conventional solar still.

Two typical days of the year were chosen for making the experimental measurements (April 10 and 11, 2017). The results obtained show a good agreement between the calculated and measured values, which made it possible to recommend the use of this model for the prediction of the performance of a conventional solar still at the M'sila site.



ID: Ene-P-57

Élaboration et caractérisation des matériaux Pr_2NiO_4 et $\text{Pr}_{1.95}\text{Sr}_{0.05}\text{Ni}_{0.95}\text{Co}_{0.05}\text{O}_4$ comme cathode de pile alcalin.

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Abstract: Les piles zinc-air sont des systèmes électrochimiques dont la réaction de réduction d'oxygène se fait au niveau de la cathode. Un des grands avantages de ces piles est que le composé réactif cathodique, l'oxygène, n'est pas contenu dans la pile mais dans l'air environnant, libérant de la place et de la masse pour mettre une plus grande quantité de composé anodique et aboutir à des énergies massiques élevées. Notre travail se focalise sur la synthèse et la mise en œuvre des matériaux Pr_2NiO_4 et $\text{Pr}_{1.95}\text{Sr}_{0.05}\text{Ni}_{0.95}\text{Co}_{0.05}\text{O}_4$ qui peuvent présenter, en terme de leur application possible comme matériau de cathode de piles alcalines à des températures ambiantes, de bonnes propriétés électrochimiques vis-à-vis la réaction de réduction d'oxygène (RRO). L'étude de ces matériaux est basée sur son utilisation comme cathode sous forme de disque tournant (RDE) à différentes vitesses de rotation. Le matériau a été synthétisé sous forme de poudres par la méthode sol-gel.

Les propriétés structurelle, morphologique de ces matériaux de cathode ont été étudiées et caractérisées par diffraction des rayons X (DRX), microscopie électronique à balayage (MEB).

Keywords: Pile zinc-air; RRO; Sol-gel; DRX; MEB.



ID: Ene-P-58

Enhanced control of multiphase permanent magnet synchronous motor drive using an adaptive neuro-fuzzy controller

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Abstract: In this article a direct vector control (DVC) strategy for a five phase permanent magnet synchronous motor (5P-PMSM) controlled by neuro-fuzzy system is proposed. Traditional DVC methods have limitations include mediocre dynamic performances, reduced robustness and parameter tuning complications when using proportional-integral (PI) regulators applied to 5P-PMSM. This work proposes a new robust control strategy based on adaptive neuro-fuzzy inference system (ANFIS). Simulation results by using ANFIS are compared with those of the conventional DVC with PI regulators. This algorithm can solve the problems caused by the use of traditional PI regulators by improving the dynamic responses and reducing the torque ripple of the 5P-PMSM.

Keywords: Adaptive neuro-fuzzy inference system ; direct vector control ; five phase permanent magnet synchronous motor ; PI controller.



ID: Ene-P-59

Enhancing Energy Efficiency in Earth Air Heat Exchangers using Grasshopper Optimization

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Abstract: This article explores the application of Grasshopper Optimization, a nature-inspired algorithm, to enhance the energy efficiency of Earth Air Heat Exchangers (EAHEs). EAHEs are an eco-friendly HVAC system, and optimizing their performance is crucial for sustainable building design. The study presents a methodology for using Grasshopper Optimization to fine-tune the design parameters of EAHEs, resulting in significantly improved energy efficiency and reduced environmental impact. The research demonstrates the potential of this approach to advance green building technologies and contribute to energy conservation.

Keywords: Earth Air Heat Exchangers (EAHEs); Grasshopper Optimization; Energy Efficiency; Sustainable Building Design; Eco-Friendly HVAC; Energy Conservation.



ID: Ene-P-60

Heat transfer enhancement in a metal hydride reactor

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Abstract: Numerical analysis has been performed to study the effect of adding fins to a LaNi₅ metal hydride reactor on the heat transfer and performance of the reactor., with a focus on the two-dimensional aspect. The governing equations for the absorption process were obtained, taking into account the principles of mass, heat, and momentum conservation. To solve the mathematical model, the Finite Volume Method with the Alternating Direction Implicit (ADI) technique were employed. The calculation code was edited in Fortran language. The results showed that the addition of fins could significantly enhance the heat transfer and performance of the reactor. Specifically, the study found that adding fins with a larger number leads to faster hydrogen absorption rates. Moreover, the addition of fins was found to improve the temperature distribution within the reactor, with a more uniform temperature distribution observed when a larger number of fins were added. The study also investigated the effect of different fin dimensions on the heat transfer and performance of the reactor. The results showed that increasing the fin height and thickness could further enhance the heat transfer and performance of the reactor. As conclusion, the results demonstrate that adding fins to a LaNi₅ metal hydride reactor can significantly improve its heat transfer and performance. The findings suggest that optimizing the number and geometry of fins can enhance the efficiency of metal hydride reactor.

Keywords: Metal hydride; finite volume method; heat transfer; two-dimensional model.



ID: Ene-P-61

How to improve heat transfer between two solids in rough contact numerical study

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ABSTRACT: A numerical simulation by the computer code ABAQUS (6.14) was conducted to study the influence of the thermal conductivity, the interstitial fluid convection coefficient and surface roughness on the thermal contact conductance "TCC" to improve the heat transfer between the materials in rough contact.

From Fourier law for steady state heat transfer by conduction, the thermal contact conductance TCC. Where Q is the average flow of heat between the hot (Q_{ch}) and cold (Q_f) specimens (W/m^2); T_{ch} and T_f are the closest surface temperatures of hot and cold specimens at the interface ($^{\circ}C$). T_{ch} and T_f are measured numerically. Results indicated that the surface roughness and thermal conductivity present a power law relationship with heat transfer enhancement unlike to the effects of interstitial fluid convection coefficient which influences weakly.



ID: Ene-P-62

The effect of the integration of porous ribs on thermal- hydrodynamic performance of a solar air heater

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Abstract: The insertion of the porous medium is very important in the heating techniques which improve the heat transfer process in the solar air collectors. In this study, the effect of using porous ribs on heat removal, heat convection coefficient, and average Nusselt number is examined. The finite volume method is employed to solve the governing equations, and the RNG k- ϵ turbulence model is used to describe the turbulent fluctuations of velocities and scalar quantities. The results indicate that the inclusion of porous ribs significantly enhances heat transfer and reduces friction rates in the channel. where, the presence of porous ribs increases thermal performance by 20% to 40% across various Reynolds numbers ($3600 < Re < 5500$) compared to conventional solar air heaters.

Keywords: Heat Transfer Rate; Air Solar Collector; Ribs; Porous Medium.



ID: Ene-P-63

The enhancement of energy quality is being studied using the shunt compensation system
SVC

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Abstract: This article discusses various approaches for calculating the reactive power and tension in Here, we want to clarify the key differences between the calculation of the power flow using the compensation or without. And to calculate the parameter of the SVC and the cost of power with and without of compensation system. This paper presents the various methods for electrical network analysis, calculate the power and voltage in the nodes of electric network (principles and technique solution), modeling, and equations of the svc Compensator.

Keywords: tension;svc power;electrical network;nodes.



ID: Ene-P-64

The TCSC series compensation system's technical and financial effects on the energy system

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Abstract: This article discusses various approaches for calculating the reactive power and tension in the electrical network's nodes (principles and methodology solutions), as well as modeling and the tcsc Compensator equation. Here, we want to make clear the key distinction between power flow calculations with and without compensation. in addition to figuring out the TCSC parameter and the cost of electricity both with and without a compensation system. to improve both the expense and the quality of energy (tension, power).

Keywords: energy;electrical network's;tcsc;tension.



ID: Ene-P-65

The thermo-hydraulic characterization of a mini heat exchanger equipped with corrugated walls

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Abstract: This study aims to improve the performance of concentric double tube heat exchangers. The thermo-hydraulic parameters were analyzed through the simultaneous use of sinusoidal corrugated tubes, the simulation was carried out for counter-current flow, water was used as the working fluid, whose hot and cold fluid temperatures is 40°C and 15°C respectively. The Reynolds numbers were considered in the range of 3000 to 11000, the standard (k- ϵ) turbulence model was used. In addition, the governing equations were solved using the finite volume method in a structured uniform grid arrangement. The results obtained showed that corrugations lead to an improvement in the heat transfer rate, and a better Nusselt number was obtained in the case of a corrugated inner tube and smooth outer tube exchanger.

Keywords: Heat exchanger; turbulent; Corrugated channel; finite volume method.



ID: Ene-P-66

The use of machine learning for the prediction of plasma properties

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Abstract: Machine learning, has become a powerful tool across a diverse range of fields and applications due to its ability to analyze large amounts of data, identify patterns, and make predictions or decisions without being explicitly programmed for specific tasks. In our study, Machine Learning was employed as a computational tool to predict specific plasma properties.

Keywords: Machine learning, regression, plasma.



ID: Ene-P-67

Thin-layer mathematical modeling of of tomato slices in new solar greenhouse dryer under semi-arid climate

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Abstract: Solar drying experiments were conducted on tomatoes in El Oued, Algeria, to address the high moisture content of this produce, necessitating effective drying techniques. In pursuit of this objective, a novel solar greenhouse dryer was designed and constructed. Ten different mathematical models, widely documented in the literature, were employed to compare their accuracy in estimating solar drying kinetics. Throughout the experimental process, the moisture content of the tomatoes was significantly reduced, decreasing from 13.28 kgH₂O/kg d.b. to a mere 0.06 kgH₂O/kg d.b. in just one and a half days.

Statistical analysis results indicate that the Midilli-Kucuk drying model exhibited superior performance in fitting the experimental drying data for tomatoes, achieving an impressive coefficient of determination (R²) of 0.9977 compared to other models.

Keywords: Solar drying; Tomato drying; Thin-layer drying models; Drying kinetics; Experimental study ; Sustainable agriculture.



ID: Ene-P-68

Development and Characterization of a Bio-adsorbent for the Reduction of Organic Matter from Photovoltaic Industries Discharges

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Abstract: Discharges of effluents, from the surface treatment of semiconductor materials (PV cells factory), in the nature affects many biodiversity cycles. Adsorption is one of the most effective treatment processes for removing organic pollutants, particularly by using a natural material (Bio) as adsorbent to move towards green chemistry. The objective of this work is the development and characterization of a natural material (resulting from banana peels) as a bio-adsorbent for the reduction of organic matter present in effluents from the semiconductor and PV cells industries. A raw bio-adsorbent called (B) and an activated one by the phosphoric acid named (Ba) were obtained, both materials were characterized by Optical Microscope (OM), Scanning Electron Microscopy (SEM), and Fourier Transform Infrared Spectroscopy (FTIR); the results showed that the modification was effective. Adsorption of the methylene blue (model of the organic pollutants) was found to be more so consistent with the Freundlich model than the Langmuir model. Significant methylene blue reduction was attained after 10 minutes of treatment time using a bio-adsorbent quantity of 0.25 g / 100 ml, at a pH of 9. The originality of this work is that published research works on the PV cells factory discharges treatments are limited, even less using bio materials.

Keywords: PV Cells, Adsorption, Banana peels, Methylene Blue.



ID: Ene-P-69

Smart Irrigation Foggara System

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Abstract: The worldwide residential, manufacturing, and farming communities all rely on a reliable water supply. Foggara, located in the Gourara district of southern Ghardaia, was a historic international traditional irrigation system. The worldwide residential, industrial, and agricultural sectors need water. The southern Gourara area of Ghardaia has an international traditional irrigation system called Foggara. Palm tree irrigation. Useful for hydrating palm fronds. The actual amount of water needed by this crop is unknown. When it comes to conserving time and water, an autonomous irrigation control system is an absolute must. In this work, a prototype for smart irrigation is proposed using a fritzing software, Arduino Uno, and a Soil Moisture Sensor. Initially, the findings indicate that the palm water requirements estimated by Cropwat and those delivered by the smart watering system are imbalanced. Small scale, the smart irrigation controller was that developed is highly efficient.

Keywords: Ghardaia, foggara, smart irrigation, palm, Arduino.



ID: Ene-P-70

Using MAX Phases Materials in Heat Transfer Applications

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Abstract: MAX phases are ternary and Nano-lamellar ceramics that have intermediate properties between those of ceramics and metals. They are good electrical and thermal conductors, machineable, tolerant to damage like metals, and they are rigid and refractory like ceramics. These phases attract the attention of the scientific community of our time because of their fascinating properties in energy storage, water purification, superior mechanical and electrical properties... etc. In this work, we will present the feasibility of integrating these new materials into heat transfer applications used specifically in solar thermal systems. A simulation study was carried out to determine the thermo-physical properties of a new heat transfer fluid, composed of a thermal oil and MAX particles, intended for parabolic solar collectors.

Keywords: MAX phases; heat transfer fluid; parabolic solar collectors; Matlab simulation.



ID: Ene-P-71

Sliding Mode Control and PI Controller for Wind Power Generation Systems with PMSG

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Abstract: This paper endeavors to conduct a comparative analysis between proportional-integral (PI) control and sliding mode control (SMC) for regulating a wind power generation system (WPGS) featuring a permanent magnet synchronous generator (PMSG). The conventional PI control exhibits challenges such as overshooting during startup and susceptibility to variations in PMSG parameters. In addressing these issues, we have employed SMC, which effectively mitigates start-up overshoot and enhances robustness against variations in PMSG parameters.

Keywords: PMSG, wind turbine, PI, SMC, robustness.



ID: Ene-P-73

Control of a wind system by adaptive fuzzy logic based on DFIG

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Abstract: We will look at a system that contains a variable-speed wind turbine and a dual-feed asynchronous machine (DFIG) that is connected to the grid via a stator and fed by a transducer on the rotor's side. In this work, the vectors are controlled individually for the active and reactive power flow between the stator (DFIG) and the grid, which is addressed using classical PI and fuzzy logic. Judo tracking that is useful for achieving the best operating point and maximum power output. The findings proved the advantages of the proposed smart control unit based on fog systems

Keywords: Doubly Fed Induction Generator (DFIG), Variable Wind Speed, Active and Reactive Power, Maximum Power Point Tracking (MPPT), adaptive fuzzy logic, Proportional Integral (PI).



ID: Ene-P-74

Numerical and experimental analyses of solar still productivity and exergy under Sfax climate conditions

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Abstract: Solar still based water distillation is a promising technology to solve the water scarcity problem. In this work, the feasibility of the implementation of water desalination system using a passive solar still in actual Tunisia Sfax central region climate conditions was studied. Three different glass cover angles ranging from 0° up to 60° were numerically investigated. The experimental study is carried out in a summer day using a solar still equipped with a glass cover having a till angle of 45°. The flow solution was obtained with the Fluent solver Eulerian multiphase model coupled to a developed C++ mass transfer code based on the Dunkle model. Experimental and numerical results showed a good agreement. The optimal glass cover angle was found to be of 20°. Results proved that the solar still can be an efficient device for solar desalination in Tunisia central region of Sfax. The maximum cumulative value of the fresh water productivity over the day is about 3083.11 ml.

Keywords: Water desalination, Solar still, Glass cover angle, Tunisia Sfax conditions.



ID: Ene-P-76

Multiple reflections of laser beam during welding

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Abstract: Laser welding has revolutionized the welding industry due to its superior precision and his super speed. Among the most common types of lasers in welding: the CO₂ laser, which produces a beam that is highly absorbed by metals, which facilitates the welding process.

However, the absorption of the CO₂ laser by metal alloys is influenced by various factors. Therefore, the aim of this poster project is to study how metallic alloy (Titanium alloy in our study) occurs and to study the energy absorbed during welding and focus on some factors that affect this absorption. A numerical model was used to describe and calculate the energy absorbed by the metal alloy; taking into account the heat source (source term), which depends on the absorption coefficient linked to the multiple Fresnel reflections. The calculations were carried out using a program in Fortran language.

Keywords: Laser welding; absorption; laser source; metal alloys; Fresnel multi reflections; absorption coefficient.



ID: Ene-P-77

Start of injection effect on performance and emissions of combustion engines fed with diesel-waste oil biodiesel blend

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Abstract: The use of biodiesel as an alternative fuel can be a solution for reducing pollutant emissions from internal combustion engines. Unlike previous studies investigating the biodiesel ratio in the blend, the present study aims to optimize the start of injection timing on the performance and exhaust emissions of a four-stroke engine fueled by 20% of waste oil biodiesel and 80% of diesel referred as the B20 blend. In this study, six start of injection timings of -40° , -30° , -20° , -10° , -5° , and 0° were numerically investigated. The numerical model was validated with test data in terms of the emissions and the output torque. Based on the outcomes of the present work, tuning a start of injection timing angle to -30° of the crankshaft angle before the top dead center results in high performance as well as low emissions at the exhaust manifold of engines fueled by diesel-biodiesel blend.

Keywords: Biodiesel, Start of injection timing, One -dimensional engine model, Performance, Hydrocarbons, Nitrogen and Carbon oxides emissions.



ID: Ene-P-78

New Materials Based Porous Silicon Nanowires for Lithium Ion Battery Anode

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Abstract: In this work, porous silicon nanowires modified with silver nanoparticles (PSiNW/Ag), were investigated for potential application as anode in lithium-ion batteries (LIBs). Free-standing porous silicon nanowires with diameters ranging from 50 to 100 nm and a porosity of approximately 60% were prepared by single-step metal-assisted chemical etching of n-type silicon wafer. The morphological structure of the the two materials will be analyzed by XRD, SEM, and XPS. After the development of the anodes and the assembling of the batteries, their electrochemical performances will be studied using the EIS, CV, and CDG methods. Galvanostatic charge/discharge measurements evaluated between 2 and 0.01 V for both electrodes. A specific capacity of about 3800 mA h g⁻¹ with a Coulombic efficiency of 98.8% at the first charge/discharge cycle was measured for the PSiNWs/Ag electrode. After 100 cycles, The results obtained show a good electrochemical performance for the two anodes with a remarkable improvement in the performance of the anode of the PSiNWs/Ag compared to the anode of the unmodified PSiNWs, and from there we show the role of the added silver nanoparticles in improving the anode's capacities.

Keywords: Porous silicon nanowires, Lithium ion batteries, Energy storage.



ID: Ene-P-79

Electrochemical stability of carbon/Cu₂S based photocathode used for CO₂ reduction

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Abstract: Photoelectrochemical reduction of CO₂ (CO₂RR) into chemical fuels and other energy-dense products is one of the current renewable energy processes resulting from global warming, primarily caused by high levels of atmospheric carbon dioxide (CO₂). The photocatalyst used in this study is copper sulphide "Cu₂S", which is deposited on carbon graphite rods to form photocathodes. electrochemical characterizations using a potentiostat station were carried out and a standard electrochemical cell with three electrodes and a basic electrolytic solution of K₂CO₃ by varying their concentration of 0.01M, 0.1M and 0.5M. We performed cyclic voltammetry with and without CO₂ purge and chronoamperometry to study the stability of our photocathodes. The results show that there is an evolution of oxidation-reduction reactions in the case of Cu₂S photocathodes depending on the concentration of the electrolyte, as well as good photocathode stability, the photocurrent delivered is greater which reaches 200 mA in the case of K₂CO₃ at 0.5M.

Keywords: stability; CO₂ conversion; graphite; Cu₂S photocathode.



ID: Ene-P-80

Intelligent controller of non-isolated interleaved DC/DC converter for Fuel Cell applications

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Abstract: Fuel cell electric vehicles (FCEVs) are a potentially viable solution for mitigating greenhouse gas emissions and reducing reliance on fossil fuels within the transportation industry. Nevertheless, FCEVs encounter various obstacles regarding reliability and control. This paper aims to address the challenges above. The utilization of a Fuel cell (FC) power source is intrinsically connected to a DC/DC power converter. The functioning of this network is characterized by nonlinearity. In order to address the convergence issue and determine the optimal controller parameters, a commonly employed method is the utilization of a linearized approach. A multi-phase interleaved DC/DC boost converter has been implemented to enhance reliability and elevate the low output voltage of the FC to the high DC bus voltage while simultaneously achieving high efficiency and minimizing input current ripple. This study employed an intelligent controller to regulate the engineered system. This paper presents a controller that offers straightforward resolutions to nonlinear control challenges encountered in power electronics. Simulations were conducted in the Matlab-Simulink environment to validate the proposed scheme and control strategy. The findings provide evidence of the converter's and control strategy's effectiveness and operational capabilities.

Keywords: Fuel Cell Electric Vehicle; Intelligent Controller ; Interleaved DC/DC Boost Converter; Non-linear control; PEMFC; Reliability.



ID: Ene-P-81

Investigation of Surface Passivation Layers (SiO₂) for n-type Mono-Crystalline Silicon

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Abstract: Thinner c-Si wafers are increasingly being used as the basis material for high-efficiency solar cells, however this has led to an increase in electrical losses at the c-Si surface, which has led to a need to reduce recombination losses at the semiconductor interface. The experiments were performed on 4-inch CZ-n (100) monocrystalline silicon wafers with low resistivity. In the first step alkaline saw damage etch and Piranha etch cleaning (mixture of sulfuric acid + hydrogen peroxide). In this work, the influence of the oxygen flow during annealing process on the operating parameters of the emitter were been studied. To investigate the influence of thermal oxide layer SiO₂ after annealing, two structures n-900 and n-850 were fabricated at 900 °C and 850°C for the same deposition time of 20 min in the LYDOP type with PoCl₃ and the same parameters (gas flow). The PSG conductive glass where removed using hydrofluoric acid. During the annealing process, we change the O₂ oxygen flow 0 to 4 slm. we discovered that the sheet's resistance dramatically drops, especially at temperatures of 900°C. We can be concluded that the quality of passivation depends greatly on temperature. In fact, when the volume of oxygen flow increased throughout the annealing process, the effective lifetime increased dramatically to a maximum value of over 180 microseconds at a temperature range of 850°C. We discovered that the volume of oxygen flow necessary for annealing is 2 slm at 900°C.

Keywords: n-type Cz-Si, SiO₂, ECV, QssPc.



ID: Ene-P-83

Modeling and drying kinetics of eucalyptus leaves under a forced convection direct solar dryer

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Abstract: Eucalyptus leaves are well-known for their medicinal characteristics, which are frequently used in both traditional and modern medicine for therapeutic purposes. In this work, the drying kinetics of eucalyptus leaves are presented, along with the suitable mathematical models, drying rate and effective moisture diffusivity are presented under a forced convection direct solar dryer. The results shows that from an initial moisture content of 49.79% (wet basis) it took the dryer 195 min to reach a final moisture content of 4.16% (wet basis) with a drying rate reaching 0.0079 (kg water/kg d.b.)/s. Midilli-Kucuk provided the best agreement between experimental and predicted moisture ratios with $R^2 = 0.9981$, $X = 0.00206$ and $RMSE = 0.02057$. The average effective moisture diffusivity for eucalyptus leaves inside the direct solar dryer was calculated as $2.1123 \times 10^{-10} \text{ m}^2/\text{s}$

Keywords: Eucalyptus; Direct solar dryer; Forced convection; Drying kinetics; Mathematical modeling.



ID: Ene-P-86

Neuro-second order sliding mode control of a five-phase induction motor drive supplied by a three-level five-phase inverter

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Abstract: Recently, field-oriented control (FOC) based proportional-integral (PI) controllers have become dominant for multi-phase induction motor due to its simplicity and good dynamic response. But this method has some drawbacks, where this technique gives more torque ripples and thus reduces the robustness of the system. This work introduces a robust technique for controlling the five phase induction motor (FP-IM) supplied by a three-level five-phase inverter (TL-FPI). This technique depends on two well known control methods, the first one using a second order sliding mode control (SOSMC), which has a main advantage known as a sliding mode property. In the second, the Artificial intelligence (AI) techniques is used to overcome the occurring chattering phenomena caused by the discontinuous control action using artificial neural network (ANN). The success of the proposed control technique, which is applied to the 5P-IM, is confirmed by Matlab/Simulink software, and then it is analyzed and compares it with traditional control technique.

Keywords: Artificial neural network ; chattering phenomena ; field-oriented control ; five phase induction motor ; PI controller ; three-level five-phase inverter.



ID: Ene-P-87

Numerical investigation of how hole number affects natural frequencies of woven composite planar beams

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Abstract. The ANSYS software, based on the "finite element method," was used to investigate the natural oscillations of planar beams. The primary aim of this research is to investigate the natural oscillation of planar beams composed of composite materials, a matrix of epoxy reinforced by woven fibreglass, with or without perforations in planar beams. The objective of this research is to include the whole dimensions of the panel (550mm, 50mm, 10mm) and the pertinent characteristics of the composite material constituting the panel by using the principles of composite materials. The determination of the first four natural frequencies (i.e., the first, second, third, and fourth modes) of a composite beam is typically carried out assuming fixed boundary conditions at one end. Subsequently, a central aperture was introduced into the plate, followed by the creation of additional apertures in pairs and triplets. Subsequently, the dimensional parameters and composite material qualities of the item under investigation were maintained. It is seen that the frequency ratio exhibits a decreasing trend for the first mode, an increasing trend for the second mode, and decreasing trends for both the third and fourth modes as the number of holes grows. Therefore, the presence of holes has an impact on the frequencies of the plate. Due to this factor, it is essential to exercise caution while considering the number of perforations in planar beams inside mechanical installations required for this investigation. This phenomenon may be attributed to the well-established understanding that objects with substantial mass and pliability have a propensity to undergo unrestricted oscillations.

Keywords: Free vibration, Composite materials, Planar beams, Modes, Natural frequencies.



ID: Ene-P-88

Allocation an independent photovoltaic station and determining its dimensions to supply a school in the state of El Oued

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Abstract: Solar energy is an infinite, unpredictable and permanent energy source among all other energy sources. Solar energy is a renewable type, clean, and inexhaustible which is sufficiently available on the Algerian territory. This work simulates the feasibility of installing a photovoltaic system insulated with batteries in a school in El Oued, Algeria. where the study is carried out to assess solar radiation and evaluate the technical and economic aspects of the PV system to supply domestic electrical energy needs. The program has been implemented by PVsyst6. The daily electricity consumption is about 42.99 kWh/day. On an annual basis, the energy that is injected into the grid is 19068 kWh. The average performance ratio (PR) of the Si-poly PV system is operated at 62.9% in the simulated study for the planned location.

Keywords: Solar energy; photovoltaic systems; dimensioning; PVsyst6, Numerical simulation



ID: Ene-P-89

Influence of N₂ content on the mechanical properties of CrZrN film

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Abstract: Based CrN has been frequently used in different industrial applications such as diffusion barriers in microelectronics, wear resistant films on cutting tools, optical, mechanical and tribological devices due its low high surface micro-hardness and high toughness, as compared with other nitrides transition. Among them, CrZrN films have excellent properties are reported in many works, which are presented a high oxidation resistance and a very low surface roughness. In this work Cr-Zr-N films were deposited by RF reactive magnetron by sputtering of chromium and zirconium under different nitrogen flow rate. The structures, morphology and mechanical properties of films as a function of N content were characterized. The Cr-Zr-N films exhibit only a tow-phase microstructure, containing a cubic CrN and ZrN phases at high nitrogen flow rate. The results reveal that the mechanical properties of films were depending N content. As the N content increases, the dense structure is obtained with a smooth surface. Also, the hardness is largely improved in comparison with CrZr films, especially at 44 at.% of N.

Keyword: CrN, ZrN, Cr-Zr-N, structure, Hardness.



ID: Ene-P-90

Enhancing the Performance of Smart Metering Systems

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Abstract: Precision in energy measurement is a crucial requirement in today's electric power sector for all smart grid systems, the increasing demand for domestic electrical energy calls for an optimization of energy distribution management by electricity providers, leading to the implementation of smart meters with high accuracy. It is evident that the greater the precision and intelligence embedded in these meters for measuring consumption, the closer we come to achieving fairness in the relationship between consumers and electric distribution companies. The main objective of the thesis is the design of an electrical energy metering system using wavelet transformation. To achieve this goal, we suggest a novel approach utilizing discrete wavelet transformation. This will be done through two main steps: the simulation of the method for calculating electrical energy through wavelet transformation in MATLAB.

Keywords: Energy meter, wavelet, microcontroller.



ID: Ene -P-91

Analytical study of energy storage by the integration of PCM in old and new buildings and new buildings

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Abstract: The use of phase change materials (PCM) as a thermal energy storage system integrated in new and old buildings has proven its worth as a promising source of renewable energy. PCM building heating and cooling applications have been studied by many scientists worldwide, based on numerical and experimental analysis. The experiments carried out mainly focused on designing a permanent prototype for active or passive application for a certain duration and weather condition. Applying PCMs in buildings helps lower indoor temperature and reduce temperature fluctuations and total hours of excess heat. In addition, PCMs can also absorb indoor heat dissipated by household equipment, lighting and occupant activities. Some researchers' results showed that the application areas of phase change materials are mainly concentrated in four parts of the northern latitude from 25 degrees to 60 degrees and the southern latitude from 25 degrees to 40 degrees, the use of paraffin is the most widespread (the maximum frequency of use reaches 87.5 %). For phase change organics, the melting temperature and heat of fusion vary from 19°C to 29°C and from 120 kJ/kg to 280 kJ/kg, respectively. Also, the application of phase change material is to reduce the air temperature in the room.



ID: Env-O-02

Architectural Innovations for Clean Air: Integrating Air Pollution Treatment Technologies into Building Design

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Abstract: In today's rapidly urbanizing world, global municipalities grapple with escalating air pollution, posing significant threats to both the environment and public health. Central to addressing this issue is the role of architecture. Historically seen as passive environmental elements, buildings are now recognized for their potential in proactively mitigating pollution. This research delves into innovative architectural designs and technologies that incorporate air pollution treatment. Rooted in an exhaustive literature review, the study tracks the evolution from aesthetics-driven architecture to environmentally harmonious designs. Key discoveries include the growing preference for bio-integrated designs, such as green walls, which serve both as visual enhancements and natural air purifiers. The adoption of advanced filtration technologies, merging traditional wisdom with contemporary innovation, is on the rise, as is the trend towards passive ventilation and renewable energy integrations in structures. Rather than viewing these solutions in silos, the research emphasizes the imperative of interdisciplinary collaboration, uniting architects, planners, environmentalists, and policymakers. With cities ever-expanding, the onus on architects grows, compelling a holistic architectural approach that views buildings not just as habitats but as pivotal tools in combating pollution. Harnessing architecture's full potential is vital for realizing cleaner, sustainable urban futures

Keywords: Architectural innovations; Air pollution treatment; Building design; Sustainable architecture; Indoor air quality.



ID: Env-O-05

Le Ghout de Souf face au modernes agricultures

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Abstract: La révolution agricole à Oued Souf a été lancée depuis les années 90 par un semi-pivot artisanal, ce qui améliorerait la productivité agricole et stimulerait l'emploi dans la région. Mais avec le temps le nature du Souf adapte sont paysages avec ce nouveau changement. Notre travail est de comprendre comment les pratiques agricoles modernes affectent le paysage et l'environnement du Souf, en particulier le sol, l'eau et la biodiversité notamment sur l'agriculture traditionnel du Soufi dans les ghouts. Pour ce faire, nous utiliserons des outils SIG (Système d'Information Géographique) pour analyser les données géospatiales et cartographiques afin d'identifier les changements qui se produisent dans le paysage et l'environnement du Souf. Nous examinerons également comment ces changements affectent la qualité de vie des populations locales et leur capacité à exploiter durablement les ressources naturelles. Enfin, nous chercherons à déterminer quelles mesures peuvent être mises en place pour améliorer la gestion des terres agricoles et réduire les impacts négatifs sur l'environnement

Keywords: Agricole, Oued Souf, environnement, impact, ghout eau.



ID: Env-O-06

Contribution of a Sand filter for soil and water conservation

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Abstract: The region of Ouargla suffers from soil pollution caused in particular by waste water and by the rise of the water table due to abundant irrigation. The irrigation method is fundamental for maintaining a wet bulb around the roots of the crop. This is the case with localized irrigation where soil moisture can be maintained permanently around the root system, between the two water content extremes. Also, one of the oldest methods used since Roman times throughout North Africa and the Near East is based on the frequent dumping of water into porous pottery vases buried in the ground. In this context, these two techniques have been combined by replacing the pottery vase with plastic bottles filled with sand that discharge water through their perforated walls into the surrounding soil. The objective is to determine the purifying power of the sand filter in the bottle. The results show a reduction in COD and BOD with a yield of 75%, as well as a reduction in MES with an average yield of 55%. The COD and the BOD at the outlet of the station are lower than the Algerian irrigation standard. On the other hand, the quantity of MES equal to 46mg/l is slightly higher than the standard (30mg/l). The elimination rate of nitrates, nitrites and phosphates from the bottle is 80%. In this context, the reuse of this waste as an adequate irrigation technique and sand filter will allow soil conservation and the safeguarding of water resources.

Keywords: Floor; water; conservation ; purification ; reuse.



ID: Env-O-08

Efficient Phosphorus Removal from Water Using Modified Biochar: Investigating
Adsorption Performance and Temperature Effects

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Abstract: Eutrophication resulting from the excessive presence of phosphorus in water bodies has emerged as a pressing environmental concern. Adsorption has been recognized as one of the most effective methods for phosphorus removal, offering a sustainable and efficient approach to water treatment. In this study, lanthanum modified biochar, specifically L-DPB700, was investigated for its phosphorus adsorption capabilities. In our study, a single-step pyrolysis has been processed to produce our biochar, then after synthesized it we get our lanthanum-modified biochar (L-DPB700). The effect of temperature on the adsorption capacity of L-DPB700 for phosphorus was investigated. It was observed that the adsorption capacity decreased with rising temperature, indicating an inverse relationship. The decrease in adsorption capacity at higher temperatures suggested that the adsorption process is influenced by an exothermic nature. The increased thermal energy at elevated temperatures hindered the phosphorus adsorption onto the modified biochar, leading to reduced efficiency. These findings highlight the importance of considering temperature effects when utilizing L-DPB700 for phosphorus removal from water.

Keywords: Eutrophication, Adsorption, Biochar, Lanthanum, Phosphorus.



ID: Env-O-11

Green Building Certifications and Wastewater Management: A Comprehensive Analysis

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Abstract: Amidst significant urban growth and environmental dilemmas, prioritizing sustainable practices in architecture and urban development has become essential. This study delves into the relationship between green building certifications, like LEED and BREEAM, and wastewater management integral facets of sustainable infrastructure. While these certifications vary, they uniformly emphasize energy efficiency, renewable resource utilization, and waste reduction. Despite wastewater management's pivotal role, it's often overshadowed in sustainability dialogues. The research evaluates its diverse treatment methods, promoting both structural and environmental health. Comprehensive case studies from diverse geographic and societal backgrounds reveal success patterns and challenges when integrating green building and wastewater methods, indicating a potential symbiosis enhancing sustainability. However, merging these domains faces challenges like financial costs, regulatory complexities, and knowledge gaps across disciplines. As urban expansion accelerates, the onus on developers transcends mere building, requiring a synchronized approach among professionals, regulators, and scholars. The research advocates weaving green building standards with wastewater practices, aiming for urban environments that embody resilience, efficiency, and environmental respect. This interplay presents a future urban blueprint, highlighting architecture harmoniously blended with nature.

Keywords: Green Building Certifications; Wastewater Management; Sustainable Practices; Urban Sustainability; Infrastructure Development.



ID: Env-O-14

NOUVELLES VISIONS SUR L'UTILISATION DE KMnO_4 EN PREOXYDATION POUR
L'OPTIMISATION DU PROCEDE OXYDATION/FLOCCULATION ET LA REDUCTION
DE LA FORMATION DES (THM) DANS LES EAUX POTABLES.

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Abstract: Etant donné l'importance de l'oxydation et de la coagulation-floculation dans l'élimination de la matière organique en particulier les substances humiques (SH), nous nous sommes intéressés dans cette étude à observer l'influence de la préoxydation au chlore et au permanganate de potassium sur l'élimination par coagulation-floculation des substances humiques et sur le taux de formation d'organohalogènes (THM). Pour ce faire, un travail expérimental a été réalisé sur des eaux d'origine et de minéralisation différentes. L'étude a montré que, quelle que soit la minéralisation de l'eau, la préchloration présente plus d'inconvénients que d'avantages : elle perturbe et limite la floculation des SH et entraîne la formation d'organohalogènes, tandis que la préoxydation au KMnO_4 est une bonne solution pour mieux éliminer les SH, réduire la formation d'organohalogènes et minimiser la demande finale en chlore en rendant la matière organique moins réactive vis-à-vis de ce dernier.

Keywords: Oxydation, chlore, permanganate de potassium, substances humiques, THM.



ID: Env-O-19

The impact of fuel mixture composition on the structure of C₃H₈/Syngas diffusion flame and its CO/CO₂ emissions

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Abstract: Climate change and global warming are among the world's biggest problems today. One of their leading causes is the use of fossil fuels and their carbon emissions. Several alternative and biobased fuels have been developed to address this issue to reduce carbon emissions. In this light, we conducted a numerical study to examine the effect of the fuel mixture composition and the strain rate on propane/syngas diffusion flame using the Ansys Chemkin code, fed by the USC Mech ver 2.0 chemical kinetic mechanism. The result showed that each flame exhibits a peak temperature at an intermediate value of strain rate; syngas enrichment increases the flame temperature even though the energy input decreases, Finally, syngas-rich fuel mixtures flames generate high carbon monoxide emissions, while propane-rich fuel mixtures flames result in higher carbon dioxide emissions.

Keywords: Diffusion flames; strain rate; carbon emissions; Propane; Syngas.



ID: Env-O-20

Thermo-Chemical Properties of Alternative Fuels in Internal Combustion.

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Abstract: Many researchers are devoting effort to overcome the fossil fuel crisis. This work contributes to the optimization of renewable energy applications in the internal combustion by using alternative fuel. Therefore, the main parameters used in this field are temperature of combustion and pollutants emission because they are the important factors explored to select fuels over others and to know the behavior of flame. In this line, the current work uses biogas, Hydrogen and LPG fuels to supply the combustion chamber under the same operating conditions. Accordingly, we investigated the numerical computations of main chemical parameters (such as CO, OH and NO_x), including different processes that ensure the reliability of the results. Generally, Both Biofuel and H₂ prioritize environmental conservation.

Keywords: Turbulent Combustion, Pollutants, fuel , Computational Fluids Dynamics.



ID: Env-O-21

Studying the effect of treating water contaminated with methylene blue dye using Deglet Nour date pits as a low-cost material and applying the treated water to the germination of some plant species

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Abstract: The study explored the potential of date seed biomass (*Phoenix dactylifera* Var. Deglet Nour) as a low-cost adsorbent for removing methylene blue (MB) from aqueous solutions. Physicochemical properties of the date seeds were analyzed using techniques like Fourier-transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). The point of zero charge (pHpzc) of the date seeds was also determined. In batch mode experiments, various parameters were investigated, including adsorbent dosage (20–220 mg), solution pH (2–11), and contact time (1–540 min). The equilibrium data exhibited a better fit with the Langmuir isotherm model compared to Freundlich and Temkin models. The maximum adsorption capacity of date seeds for MB was 208 mg/g at 303 K. The kinetic study revealed that the adsorption process followed a pseudo-second-order (PSO) model. Additionally, the impact of water treated with MB on the germination and growth of durum wheat seedlings (*Triticum durum* Desf. cultivar VITRON) was investigated. Germination experiments were conducted using distilled water (control), treated water (23.28 mg/L MB), and polluted water (100 mg/L MB). The findings indicated that the wheat variety was sensitive to the toxic effects of high concentrations of methylene blue dye. However, germination with treated water closely resembled the control, suggesting that treated water could be suitable for irrigation purposes.

Keywords: Adsorption; biomass; methylene blue; germination; water treatment.



ID: Env-O-23

Mitigation of global warming and climate change impacts on the evaporation losses from open lakes using FPV, A Case Study of Lake Réghaïa, Algeria

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Abstract: This study aims to assess the impact of global warming and climate change on the evaporation losses from Lake Réghaïa and present appropriate mitigation measures. Floating photovoltaic (FPV) is used for partially covering the Lake Réghaïa for reducing water evaporation as well as electricity production. Evaporation rate from open lakes depends on different parameters such as temperature (T), wind speed (U) and relative humidity (RH). However, the temperature increase has decreased the relative humidity and different scenarios have been considered for this decrease (-1, -2, -3, -4 and -5%). The results revealed decreasing the relative humidity increased the losses by 0.31, 0.92, 1.82, 2.98, 4.38 MCM/year. The total losses from the lake due to changes in climate parameters (T, U, RH) reached 1.1, 2.77, 5.15, 8.04, and 12.75 MCM/year. Covering parts of the lake by FPV could be an appropriate solution to reduce the evaporation losses. The evaporation from the Lake has decreased by 0.72, 1.44, 2.16, 2.88 and 3.6 MCM/year and the annual rate of electricity production from FPV panels reached 251, 502, 752, 1003 and 1254 MWh/year for covering 10, 20, 30, 40 and 50% of the area by FPV, respectively. This study can be applied in different areas in Algeria and worldwide to overcome lack of water and energy. Findings of this study could help to mitigate climate change by reducing water losses from Lakes that increase water resources and energy.

Keywords: global warming; climate change; evaporation losses; FPV; Lake Réghaïa, Algeria.



ID: Env-P-01

A physiochemical and microbiological study to compare some drinking water from mobile reservoirs in Touggourt

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Abstract: The water that is used for drinking is one of the basic human needs, which is supposed to have specific standards in terms of taste and color in addition to the physicochemical and biological specifications. In this area, the current study focused on analyzing and evaluating the quality of drinking water for some mobile tanks for selling water in the state of Touggourt. As a starting point, two samples were randomly selected from two tanks (a sample of filtered water and a sample of chamber water), and the third sample was taken from a home tank containing tap water. Physiochemical and microbiological analyzes were conducted on it, and the results were compared with the standard specifications of the Algerian Official Gazette and the World Health Organization for drinking water. The microbiological analyzes showed that the samples were free of Coliform and streptococci bacteria, and the presence of Clostridium is evidence of the lack of periodic cleaning of the tanks. As for the physiochemical analyzes, they were not good in general, especially the water sample of the domestic tank. Finally, we concluded that the filter water sample and the chamber water are suitable for human consumption, and on the contrary, the household tank water sample is not suitable for human consumption.

Keywords: Water from drinking tanks; Physiochemical analyzes; Microbiological analyzes; Filtered water; Well water; National standards ; WHO standards.



ID: Env-P-02

Antimicrobial dégradation with high efficiency through biosynthesis of CN nanocomposites

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Abstract: This study synthesized (NC) nanocomposite using a green synthesis method with Mentha pulegium leaf extract. Characterization techniques such as UV-vis, FTIR, SEM, TGA, and XRD were employed to confirm the formation of NC and thermogravimetric analysis to evaluate the breakdown of NC in the presence of heat. XRD analysis showed a particle size of about 50 nm and SEM images of NC revealed spherical shaped agglomerated particles. The optical bandgap energy of the NC was estimated to be 2.51 eV for direct bandgap and 1.57 eV for allowable indirect bandgap. Photocatalytic activity of the NC was evaluated for the degradation of Amoxicillin, Cephalexin, and Metronidazole antibiotics under sunlight irradiation, showing degradation efficiencies of 71%, 69%, and 99%, respectively, suggesting the potential of NC for removal of antibiotics from waterways. First-principles theory was employed to establish the adsorption energy (E_{ad}) of the antibiotic species, including Amoxicillin, Cephalexin, and Metronidazole, on the surface of the nanocomposite, which were found to be -8.064, -8.791, and -21.385 eV, respectively, indicating strong adsorption.

Keywords: nanocomposite ; metronidazole ; cephalexin ; amoxicillin ; antibiotic ; wastewater.



ID: Env-P-03

Avenir des Ghouts dans la vallée du Souf sous l'impact de la qualité des eaux souterraines à l'aide de l'intelligence artificielle

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Abstract: Le développement économique remarquable qui a connu la vallée du Souf, au Sud-est de l'Algérie, suite à l'activité agricole intense, avec une croissance démographique significative accompagnée par une extension du tissu urbain, tous ces facteurs ont entraîné une augmentation de la demande d'eau souterraine, qui est la principale source à des fins domestiques, agricoles et industrielles, dans une région aride. La mauvaise gestion de cette importante ressource d'eau a entraîné des perturbations dans l'écosystème local, y compris les Ghouts, qui caractérisent la région du Souf, et en raison de son importance historique, économique et environnementale elle a été classée par l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO) comme patrimoine agricole mondial.

Keywords: Vallée du Souf, Ghout, Qualité des Eaux Souterraines, SIG, Intelligence Artificielle.



ID: Env-P-05

Élimination de bleu de méthylène de l'eau par l'échange ionique

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Abstract: Les colorants sont souvent considérés comme des polluants, et la majorité des recherches se sont concentrées sur leurs impacts environnementaux, négligeant les coûts associés à leur rejet. Cependant, le recyclage des colorants pourrait améliorer la rentabilité des processus industriels, notamment dans des secteurs comme l'industrie textile, qui génère 40 millions de tonnes de rejets colorés. Les méthodes actuelles d'élimination des colorants incluent les procédés d'oxydation avancés, qui traitent des concentrations limitées de colorants (<10 ppm), mais n'atteignent jamais une minéralisation totale. Les sous-produits incolores de ces procédés peuvent être plus nocifs que les colorants eux-mêmes. L'adsorption sur des déchets solides bon marché est une autre méthode, mais elle est moins efficace que les adsorbants traditionnels plus coûteux tels que le charbon actif. Face à cette problématique de pollution, une approche a été développée, consistant à fixer les colorants sur des résines échangeuses d'ions pour leur régénération et leur recyclage industriel. Cette approche permet d'économiser les coûts et d'éviter les rejets. Une étude de faisabilité a été réalisée sur le colorant cationique, le bleu de méthylène.

Keywords: Bleu de méthylène; adsorption; Minéralisation; Colorant cationique.



ID: Env-P-06

Enhancing Sustainable Wastewater Treatment with Muscovite Mineral Clay for Methylene Blue Removal: Optimization via Box-Behnken Design and a Novel AI-Guided Comparison of Conventional and Techno-Economic Methods

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Abstract: In this study, the effectiveness of Muscovite mineral clay as an adsorbent for the removal of Methylene Blue (MB) from water-based solutions is assessed. The investigation delves into the influence of initial MB concentration, adsorbent mass, and contact time on the MB removal process. To accurately predict MB removal efficiency, two modeling techniques, the Box-Behnken design with response surface methodology (BBD-RSM) and Artificial Neural Network (ANN), were employed. Both the RSM and ANN models provided reliable estimates of MB removal efficiency. To further enhance the optimization process, two distinct approaches were implemented. The first was a conventional method with the goal of maximizing dye removal efficiency (R). In contrast, the second approach, termed techno-economic optimization, incorporated multiple objectives. A comparative analysis of these methods revealed the superiority of the techno-economic approach over the conventional one.

Keywords: Muscovite, removal, MB, RSM, ANN.



ID: Env-P-07

Etude De L'évolution De La Qualité Des Eaux Usées De La STEP D'el-Kala Dans Différents Stades De Traitement (Nord-Est Algérien)

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Abstract: Notre travail consiste à une étude hydro chimique sur les eaux usées de la station d'épuration de la ville d'El-Kala qui est située dans la wilaya d'El Tarf (Nord-Est Algérien), se basant sur des analyses des paramètres physico-chimiques qui ont été effectués au laboratoire de la STEP El-Kala pendant deux périodes (périodes estivale, période hivernale) dans différents filières de traitement (Bassin d'entrée, Bassins d'aération, Décanteur, Bassin de sortie). A travers de ces analyses, différente méthode existante pour traitement des données va aussi nous permettre de mesurer les concentrations de la charge polluante dans les eaux usées et d'évaluer la capacité d'élimination des micropolluants (rendement de la station) ainsi que déterminer l'évolution spatiotemporelle de la qualité des eaux usées de la station d'épuration dans différents stades de traitements des eaux. Le traitement statistique et graphique des données mettre en évidence que la STEP d'El-Kala a un bon fonctionnement pour la biodégradabilité de la matière organique, ou on note pour les eaux épurées inférieures à la limite du rapport DCO/DBO5 qui égale à 3 pendant les deux périodes saisonnières. Ainsi que l'analyse des données enregistrées dans différents bassins mettre en évidence que la STEP d'El-Kala a un rendement d'élimination des polluants peu important, par conséquent le faible traitement qu'engendre la présence des micro-algues à un impact direct sur l'environnement.

Keywords: Nord-est Algérien, Eaux usées, Station d'épuration, Filières de traitement, Hydro-chimique.



ID: Env-P-10

Gravimetric Investigation of Zinc Oxide Nanoparticles as Effective Corrosion Inhibitors for XC70 Mild Steel in 1M HCl Acidic Environment

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Abstract: An environmentally sustainable approach and cost-effective synthesis method for zinc oxide nanoparticles using non-thermal plasma was investigated in this study. The success of the synthesis protocol was confirmed through X-ray powder diffraction (XRD) and Energy Dispersive X-Ray Analysis (EDX) analysis. The corrosion inhibition activity was studied using weight loss measurements, as well as scanning electron microscopy (SEM) and EDX, in a 1M solution of hydrochloric acid (HCl) as an aggressive medium at room temperature (298K), both in the presence and absence of ZnO NPs. The weight loss measurements demonstrated that zinc oxide can be considered an excellent corrosion inhibitor for XC70 mild steel in an acidic environment, with an inhibition efficiency of 84% at an effectiveness of 50 mg/l concentration. SEM and EDX analysis of the mild steel revealed the formation of a compact film that protects the surface from corrosive media and retards the corrosion rate. These findings highlight the potential usage of ZnO NPs to mitigate the corrosion of XC70 mild steel in 1M HCl acidic environment.

Keywords: Environmentally sustainable synthesis, Zinc oxide nanoparticles, Non-thermal plasma, Corrosion inhibition, Eco-friendly inhibitor, Mild steel



ID: Env-P-12

Le Traitement des effluents colorés

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Abstract: Le traitement des effluents colorés a pour but de réduire la présence des colorants, qui ont des effets néfastes sur l'environnement et sur la santé humaine car ils sont très toxiques. Pour cela on utilise l'adsorption comme méthode d'élimination, à cause de sa simplicité et son efficacité. On a utilisé un biosorbant (les coquilles d'œufs à l'état brute) comme adsorbant et le rose Bengale comme colorant. L'élimination a été testée en utilisant un biosorbant dans des réacteurs en batch. Une quantité prédéterminée de biosorbant a été placée en contact avec le colorant. Des prélèvements, à des temps bien déterminés, ont été effectués. Des mesures des concentrations résiduelles ont été réalisées par une analyse spectrophotométrique, après centrifugation si nécessaire. Les résultats obtenus montrent que la quantité éliminée du colorant est importante. Les résultats du MEB indiquent que le support étudié possède une surface poreuse, d'après les résultats du BET les coquilles d'œufs à l'état brute possède une surface spécifique importante.

Keywords: adsorption ; colorant ; adsorbant ; infra-rouge ; MEB ; BET.



ID: Env-P-13

Mechanical performance of recycled aggregate concrete

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Abstract: The depletion of natural resources is a big challenge for the sustainable manufacture of concrete. Replacing part of the natural aggregates with recycled aggregates will have a marked economic and environmental impact. The composite developed in this study is a concrete in which the natural aggregates (NA) (sand and gravel) have been substituted by recycled concrete aggregates with the following percentages: 0%; 15%; 30%; 50% and 100% of gravel or sand volume. Seven different concrete mixes were prepared. This experimental study consisted, first, to characterized all the used materials to evaluated their physical and mechanical properties. Second, to make concretes with different substitution rates of recycled gravel and sand. The mechanical properties of concrete are determined by compressive and bending tests, ultrasonic test, and Schmidt hammer test. The aim is to investigate the influence of recycled aggregates on the mechanical properties of concrete, and to prove that nondestructive testing are also valid to evaluate the properties of recycled aggregates concretes in comparison with the destructive testing. The obtained results show that the incorporation of 30 to 50% of recycled concrete gravel in a new concrete did not have a great influence on the compressive strength of concrete at the age of 7 and 28 days.

Keywords: Recycled aggregates; concrete; environment; mechanical properties; non destructive testing.



ID: Env-P-14

Surface Chemistry, Texture, and Adsorption Properties of Activated Carbons Derived from Agricultural Waste for the Removal of the anionic dyes : an application study

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Abstract: In this study, cost-effective and environmentally friendly activated carbons were synthesized from palm waste residues, a type of agricultural waste. These prepared activated carbons were employed for the adsorption of the anionic dye Congo Red. Texture characterization tests, such as iodine number and methylene blue adsorption, were conducted to assess the properties of the prepared activated carbons. To evaluate the adsorption potential of the activated carbons, batch adsorption experiments were carried out by varying various parameters such as pH of the medium (from 2 to 10), adsorbent dosage (from 0.025 to 1.5 g/L), contact time (from 20 to 600 minutes), and initial dye concentration (from 20 to 800 ppm).

Fourier-transform infrared spectroscopy (FTIR) was used to characterize the activated carbons before and after adsorption. The experimental data were fitted to Langmuir and Freundlich isotherm models to describe the adsorption behavior. The results clearly demonstrated that the adsorption phenomenon closely followed the Langmuir isotherm model. Furthermore, the sequential adsorption kinetics of Congo Red dye onto the activated carbons were best described by a pseudo-second-order kinetic model.

Keywords: Palm Residues; H₃PO₄-Activated Carbon; Adsorption; Congo Red.



ID: Env-P-15

Preparation and analysis of zinc oxide nanoparticles, and their application in the treatment of contaminated water

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Abstract: Metal oxide materials have emerged as intriguing contenders for effective wastewater treatment due to their distinctive physicochemical properties. The ability of zinc oxide (ZnO) and other metal oxide nanoparticles to effectively remove emerging contaminants, heavy metals, and organic pollutants from wastewater is well established. In this work, we will use ZnO nanoparticles produced by cold plasma (sliding arc) to degrade organic pigments. The created nanoparticles were studied by scanning electron microscopy, X-ray diffraction, Fourier transform infrared (FT-IR) and ultraviolet-visible (UV-Vis) spectroscopy. The degradation of dyes by nanoparticles was studied as a function of time, pH, nanoparticle mass, dye concentration and temperature. A new, highly effective material has been discovered that attenuates colors in daylight using photocatalysis.

Keywords: zinc oxide, nanoparticles, cold plasma, organic pollutant.



The Comparison of different mathematical methods for the estimation of BOD parameters of domestic wastewater at different pollution levels

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Abstract: The measurement of Biochemical Oxygen Demand (BOD) is essential for assessing organic pollution in domestic and industrial wastewater. This measurement involves quantifying the dissolved oxygen utilized by microorganisms during the biological oxidation of organic matter. The kinetics of BOD degradation is a key parameter for evaluating the efficiency of wastewater treatment processes. Various mathematical and graphical methods are used for determining the kinetic parameters k (rate constant per day) and L (the ultimate BOD in mg/L) of the Phelps model. The objective of this study is to determine the most suitable method for estimating the kinetic parameters by assessing the accuracy and validity of each method. This paper aims to apply five of these methods, namely the method of Least squares, the method of Thomas, the method of iteration, the method of Moment and the method of log difference for the estimation of the kinetic parameters of the BOD in two points of different pollution levels (before and after the treatment plant of Eloued Algeria). The Total error (Err2), Coefficient of determination (CD) and Model of selection criteria (MSC) are calculated to evaluate and compare the performance of these methods. And the best one is determined. The study revealed that the ultimate biochemical oxygen demand value ranges from 33.93 to 533 mg/L and the rate constant K (per day) ranges from 0.06 to 0.19 /d. It was found that the best method for estimating the BOD kinetics is the first-order least squares method and Thomas method for the low pollution level, while least squares is the best for the high level.

Keywords: BOD, kinetic parameters, rate constant, the ultimate BOD, wastewater, Least squares, Thomas, Iteration, Moment, log difference, (Err2), (CD), (MSC).



ID: Env-P-17

Treatment of Dye Textile by Calcined Layered Double Hydroxides in Aqueous Solution
using solar irradiation

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Abstract: In this work, CuAl layered double hydroxides intercalated with carbonate ion were synthesised via a co-precipitation method at a constant solution pH and calcined at 800°C. The synthesised Cu-Al LDH was calcined and characterised by X-ray diffraction (XRD) and transmission electron microscopy (TEM). In this paper, a batch reactor was used to study the photocatalysis of dyes textile using calcined Cu-Al LDH as photocatalysis. Photocatalysis onto synthesized calcined Cu-Al LDH was investigated varying initial dye concentration.

Keywords: catalysis; layered double hydroxides; dye;process, photocatalysis.



ID: Env-P-18

Treatment of polluting oil drilling waste, proposal of a green economy process , drill cuttings case

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Abstract: The resource curse impacts all natural resource exporters, especially oil producers. The pro-cyclical nature of fiscal policy, the irregular nature of resource revenues, and the unsatisfactory quality of political and economic institutions are a few of the explanations put forth for this negative effect on natural resources. Moreover, in order to meet their energy needs, the oil economy must drill more wells and produce more drilling waste. These discharges contain toxic substances, which would cause extensive environmental pollution; The Petroleum & Energy Government Body requires companies in this sector to take preventive measures and manage environmental hazards associated with drilling activities. The current process for treating drill cuttings is based on the cementation stabilization of organic and metallic pollution, which consumes vast quantities of cement. The topic that was raised was whether or not this treatment met the standards established by the regulations in place, as well as what the added economic value was. In order to contribute to this problem, we conducted a technical-economic study of the efficacy of treatment by stabilization/solidification in this work.

Keywords: drill cuttings; Petroleum; Solidification; Stabilization; Cementing



ID: Env-P-19

Using the balconies for Improve Air Quality in the Symmetrical Built Environment

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Abstract: This study is based on the effect of balconies in buildings on the dispersion of pollutants within an area. Computational fluid dynamics (CFD) simulations were performed considering the presence of porches of different dimensions with an aspect ratio of $H1/H2$. The effect of two engineering parameters was studied: balcony geometry and other green wall engineering parameters. The results show that the presence of balconies can determine a significant flow field modulation within urban areas with less homogeneous dispersion of pollutants from circulating vehicles on the street and less effective exchange with the atmosphere above. Therefore, the results obtained can contribute to the development of more feasible models of air pollution in urban areas, especially in the construction of an urban area.

Keywords: Balconies, Street Canyon, Pollutant Dispersion, Street Canyon, Numerical Simulation.



ID: Env-p-25

The bioplastic is the solution from the pollution of the environment by traditional plastic

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Abstract: The risk of the continued and terrible rise of accumulation form petroleum based plastic, and it is slow biodegradability, where 12% of urban solid waste is the plastic matériel and >6 billion of plastic waste between 1950 and 2015 equivalent to 79% was the total recycling pose the several problems in the environment and biodiversity

However to find one solution to replaced this plastic, in this study was manufacture the plastic based starch of the primary, natural matériel biodegradable and biological is the potato g, was used different methods of extraction the starch (neutre, basic, acid) steeping and to do the comparison between extraction yield of starch from three methods, and the yield of bioplastic from each starch, the results obtained in the form of percentages starch bioplastic as follows (12, 5\22, 77,9 , 16/3 , 22 and 11 , 83/2 , 82) respectively, in conclusion the best method is the basic steeping where is giving the best starch qualitatively and the best bioplastic quantitatively.

Keywords: Bioplastic ; pollution ; biodegradable ; environnement.



ID: Env-P-26

Impact of agricultural activity on the quality of groundwater in the Hennaya plain, Tlemcen
(NW Algeria)

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Abstract: The Hennaya Plain is considered an area of significant agricultural activity, characterized by the production of citrus fruits and seasonal crops. However, the expansion of agricultural activities required a significant augmentation in the utilization of agrochemicals, which had an adverse impact on the groundwater's quality. This study was conducted with the aim of evaluating the quality of groundwater at the irrigated perimeter zone of the region using physico-chemical analyzes of 19 wells distributed in this zone. The preliminary results showed high concentrations of nitrates (97.99 to 217.26 mg.L⁻¹; average: 144.39 mg.L⁻¹), which is explained by the excessive use of chemical fertilizers (Nitrogen fertilizers, NPK ...). The statistical analysis of the chemical elements presents high values of the coefficient of variation (CV) for NO₃⁻ and Cl⁻ (23% and 29%, respectively), indicating the heterogeneous distribution of these two elements, which confirms the origin of the pollution is mainly due to agricultural activities. The values of the irrigation quality water index (IQWI) ranged between 56.85 and 69.04, which suggests that all of these groundwater samples are of medium quality for irrigation and that these waters are only suitable for irrigation of certain plants with high salt tolerance with special salinity control practices. The Geographic Information System (GIS) provides spatial distribution mapping of the various parameters.

Keywords: Hennaya plain ; Irrigated perimeter ; Statistical analysis ; IQWI ; GIS.



ID: Env-P-27

Effect of combustible material nature on the CO and CO₂ emission in gasoline engines

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Abstract: The scientific research aim is to conduct a comparative study between different types of gasoline and its effect on the rate of gas emissions (gasoline and liquefied petroleum gas). Also the aim of this work is to study the production of mechanical energy from chemical energy stored in fuels (gasoline of various types in addition to LPG) through the combustion process in engines (internal combustion) and its impact on the environment, especially exhaust gas emissions. One of the main reasons for the difference in emissions is the number of octanes in fuels. The study of the comparison of combustible materials is very important, to fully understand the properties of each fuel and how affects the stability of the environment by combustion, in order to reduce gas emissions and improve air quality. Mainly the percentage of (CO and CO₂) emitted by each type to determine the most ecological fuel. It is examined a group of samples of car engines that differ in the type of gasoline in addition to cars running on liquefied gas (PLG). After the study It was found that there is a variation in the percentage of gas emission, mainly due to the quality of the gasoline used in addition to the presence of other

Keywords: Gasoline; engine; gasoline production; LPG; combustion; environnement.



ID: Env-P-30

Photodegradation of organic contaminants in aqueous solution by low-pressure ultraviolet irradiation: kinetic modeling

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Abstract: A kinetic model, which predicts organic contaminants degradation in water by low-pressure (LP) ultraviolet (UV) irradiation, is developed and verified based on experimental results obtained from the literature. Pollutants with different chemical natures and belonging to various organic contaminant classes, including pharmaceuticals, pesticides and disinfection by-products were selected as model compounds. Predicted and experimental results revealed an excellent agreement. The developed model was then utilized to evaluate the removal efficiency of organic contaminants by applying specific UV fluences. First, a UV fluence of 400 mJ cm⁻² was examined, degradation rates of 0.7 % (Carbamazepine) to 94 % (Diclofenac) were obtained. Then, a considerable UV fluence of 1400 mJ cm⁻² was introduced, removal rates of 2.4 % (Carbamazepine) to 100 % (Diclofenac) were observed.

Additionally, bonds to be broken and possible degradation reactions of the studied organic contaminants were discussed.

Keywords: Kinetic model; LP/UV irradiation; pharmaceuticals; pesticides; disinfection by-products.



ID: Env-P-31

Biodegradation of Pollutants in wastewater by bacterial strains

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Abstract: Discharged effluents from industry have been responsible for the deterioration of the aquatic environment in many parts of the world. Increasing industrialization and urbanization have resulted in the discharge of large amounts of waste into the environment, resulting in high pollution loads. Heavy metals that build up in soil and water and affect the environment and living things are the main pollutants. Bioremediation has been used as an environmentally-friendly, energy-saving and efficient method for removing pollutants. The aim of this research was to utilize microbial agents such as bacteria, isolated from different sources, to reduce pollutant loads such as heavy metals in effluent samples. These strains were found resistant to 10 different heavy metals, tolerating high concentrations up to 50 mM. They also reduced the concentration of different heavy metals in wastewater like Cr by 94%, Ni by 89%, Fe by 80% and others all simultaneously, within a short span of 10 days. These strains are promising candidates for eventual applications in bioremediation of heavy metal impacted sites, such as wastewater.

Keywords: pollutants; heavy metal; bacteria; wastewater.



ID: Env-P-32

RÉGLAGE DE TURBIDITÉ DES EAUX

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Abstract: Les eaux usées (ou eaux résiduaires, eaux résiduelles, eaux d'égout, aussi appelées « effluents liquides ») sont des « eaux polluées » par un usage humain, constituées de toutes les eaux de nature à contaminer les milieux dans lesquels elles sont déversées, par des polluants physiques, chimiques ou biologiques. L'objectif de notre travail est de faire un suivi de la turbidité des eaux usées en présence des biomatériaux (B1et B2) . Ce travail a été réalisé dans le laboratoire de l'université d'Adrar. Les résultats obtenus signifient que la meilleure hauteur de garnissage est 40 cm , nous pouvons distinguer aussi une réduction de la valeur de turbidité de 41,86% pour les eaux usées à la sortie de station d'épuration Maraguen pour (B1), et de 30%pour le (B2), et nous notons que le biomatériau B1 donne des résultats appropriés que le biomatériau B2. Cela est dû à deux facteurs principaux, qui sont l'intervalle du temps de saturation et le pourcentage de réduction de la turbidité des eaux usées. La valeur de la turbidité des eaux usées à la sortie de la station de Tamantit a diminué de 27,5 % lorsqu'elles sont traitées avec le biomatériau B1 , et lorsqu'il est traité avec le biomatériau B2, la turbidité a diminué de 25%.

Keywords: eaux usées ; biomatériau ; turbidité ; polluants..



ID: Env-P-34

Analysis of the strain energy during the interaction crack /dislocation

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Abstract: The main goal of this research is to evaluate the strain energy in a brittle material during the interaction of the crack with a neighboring dislocation. The problem is formulated by considering a cracked thin plate having a micro-crack that rotates around itself and around the semi-infinite crack whose the cracked plate is subjected to a uniform load in mode I. During the interaction between the crack and dislocation, the strain energy and stress field can be generated at the crack tip of crack. The theoretical analysis of this interaction is treated mathematically by the complex potentials functions. It is shown that the positioning of the dislocation relative to the crack leads to amplification, reduction and absorption of the strain energy at the crack-tip. The theoretical results agree with those found numerically.

Keywords: Strain energy; interaction; amplification; stress.



ID: Env-P-35

Vacuum diagram contributions reformulated for strongly correlated systems

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Abstract: in this study, we introduce a new algorithm focused on determining the impact of many-body vacuum diagrams at finite temperatures. We have also created a C++ program using this algorithm, Capable of displaying the analytical representation of each contribution and transforming it into divided differences. This transformation makes it easier to compute the grand potential at high temperatures and also prevents singularity issues during integral calculations at a specific temperatures. To showcase the effectiveness of our program, we applied it to the one-dimensional Heisenberg spin $-1/2$ XXZ model. As a result, we obtained all coefficients of the high temperature expansion of the free energy per site up to the 7th order.

Keywords: theory of perturbation; theory of strongly correlated system; vacuum diagram contribution.



ID: Env-p-37

Study and modeling of interaction parameters in liquid-liquid equilibrium using genetic and threshold acceptance algorithms for the ternary system 1-Butanol (1), Acetic acid (2), Water (3) at 299.8 K.

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Abstract: Liquid-liquid equilibriums data of ternary systems are very important for simulation, design, optimisation and control in chemical process engineering. The interaction parameters are the basis of the study of equilibrium liquid-liquid. The determination of liquid-liquid equilibrium data for ternary systems studied by the thermodynamic models NRTL and UNIQUAC, requires knowledge of the interaction parameters in the ternary system 1-Butanol (1), Acetic acid (2), Water (3) at 299.8 K. The optimal values of these parameters are estimated and obtained by a MATLAB calculation program based on evolutionary optimization methods of the genetic algorithm, the threshold acceptance method, and therefore the liquid equilibrium is determined.

Keywords: Liquid-Liquid Equilibrium; Optimization; genetic algorithms; threshold algorithms.



ID: Env-P-40

APPLICATION DE L'ÉLIMINATION DES MÉTAUX LOURDS (Zn (II), Pb (II) ET Cu (II)) DES EAUX USÉES DE LA RÉGION DE GHARDAIA PAR L'ARGILE BRUTE D'EL MENIA

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Abstract: L'objectif de notre étude est d'éliminer les métaux lourds des eaux usées par l'argile brute. La cinétique d'adsorption du Zn(II) sur l'argile est d'une valeur maximale avec un rendement de l'ordre de 58, 07% après 30 minutes de contact ainsi que le modèle de pseudo-second ordre est le plus adapté pour décrire la cinétique d'adsorption. Les essais du traitement des eaux usées donnent des résultats plus que satisfaisant avec un temps de contact de trois jours. Concernant les rendements d'élimination des Cu (II), Fe (III) et Pb (II) sont dépassés le 31%.

Keywords: métaux lourds; eaux usées; argile brute; cinétique d'adsorption.



ID: Env-P-41

Applications of calcined sugar scum for dye removal from aqueous solutions: isotherm studies

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Abstract: The rapid economic growth has caused environmental disorder with huge pollution problems. The demand for water has increased tremendously in agricultural, industrial and domestic sectors. This has resulted in the generation of large amounts of wastewater containing a high number of contaminants. Many industries, such as textiles, paper and plastic, use dyes tuffs in order to colour their products and they also consume substantial volumes of water. Therefore, calcined sugar scum as by-products have been used to produce a low-cost adsorbent for the removal of dyes from wastewater. The adsorbent was used to adsorb Basic Blue 41 (BB 41) . The results show that the equilibrium data were correctly represented using the Langmuir adsorption isotherm. The maximum uptake of BB 41 was found 23. 26 mg/g at temperature 25 °C, for an adsorbent dose of 2 g/L . The calcined sugar scum was found to be an effective material for dye removal from wastewater.

Keywords: Sugar scum;Adsorption;Dyes;Environment;Basic Blue 41 ; isotherms.



ID: Env-P-42

Apport de méthode géophysique électrique à la détermination de l'origine des eaux
souterraines de la nappe alluviale de Oued Biskra (Algérie)

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Abstract: La nappe alluviale d'Oued Biskra représente une richesse en eau véritablement gigantesque, avec un volume d'eau stocké estimé à environ 30 millions de mètres cubes, prêt à être exploité. Le non tarissement de cette nappe, même face à des débits de pompage élevés atteignant 1409 m³/h, la rareté des crues (seulement quatre à cinq crues par an), et les faibles apports pluviométriques (environ 125 mm/an), suscite des interrogations quant à l'origine de cette eau. Une étude géophysique est adoptée pour approcher la structure cet aquifère, nous avons tenté à travers une prospection géophysiques par sondage électrique vertical basée sur la mesure de la résistivité des formations géologiques de déterminer et de localiser les zones conductrices et celles qui sont résistantes. L'enquête géophysique à mis en évidence l'existence d'une zone extrêmement conductrice située sur l'axe centrale de l'aquifère et au niveau du mur de celui-ci, suggérant la présence d'une zone saturée en eau fortement minéralisée. Par conséquent, la présence d'une alimentation ascendante de l'aquifère (forme d'intrusion) à partir des formations plus profondes.

Keywords: Nappe alluvionnaire; Sondage électrique vertical; conductrice; eau mésothermale; Biskra; Algérie



ID: Env-P-43

Assessment of groundwater quality through heavy metal contamination indices in Biskra, North-East Algeria

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Abstract: Groundwater is a vital water resource for consumption and irrigation purposes in the Biskra region. Currently, these waters are used cautiously due to their deteriorating quality status, which is increasingly threatened by demographic growth and agricultural development. This study aims to investigate the spatial variation of groundwater pollution by analyzing six parameters (Pb, Fe, Mn, Cr, Cu, and Zn) in April 2019 and applying the Heavy Metal Evaluation Index (HEI), the Nemerow Index (PIN), and the Pollution Load Index (PLI). Results obtained indicate that the average contents of heavy metals are in the following order: $Pb > Fe > Mn > Cr > Cu > Zn$. The average values of Fe, Cu, and Zn are below the minimum requirements of the World Health Organization (WHO). However, the mean values of Pb and Mn exceed the WHO standard for 75% and 23% of samples, respectively. The HEI values range from 19.33 to 120.66, with an average of 57.635. Of the samples, 33.33% belong to the low pollution class, 41.66% to the medium class, and 25% to the high pollution class. Meanwhile, the ILP values are greater than 1 (one), indicating moderate to high pollution. The values of the PIN vary from 0.159 to 16.77, with 34% of the samples in the safe class (no impact), 17% in the moderate class (medium impact), and 50% in the high-impact class. The indices used allow for determining the level of groundwater contamination from anthropogenic activities and can be applied in similar research domains.

Keywords: Water resources; Heavy metal evaluation index; Nemerow index ; pollution load index; Biskra.



ID: Env-P-44

CONCEPTION ET REALISATION D'UN SECHOIR PASSIF ASSISTE PAR UN CAPTEUR SOLAIRE PLAN

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Abstract: La présente étude vise à réaliser des séchoirs solaires indirects pour les produits agroalimentaires de la région d'Oued-Souf (Sud-Est de l'Algérie). Les séchoirs réalisés sont assistés par capteurs plans ayant différents types des ailettes pour améliorer ses performances, tel que la température et le temps de séchage. Une application de ce dispositif sur la menthe donne des résultats déférents, tel que les températures dans les chambres de séchage. Une perspective et une continuité de ce travail, en faisant améliorer ces séchoirs en lui rajoutant les instruments pour pouvoir relever les mesures en continu, aussi l'intégration des matériaux de changement de phase pour le séchage en nuit. Ces dispositifs, fera donc l'objet d'une unité de séchage sur lequel on pourra effectuer des essais de séchage solaire performant .

Keywords: séchoir solaire; teneur en eau; capteur solaire; chambre se séchage.



ID: Env-P-45

Decontamination of secondary effluents from the East WWTP of Tizi-Ouzou (Algeria) with the aqueous extract of the green pod of the carob tree

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Abstract: This work reviews studies conducted to investigate the effect of carob tree on the reduction of indicator bacteria of fecal contamination that cannot be removed after the secondary stage of biological treatment. The aim is to use the wastewater safely in irrigation and expand the list of irrigable plants with this unexploited resource. Physico-chemical and bacteriological parameters were used to determine the optimal conditions and evaluate the treatment's efficiency. A contact time of 1 h and a dose of 1 mL of disinfectant reduced *E. coli* and fecal coliforms from 5.105 CFU to 1 237 CFU (99,75%) and from 7.106 CFU to 1 505 CFU (99,98%), respectively. For the same contact time, the fecal streptococci were reduced from 4.105 CFU to 59 CFU (99.99%). According to WHO standards, this dose and contact time are sufficient to use this water for irrigation. A minimum contact time of 2 h with a dose of 1 mL of the aqueous extract of the green pod of the carob is required to obtain a reduction of *E. coli* and fecal coliforms from 5.105 CFU to 5 254 CFU (99.95%) and from 7.106 CFU to 340 CFU (99,99%) to meet the Algerian standards of reuse of treated wastewater being more stringent. The results show that the same conditions reduce fecal streptococci from 4.105 CFU to 5 CFU (99.99%). This elimination level shows that green carob juice can be used for disinfection with the necessary doses for each bacterial load and sufficient contact time.

Keywords: Disinfection, *Ceratonia Siliqua*, Fecal contamination, Contact time.



ID: Env-P-48

Etude des paramètres physicochimiques des eaux souterraines de la région du Bas Chélif « wilaya de Relizane » et leur influence sur le sol et la végétation

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Abstract: La wilaya de Relizane est une région à vocation agricole caractérisée par un climat semi-aride ce qui impose le recours aux irrigations comme solution incontournable pour les agriculteurs de la région. Cependant, la sur exploitation des eaux souterraines peut entraîner des problèmes de salinisation, de baisse du niveau de la nappe phréatique, de dégradation de la qualité de l'eau et d'assèchement des puits. Il est donc essentiel de gérer de manière durable les ressources en eau souterraine du Bas Chélif afin de préserver cette ressource vitale pour les communautés locales et les écosystèmes de la région. L'objectif principal de cette étude est d'étudier les paramètres physicochimiques des eaux souterraines dans la région de Bas Chélif, notamment les communes d'Oued Rehiou, Ouarizan, Djdiouia et Hmadna (Wilaya de Relizane). Les analyses physico-chimiques ont été réalisées au niveau de laboratoire de l'ADE de la wilaya de Chlef sur 39 points de prélèvements bien répartis dans la zone d'étude. Les résultats obtenus ont montré que la qualité des eaux de la majorité des puits et des fourrages étudiés sont déconseillées à l'utilisées en irrigation pour éviter des problèmes de dégradation des sols à long terme et la chute de rendement de certaines plantes.

Keywords: Qualité de l'eau; irrigation; Bas Chélif; agriculture.



ID: Env-P-49

Etudes des isothermes d'équilibre, de la cinétique et de la thermodynamique de l'adsorption du bleu de méthylène sur les déchets de biomasse (PT) en tant que biosorbant naturel à faible coût

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Abstract: Dans ce travail, le potentiel des déchets de biomasse PT en tant qu'adsorbant à faible coût pour l'adsorption du bleu de méthylène (MB) à partir d'une solution aqueuse a été étudié. Les propriétés physicochimiques du PT ont été caractérisées à l'aide d'analyses instrumentales telles que la spectroscopie infrarouge à transformée de Fourier (FTIR), la microscopie électronique à balayage (MEB), de la diffraction des rayons X et l'analyse du point de charge nulle (pHpzc). Des études d'adsorption en mode batch ont été menées en faisant varier les paramètres opérationnels tels que le dosage d'adsorbant (0,05 à 0,15 g), le pH de la solution 4 à 10, la température (25 à 55 °C) et le temps de contact (30 à 180 min). Il a été constaté que les données d'équilibre correspondent mieux au modèle isotherme de Langmuir qu'au modèle de Freundlich. La capacité d'adsorption maximale, q_{max} de PT pour MB, était de 150 mg/g à 303 K. L'étude cinétique a révélé que le système actuel obéissait au modèle de pseudo-second ordre (PSO). Les paramètres d'adsorption thermodynamiques, l'enthalpie standard (ΔH°), l'entropie standard (ΔS°) et l'énergie libre standard (ΔG°) ont montré que l'adsorption du MB sur la surface du PT est exothermique et spontanée dans les conditions expérimentées. Tous les résultats mentionnés ci-dessus indiquent que le PT peut être utilisé pour éliminer le MB d'une solution aqueuse.

Keywords: Adsorption ; Bleu de méthylène; Déchets de biomasse PT ; Adsorbant à faible coût.



ID: Env-P-50

Green synthesis of metal oxide nanoparticles using Common Rue extract

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Abstract: The present study focuses on the eco-friendly synthesis, physical characterization, and activity assessment of a variety of metal oxide nanoparticles (NPs) generated using an extract from Common Rue. After the synthesis of metal oxide NPs, including ZnO/CuO/Cu₂MgO₃, a comprehensive characterization was conducted using diverse techniques, such as FTIR, UV, XRD, and SEM, to analyze their chemical and physical properties. Photocatalytic activity was assessed by testing their efficacy in degrading bromocresol green, an anionic dye

Keywords: Metal Oxide Nanoparticles; ZnO/CuO/Cu₂MgO₃; Photoactivity degradation; Biosynthesis.



ID: Env-P-51

Suivi de la minéralisation et aptitude à l'irrigation des eaux de la nappe superficielle de la plaine de Chemora wilaya de Batna Nord Est Algeria

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Abstract: La plaine alluviale de chemora, objet de ce papier, se trouve dans les territoires de la wilaya de Batna et fait partie des hauts plateaux constantinois à l'est algérien. Elle est soumise à un climat semi-aride. Cette région est à vocation agricole, l'activité principale est la céréaliculture intensive en plus des cultures maraîchères, l'élevage du bétail et la production de la volaille. La demande en eau souterraine ne cesse d'augmenter avec le développement de l'activité agricole et nécessite par conséquent un suivi strict, notamment sur le plan qualitatif, afin de préserver la ressource de toute dégradation. L'objectif de ce papier est une caractérisation de la minéralisation des eaux de la nappe superficielle, utilisées pour l'irrigation, le suivi de la répartition spatiale et les origines de la charge solide dans ces eaux. Par ailleurs, nous nous intéressons à l'aptitude de ces eaux à l'irrigation.

Keywords: Plaine de Chemora, nappe superficielle, irrigation, salinité, roches évaporitiques..



ID: Env-P-52

Terpenoids from the Genus *Artemisia* as Potential Pesticides

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Abstract: In their glandular trichomes, members of the higher plant genus *Artemisia* (Compositae) synthesize a wide variety of terpenoid chemicals. The sesquiterpenoid lactones in particular are biologically active as fungicides, herbicides, antimicrobials, insecticides, and insect antifeedants. These substances have enormous promise as producers of novel insecticides. Toxaphene (an insecticide and herbicide) and cinmethylin (an herbicide) are two examples of pesticides that are produced commercially and are derived from or chemically linked to these naturally occurring terpenoids. Recent research has revealed that artemisinin, an antimalarial sesquiterpenoid derived from annual wormwood (*Artemisia annua*), is a strong phytotoxin. This substance and other terpenoids generated from *Artemisia* are addressed as illustrations of the factors to take into account when selecting natural substances for use as pesticides. Therefore, in the present review, *Artemisia* was studied for its larvicidal efficiency; *Artemisia* extracts contain artemisinin that has been reported to reduce insects development, thus reducing transmission of malaria, this fact being especially significant in preventing the spread of resistant strains.

Keywords: Genus *Artemisia* ;terpenoids; insecticides ; larvicidal effect ; environment; human health.



ID: Env-P-53

Treatment of water polluted by methylene blue using the method of adsorption by activated carbon prepared from the nucleus of the Peach

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Abstract: pollution is one of the problems that humans face, and by entering the industry advanced stages, pollution in the ocean has increased, and we mention water pollution by some of the colorants used by some factories, and in this work we will treat the water from pollution by using methylene blue. This treatment is done by activated carbon prepared from nucleus of the Peach. The activated carbon previously prepared performs the adsorption process for methylene blue . We will also study the factors affecting the treatment process and begin to study the effect of methylene blue concentration (the concentration of the adsorbent material). We study the effect of the amount of activated carbon (the amount of adsorbent), after we study the effect of the type of middle in which the treatment takes place(the pH value on the treatment process) . After studying all these effects, we choose the best results and conditions in which the water is treated from this pollutant.

Keywords: pollution; activated carbon; methylene blue; nucleus of the Peach; adsorbent.



ID: Env-P-54

Comparative study of experimental mixture design methods and artificial neural networks for the workability of self-compacting concrete

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Abstract: The self-compacting concrete (SCC) flows under its weight and does not require external vibration for compaction. However, its formulation requires careful calculation of its constituents. Three methods are considered: the first is an empirical method represented by an approach based on mortar optimization, a solution proposed by Japanese researchers who originally introduced the concept of self-compacting concrete; the second is a graphical method by Dreux-Gorisse used for ordinary concrete, which optimizes the composition of the aggregate skeleton by selecting fractions without additives and superplasticizers; and the third is a statistical method that we developed using an approach based on artificial neural networks (ANN) built from a database from previous research projects. The objective is to characterize workability through an ANN model and compare it with experimental methods. Therefore, we focused on the slump flow, L-box, and sieve stability tests.

Keywords: Mixture design method; Fresh state properties; Self compacting concrete; Workability.



ID: Env-P-58

Removal anionic dye, acid orange 7 from aqueous solutions by adsorbant based from Wood waste

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Abstract: In order to reduce the effects of organic pollutants, several wastewater treatments processes have been used, in particular, the adsorption technique. The present study consists in using a new natural biodegradable adsorbent based on wood waste (BAWW) for the removal of the anionic dye, acid orange 7. The effect of various factors on adsorption as well as the study of adsorption kinetics and isotherms were studied. The specifications of adsorbant were determined using FTIR, XRD, TGA, and pHzpc analysis. The results showed that the adsorption of orange acid on BAWW was independent of pH. The percentages of dye removal reached values above 99% in the range of pH values from 2 to 12 for the two dye concentrations studied (17.5 and 35 mg/L). Regarding the adsorption isotherms, Sips isotherm ($R^2 = 0.99$) was more suitable than Langmuir equation ($R^2 = 0.91$) and Freundlich equation ($R^2 = 0.98$). Kinetic results suggest that the adsorption of AO7 onto BAWW followed pseudo-second-order kinetic model. The maximum adsorption capacity has been calculated to be 209.09 mg/g. Furthermore, the calculated equilibrium adsorption capacity q_e is 18.69 and 32.27 mg/g for 17.5 and 35 mg/L concentration dye respectively. which is very similar to the actual amount of adsorption equilibrium (17.39 and 34.03 mg/g).

Keywords: Removal anionic; acid orange 7; treatments; wastewater; adsorption.



ID: Env-P-59

Preparation of Biofuel by Hydrothermal Carbonization of Agricultural Wastes.

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Abstract: The global issue in the energy field is the combination of increasing energy consumption and steady depletion of fossil fuel resources. This, together with the global environment issues of the appropriate treatment of increasing the production of empty fruit bunch (EFB) has prompted a global research in the multidisciplinary field of science and energy, to develop alternative energy and chemicals as well as to reduce CO₂ and CH₄ emissions by using renewable energy from biomass and waste. Hydrocarbonization or hydrothermal carbonization (HTC) is one of the heat treatment methods to recover the waste. HTC is a wet waste conversion process which works under low temperature condition and autogenous pressure. HTC gives promising results of hydrochars, biofuels and biogas which contribute to the sustainable development of societies and therefore to the protection of the environment. To our knowledge the hydrocarbonization of biomass will be used for the 1st time in Algeria to produce biofuel. This new technique that works with specific autoclave for different biomasses (olive pomace and date seeds) based on tow parameters: temperature (180-200), time (3, 5, 10h) and content of biomass. During HTC process biofuel increases with increasing of temperature and time and decrease with the increasing of biomass quantity. The FTIR results showed that the obtained biofuels were rich of oxygenated functional groups, including O-H, C=O, OCH₃, C-O-C, and C-O.

Keywords: Biomass; Agricultural Waste; Hydrocarbonization; Biofuel; Temperature; Time.



ID: Env-P-63

Removal Of 4-Nitrophenol From Aqueous Solution By Electrocoagulation

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Abstract: 4-Nitrophenol (4-NP) is used in the manufacture of dyes, textiles, pesticides. It is also an intermediate of synthesis and a product of pharmaceutical degradation (example: paracetamol). This species enters the environment by industrial and agricultural wastewaters which enters ecological problems as: ecotoxicity, carcinogenetic... This work consists in the study of the elimination of 4-Nitrophenol by electrocoagulation processes. Many treatment processes can be used for the elimination of pollutants such as activated carbon adsorption, sand filtration, ion exchange, membrane filtration, and coagulation-flocculation. For the past few years, water treatment research has been based on the electrocoagulation (EC) process. It is a polluted water treatment technique which has shown its effectiveness for the treatment of certain soluble or colloidal pollutants, such as encountered in liquid discharges containing heavy metals, emulsions, suspensions. This work consists of the study of the elimination of 4N-nitrophenol by the electrocoagulation process. The tests were carried out on this compound dissolved in mineralized water with an electrical conductivity equal to 5.57 ms/cm and a pH between 6.66 and 7.50. The elimination of 4-NP (4-nitrophenol) by electrocoagulation gave excellent results reaching 99.47% with the use of aluminum electrodes with an inter electrode distance of 2.5 cm placed vertically in the reactor under direct current.

Keywords: Nitrophenol; Removal; Electrocoagulation; Direct current; Aqueous solution.



ID: Env-P-65

Adsorption mechanism of heavy metals and nitrate on prepared biochar and activated carbons

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Abstract: In order to valorize local waste and to seek solutions to minimize the risk of contamination of water resources in the region of Annaba by heavy metals from industrial origin, our work with this dual purpose was to study in laboratory the effectiveness the biochar and activated carbons prepared from local biomasses for the removal of heavy metals (cadmium and zinc) present in aqueous solutions by a very simple technique which is adsorption. The results of the adsorption have shown that the prepared materials eliminate moderate amounts of cadmium and zinc while they are very efficient in nitrate elimination. Finally, the mechanism of elimination of pollutants on these carbons has been suggested

Keywords: Bark and nuclei of jujube; biochar; activated carbon; adsorption mechanism; heavy metal; nitrate.



ID: Env-P-70

Green synthesis of NiO nanoparticles: Characterization and application

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Abstract: The utilization of biological systems, particularly plant extracts, as a means of synthesizing nanoparticles has emerged as a significant field within the realm of nanotechnology. In this study, Fresh *Mentha pulegium* extract was utilized as a green synthesis method for the production of Nickel oxide nanoparticles. The synthesized nanoparticles were subjected to a comprehensive characterization process using various analytical techniques, including ultraviolet-visible spectroscopy, Fourier transforms infrared spectroscopy, X-ray diffraction, and electron analysis via scanning electron microscopy. also investigated the potential of the synthesized nickel oxide nanoparticles to exhibit photocatalytic activity on Rose Bengal (RB) and Methylene Blue (MB) under sunlight. This inquiry aimed to assess the ability of the nanoparticles to mitigate the contamination caused by these dyes in wastewater released into the aqueous system.



ID: Env-P-71

Green Synthesis of ZnO Nanoparticles: Effect of pH on Optical and Morphological Properties, and Photocatalytic Activity

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Abstract: This study presents the green synthesis of ZnO nanoparticles (NPs) using *Portulaca oleracea* leaf extract at varying pH levels of 4, 6, 9.5, and 11. The study investigates how pH affects the optical and structural properties of these nanoparticles. Optical properties were characterized using UV-Vis spectrophotometry and FTIR spectroscopy, while structural properties were assessed using Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD). The research also delves into the photocatalytic degradation of methyl orange dye by these ZnO nanoparticles. The characterization results confirm the successful biosynthesis of ZnO nanoparticles, with sizes ranging from 22.17 to 27.38 nm. Importantly, the pH of synthesis plays a significant role in influencing both the optical and morphological properties of the ZnO nanoparticles. Overall, the findings demonstrate the high efficacy of these environmentally friendly ZnO nanoparticles in degrading dyes.

Keywords: green synthesis; *Portulaca oleracea*; zinc oxide; metallic nanoparticles; photocatalysis; methyl orange; sustainability



ID: Mat-O-01

A New Experimental Protocol applied on three point bending tests [concrete behavior characterization using steel contours]

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Abstract: The experimental characterization is the major source for the material behavior detection. In this work, we are going to present a new experimental protocol applied on a three point bending tests done according to the ASTM norm and using an MTS testing machine. The tested specimens were Concrete ones with two different configurations. The first configuration was the base of the improvements applied on the second one. The applied improvements and the second configurations show a high coherence between the obtained curves and the theory, offers a base for the concrete curve elaborating and shows a clear representation of both nonlinear behavior of the concrete and the linear one for the steel. The concrete experimental curve was obtained through a subtraction point by point method applied between the Total and steel curves. The obtained curve was judged acceptable, significant and coherent comparing to the experimental curves presented for validation. At the end of this work, concrete proprieties of which we can cite the fracture energy, flexural strength has been calculated and that basing on the obtained experimental curve and while applying some mathematical models elaborated basing on experimental investigations. This works allows us of proposing a new experimental protocol that can be applied on a huge range of materials and can be a good alternative were the ordinary experimental protocols can generate some difficulties or non-significant results.

Keywords: Bending tests, material's behavior characterization, Concrete and cement specimens, Flexural stress-strain response, concrete aging effect, Geometry effect, Elasticity modulus, Flexural, compressive strength.



ID: Mat-O-04

Analysis of Transient Time-of-Flight Photo-Currents in Amorphous Semiconductors in the presence of a Linear Field

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Abstract: We have developed equations that take into account the multiple trapping process to describe transport phenomena in disordered semiconductors. These equations have been incorporated into a numerical simulation to model the transient photoconductivity in time-of-flight measurements. Our model includes charge transport equations, including trapping and release of charge carriers in the presence of a linear electric field. The influence of parameters such as the density of localized states and the electric field on the results has been studied.

Keywords: Amorphous semiconductors; multiple-trapping model; Density of localized states; drift mobility; Laplace technics; time-of-flight



ID: Mat-O-05

Comparative first-principles calculations of structural, electronic and elastic properties of
LiCdP Half Heusler alloy and GaSb III-V semiconductor

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Abstract: From the density functional theory framework (DFT) and the pseudo potentials with a plane wave approach, we present comparative first-principles calculations of structural, electronic and elastic properties of cubic LiCdP Half Heusler alloy and GaSb III-V compound. The exchange correlation potential was treated using the generalized gradient approximation (GGA-PBE) and the (HSE03) hybrid functional. Features such as lattice constants, bulk modulus, band gaps and static dielectric constants have been calculated and discussed. According to our calculations, LiCdP, and GaSb compounds exhibit semiconductor properties, with direct band gaps. The results obtained for electronic properties using HSE03 show considerable improvement over other theoretical work and are closer to experimental data. We also calculated the elastic constants of two materials LiCdP and GaSb. The obtained results are in agreement with available theoretical data and experimental results.

Keywords: Half Heusler; III-V compound; electronic properties; elastic properties.



ID: Mat-O-06

Contribution à l'élaboration d'un sable normalisé à partir du sable alluvionnaire local

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Abstract: Les essais de contrôle et de caractérisation réalisés au niveau des cimenteries et des laboratoires de contrôle sur les ciments et les mortiers nécessitent l'utilisation d'un sable spécial ; dit sable normalisé, qui est généralement, importé de l'étranger et qui coûte très chers en devise. Pour résoudre ce problème on a pensé à préparer ce sable chez nous avec des moyens et des ressources locaux. En se basant sur la norme EN 196.1-ISO:679 qui régit ce sable, on a essayé de préparer un sable qui répond aux caractéristiques chimiques, granulométriques, physiques et mécaniques recommandées par les normes en vigueur. Nous avons obtenu un sable similaire au sable d'origine et qui a donné des résultats très encourageants avec des caractéristiques très proches à celles du sable normalisé importé.

Keywords: valorisation, sable normalisé, sable alluvionnaire, granulométrie, Norme EN 196.1-ISO:679.



ID: Mat-O-12

Enhancing building energy efficiency by incorporating phase change materials and nanoparticle

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Abstract: Phase change materials (PCMs) have received significant attention due to their unique thermal energy storage properties and potential for diverse applications in various fields. With the energy market challenges faced by countries lacking strong energy sources, reducing energy consumption, particularly in the building sector, becomes critical, making PCMs an attractive solution. This research paper aims to explore the effective use of PCM phase change materials in wall construction to creatively reduce energy use. Specifically, three different PCMs, namely n-octadecane, calcium chloride hexahydrate, and fatty acid A26, were selected and tested for their effectiveness in bricks under atmospheric conditions, focusing on the Oum El Bouaghi region in Algeria. To address the poor thermal conductivity of PCMs, which hinders their effectiveness in buildings, this paper proposes a solution using nanoparticles. To enhance the thermal conductivity of PCMs and study their effect on building phase change materials, Al₂O₃ nanoparticles were incorporated. Different proportions of nanoparticles ($\varphi = 0\%, 1\%, 2\%, 3\%, 4\%$, and 5%) were determined and investigated. Through experimental analysis and data interpretation, this paper contributes to understanding the applications of PCM in energy-reduction wall construction. It provides a solution to the problem of thermal conductivity of phase-change materials

Keywords: phase change material (pcm); nanoparticles; heat flux; thermal conductivity.



ID: Mat-O-13

Etude de la variation des résistances à la rupture des grains dans les matériaux granulaires cas de la rupture fragile.

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Abstract: La rupture fragile des grains sous chargement est un problème spécifique pour les matières granulaires il intervient dans l'évolution et modifie leurs structure .Il est l'une des causes principales de la compressibilité et de la détérioration des propriétés mécaniques de ces matériaux lorsqu'ils sont soumis à de fortes contraintes. Les charges appliquées et les mouvements relatifs des grains les uns par apports aux autres engendrent le phénomène d'écrasement des grains. Les cassures des grains peuvent être des ruptures partielles dans les zones de contacts ou catastrophiques en produisant d'autres grains de taille plus petite. La fragmentation des grains, entraîne un changement de leur forme et la diminution de leur taille qui induit une formation de particules fines et par conséquent, une modification de la structure du système, Artoni et al (2019), kheffache et al (2021)). Ce travail présente une étude statistique sur l'écrasement des grains dans un milieu granulaire soumis à une compression uniaxiale. Pour quantifier le taux d'écrasement en fonction de la charge appliquée, un modèle probabiliste a été proposé en utilisant une distribution statistique. Les matériaux utilisés dans cette étude sont des grains de calcaire. Les conclusions obtenus est que la probabilité de survie des grains dans un milieu granulaire soumis au à la compression suit une distribution statistique.

Keywords: Rupture ; Grains ; matériaux granulaires ; compression ; distribution statistique..



ID: Mat-O-14

Finite element method study of the homogenization of nano-composites

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Abstract: Nano composites are defined by nano fibers that are incorporated into a matrix. Nano-composites which are considered as non-homogeneous materials can be replaced by homogeneous fictitious materials with equivalent macroscopic properties through homogenization. A wide range of physical properties can be determined through homogenization; these properties can be mechanical, electrical, acoustic, thermal and others. In order to calculate the equivalent mechanical properties by doing the homogenization, a simulation tool based on the FEM finite element method is used. The results obtained are compared with those in the literature, and then a parametric study by adjusting the size and shape of the fibers is carried out.

Keywords: Nano composites; Homogenization; FEM; Effective properties.



ID: Mat-O-15

Influence of Aluminum on Chromium Nitride Films

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Abstract: Chrome aluminum nitride (CrAlN) films are thin coatings that have garnered significant interest in both scientific and industrial fields due to their unique properties and potential applications. CrAlN films are typically deposited using physical vapor deposition (PVD) techniques, using targets composed of chromium (Cr) and aluminum (Al) in a nitrogen (N₂) or nitrogen-argon (Ar) environment. CrAlN films, which have been extensively studied, are known for their excellent hardness, wear resistance, corrosion resistance, high thermal conductivity, and high temperature stability. These properties make them promising materials for various applications, including automotive, aerospace, tooling, electronics, and chemical industries. Ongoing research in this field aims to develop new advanced coatings based on CrAlN films for a wide range of technological and industrial applications. In this study, CrAlN films deposited by magnetron sputtering were used to investigate the effect of aluminum percentage on the properties of CrN coating

Keywords: Magnetron sputtering; Tribology; Thin films; CrN/CrAlN.



ID: Mat-O-16

Photocatalytic degradation of carcinogenic Congo red dye by nanoparticles

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Abstract: In this study, manganese oxide nanoparticles (MnO₂ NPs) were biosynthesized using the aqueous leaf extract of *Ziziphus spina-Christi* (ZSCLE). Their optical properties and photocatalytic activity towards azo dye degradation in Congo red (CR) were investigated. In this study, in order to develop photocatalytic activity from a water test solution, we focused on the synthesis of green MnO₂ NPs. Then, the nanostructure, morphological, and thermal properties of MnO₂ NPs were examined by UV-Vis spectroscopy, Fourier transform infrared (FT-IR), and X-ray diffraction (XRD). The photocatalytic degradation of the azo dye was monitored spectrophotometrically in a wavelength range of 250–900 nm, and a high decolorization efficiency (95.96%) was obtained after 60 minutes of reaction. As a result, the use of aqueous leaf extract *Ziziphus Spina-Christi* offers a cost-effective and eco-friendly method.

Keywords: Manganise oxide nanoparticles; *Ziziphus spina-Christi*; photosynthesis; catalytic activity; dye degradation; Congo red.



ID: Mat-O-17

Structural and Optical Features of Nitrogen Plasma Treatment on TiO₂ Thin Films for Photocatalytic Application

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Abstract: TiO₂ thin films were deposited using a spin-coating technique and treated with nitrogen plasma discharge at different gas pressures. X-ray diffraction analysis showed typical peaks of the TiO₂ anatase phase, a decrease of crystallite size was observed when nitrogen gas pressure increases. UV-visible analysis exhibited transparency in the range of 80–90%. Increasing nitrogen gas flow, a slightly decrease of the energy band gap from 3.4 to 3.2 eV was observed, as well as a decrease in electrical sheet resistivity from 35 to 17 Ω . Contact angle measurements showed the super-hydrophilicity of TiO₂ thin films treated with nitrogen plasma. Slightly effect on the photocatalytic activity of nitrogen plasma-treated TiO₂ thin film was observed.

Keywords: TiO₂ thin films; sol-gel processes; plasma treatment; photocatalysis.



ID: Mat-O-18

Structural, elastic, electronic and magnetic properties of novel Fe-based full Heusler alloys for spintronic applications.

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Abstract: Recent researches have focused on the investigation of structural, elastic, electronic, and magnetic properties in the context of spintronic applications. Materials intended for use in spintronic applications typically exhibit half-metallic properties and are expected to possess a high spin polarization. In pursuit of this goal, three novel Fe-based Heusler alloys, Fe₂HfZ (Z=Al, Ga and In), have been studied using first-principles calculations. The Fe₂HfAl, Fe₂HfGa, and Fe₂HfIn alloys exhibit, respectively, ground state lattice constants of 5.95, 5.95, and 6.16 Å. The results align closely with those derived from both the Birch-Murnaghan equation of state and the Murnaghan equation of state. The analysis of elastic constants has confirmed that all these compounds are mechanically stable. The elastic constants play a crucial role in determining various material properties. Notably, Pugh's ratio, Poisson's coefficient, and the anisotropy factor were observed to surpass values of 1.75, 0.25, and 1, respectively. Moreover, the three alloys are found to be ductile, ionic, and anisotropic. On the other hand, the Fe₂HfZ (Z=Al, Ga and In) alloys showed a nearly half-metallic character with a high spin polarization of 79%, 87% and 90%, and respectively, magnetic moments of 0.9, 0.91 and 0.92 μ_B highlighting their significant promise for use in spintronic applications. These findings hold promise for advancing the integration of Fe-based full Heusler alloys into spintronic devices.

Keywords: Fe-based Full-Heusler, spin polarization, magnetic moments, Spintronic.



ID: Mat-O-21

The optical properties of CdSnP₂ chalcopyrite

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Abstract: The aim of this study is to calculate the optical properties of CdSnP₂ chalcopyrite materials that crystallizes in tetragonal structure, belonging to the $I4\bar{2}d$ (#122) space group. The calculations are performed by the density functional theory (DFT) [1] implemented in Wien2k. The exchange-correlation potential is treated by the local density approximation (LDA) and the generalized approximation PBE-GGA. The computed structural parameters for the studied compounds such as the equilibrium lattice constants, tetragonal distortion and bond lengths are in good agreement with the experimental and theoretical data. To understand the optical properties, the linear optical properties namely the real and imaginary parts of dielectric function, refractive index and extinction coefficient are calculated over a wide range of energy, 0–30 eV.

Keywords: WIEN2k; Chalcopyrite; DFT; Optical properties.



ID: Mat-O-23

Potential of replacing clay soil with industrial by-product materials (CKD) in enhancing the properties of compressed earth blocks (CEBs)

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Abstract: To preserve a clean environment and support the sustainable growth of the entire world, recycling of industrial by-products and the use of local resources in general, and earth blocks in particular, for the construction of houses must be managed responsibly. Our research sought to determine the impact of substituting clay with industrial by-product materials such as cement kiln dust (CKD) in compacted earth blocks (CEB), as well as how to analyze the impact of CKD substitution on the mechanical and thermal behavior of CEB. An experimental program was carried out on samples of compacted earth blocks created with twelve different CKD contents (5 percent to 25% wt. of clay by step to 5) and two distinct kinds of clay from Algerian regions. Chemical, Microstructural analysis, and mineralogical analysis have been carried out using XRD and Laser particle analysis, the mechanical strength and thermal diffusivity, were analyzed. Test results showed that as the CKD replacement increased, the strength and thermal conductivity of the compacted earth blocks (CEB) improved. It was observed that 10% cement kiln dust is enough to provide the compacted earth blocks with the appropriate mechanical strength and durability (CEB).

Keywords: Compacted Earth Blocks (CEB), Cement Kiln Dust (CKD), Clay, Environment, Substitution, Thermal properties, mechanical strength.



ID: Mat-O-24

Glasses doped with rare earth ions

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Abstract: In The field of communication and active laser medium, rare-earth ions doped glasses are used as optical amplifiers. The properties of doped glasses for integrated optics depend on both the nature of the glass hostess and the doping ion. In view of the amazing properties of glasses specially phosphate glasses, which is the better one for this application. We deal with phosphate glasses doped with rare earth ions, reviewing the most significant glass compositions and their related thermal and mechanical properties, with emphasis given to optical and spectroscopic properties in the domain from ultraviolet to infrared. Optical transparency, multi-phonon relaxations, luminescence in optical fibers and planar waveguides doped with trivalent rare earths ions are reviewed. Applications as new compact light sources and lasers, especially for the domain from ultraviolet to infrared are shown. Thanks to the gain factor, which was used to determine the best glass of each kind of (Nd, Er, Yb) doped phosphate glasses. These glasses of high qualities can be used as laser and optical amplifiers.

Keywords: Phosphate glasses; rare -earth ions; laser; optical amplifiers; Erbium; Ytterbium.



ID: Mat-O-25

Characterization of Nickel Oxide Films Enhanced with Silver doping: Optical and Structural Analysis

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Abstract: In this study, we have successfully fabricated thin films of silver-doped nickel oxide with a range of doping percentages (0%, 2%, 4%, 6%, 8%) on glass substrates using the thermal chemical spray technique. The precursor materials for this process comprised nickel acetate and silver acetate solutions, each possessing a molar concentration of 0.05 mol/l. The main objective of this research was to comprehensively examine the impact of doping on the physical properties of $\text{Ni}_{1-x}\text{Ag}_x\text{O}$ thin films, specifically designed as transparent conductive coatings in electronic devices such as touch screens, OLEDs (organic light-emitting diodes), and solar cells. Analysis of their optical spectra revealed a noteworthy increase in transparency, with values spanning from 71% to 85%. This peak transparency was notably achieved at a 6% doping ratio within the visible wavelength range. Furthermore, the investigation uncovered substantial variations in the optical bandgap energy, ranging from 3.64 eV to 3.73 eV, dependent on the doping ratio. The range of Urbach energy was observed to be limited within the span of 330 meV to 428 meV. Interestingly, among the various doping ratios, the $\text{Ni}_{0.92}\text{Ag}_{0.08}\text{O}$ thin film prepared with an 8% doping ratio exhibited the lowest bandgap energy coupled with the highest Urbach energy. Structural characterization, conducted through X-ray diffraction (XRD) patterns, consistently affirmed that all the prepared $\text{Ni}_{1-x}\text{Ag}_x\text{O}$ films featured a polycrystalline cubic structure. This finding underscores the robustness and uniformity of the deposition process. Notably, the study identified that the highest electrical conductivity was achieved at an 8% doping ratio, with a remarkable measurement of $2.39 \times 10^{-2} (\Omega\cdot\text{cm})^{-1}$, which is of significant relevance for gas sensing and Photovoltaics applications requiring enhanced electrical properties. These results underscore the complex interplay between doping percentages and the consequent modulation of optical and structural properties within $\text{Ni}_{1-x}\text{Ag}_x\text{O}$ thin films.

Key words: Thin films, nickel oxide, chemical spray pyrolysis technique, Optical properties, Structural properties, X-ray diffraction, Silver (Ag) doping.



ID: Mat-O-26

Numerical study of argon spectra generated induced by LIBS technique

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Abstract: The aim of this work is to present numerical study of the experimental spectra of plasma containing argon. This study relates to electronic transitions from atom and ion of argon in plasma. The plasma is generated after steaming the sample by laser induced breakdown spectroscopy LIBS. Our calculation is based online intensity ratio method to obtain the theoretical spectra and to estimate the electron temperature. The obtained results are compared to the experimental spectral database of LIBS. The results of our numerical study have shown an agreement with the already published experimental results.



ID: Mat-P-01

Ab Initio Full-Potential Study of the Structural, Electronic, and thermodynamic Properties of the Cubic YS_{1-x}Sex Ternary Alloys

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Abstract: The full-potential linearized-augmented plane wave calculations based on density functional theory are performed to study the structural, electronic, and thermodynamic properties of YS_{1-x}Sex alloys (with x=0.0, 0.25, 0.50, 0.75 and 1). The revised Perdew–Burke–Ernzerhof generalized gradient approximation (GGA) is used to calculate all properties. Moreover, the calculated lattice parameters agree well with the experiment results. The binary and ternary alloys indicate a metallic behavior using GGA scheme. A quasi-harmonic Debye model is applied to calculate the thermal properties.

Keywords: DFT, FP-LAPW, YS_{1-x}Sex, structural properties, GGA.



ID: Mat-P-02

An Investigation into Hardening Parameters and Anisotropy Effects on Mechanical Behavior of AA2024 Aluminum Alloy and Ferritic Stainless Steel DIN-St14.

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Abstract: Mechanical testing plays a pivotal role in establishing precise material behavior laws, crucial for component shaping applications. This study delves into the characterization of two distinct materials, AA2024 Aluminum Alloy and Ferritic Stainless Steel DIN-St14, with the objective of precisely determinate hardening parameters and stress intensity coefficients beyond the estimated experimental homogeneous deformation range of 20%. Additionally, it aims to predict the influence of anisotropy parameters from both quadratic Hill48 and non-quadratic Yld2000-2D yield criteria on material behavior across varying levels of equivalent deformations. The study encompasses the modeling of both yield criteria parameters and the development of isotropic and one-dimensional strain-hardening models, where stress (σ) is expressed as a function of equivalent plastic strain (ϵ). The results unveil significant variations in the anisotropy parameters of these materials before the necking zone (homogeneous) and after necking (heterogeneous). These findings contribute substantially to our understanding of material behavior, providing invaluable insights for optimizing component shaping processes in diverse industrial applications.

Keywords: Hardening; Anisotropy; Material characterization; Modeling; Optimization; AA2024 Aluminum alloy; Ferritic Stainless Steel.



ID: Mat-P-03

An investigation on the bandgap energy and particle size for biosynthetic nanoparticles

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Abstract: In this study, manganese oxide nanoparticles (MnO₂ NPs) were successfully biosynthesized using aqueous leaves extract of Ziziphus Spina-Christi (ZSCLE). X-ray diffraction confirmed the crystalline nature of MnO₂ NPs with a crystallite size. The MnO₂ NPs have an tetragonal and spherical shape. UV–vis spectroscopy showed that MnO₂ NPs have a direct bandgap of 4.97 eV and an indirect bandgap of 1.19 eV. Fourier transform infrared analysis suggests that the synthesized MnO₂ NPs might be stabilized through the interactions of –OH and C=O groups in the carbohydrates, flavonoids, tannins, and phenolic acids present in Ziziphus Spina-Christi. Interestingly. As a result, the use of aqueous leaves extract Ziziphus Spina-Christi offers MnO₂ NPs by a cost and eco-friendly method.

Keywords: Manganise oxide nanoparticles; Ziziphus spina-Christi.



ID: Mat-P-04

Antimicrobial activity of silver nanoparticles (AgNPs) green synthesized using a pigment of Actinobacteria isolated from bee pollen

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Abstract: The green synthesis of silver nanoparticles (AgNPs) using secondary metabolites of Actinobacteria is gaining great interest due to their diversified medical properties including antimicrobial, antioxidant and anticancer activities. This study aims to evaluate the antimicrobial activity of silver nanoparticles biosynthesized using a pigment of one of the Actinobacterial strains that were isolated from bee pollen. Silver nanoparticles were synthesized by mixing of produced Actinobacterial pigment with silver nitrate solution (1mM) at pH 5. The synthesized AgNPs were characterized using UV–Vis, FE-SEM and EDX analysis. Antimicrobial activity was evaluated using agar well diffusion method against some pathogenic microorganisms. The UV-vis analysis confirmed the synthesis of AgNPs by its characteristic peak determined at 427 nm. The FE-SEM and EDX images showed AgNPs with an estimated mean size of 63 nm. A high antimicrobial activity was observed against *C. albicans* ATCC 10231 with an inhibition zone of 27 mm, followed by *E. faecalis* ATCC 19433 (25 mm), *P. aeruginosa* ATCC 27853 (23 mm), *B. subtilis* ATCC 6633 (22 mm), *S. aureus* ATCC 6538P (21 mm), *K. pneumoniae* ATCC 13883 (20 mm) and *E. coli* ATCC 7839 (18 mm). According to this study, silver nanoparticles synthesized using the pigment of an Actinobacterial strain isolated from bee pollen can be used as an alternative antimicrobial agent in the treatment of infectious diseases.

Keywords: Actinobacteria ; silver nanoparticles ; microbial pigments ; antimicrobial activity ; green synthesis.



ID: Mat-P-05

Boron and nitrogen effects of diffusion on microstructure in a low-alloyed steel

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Abstract: in this work , we investigated the diffusion of Boron and nitrogen atoms into the surface layer of 25CrMo4 steel under conditions of a process a temperature of 900 ° C for 4 hours for boriding treatment and at a temperature of 550 ° C for 12 hours for nitriding treatment. The structures of surface layers and diffusion zone were examined by optical and scanning electron microscopy and X-ray diffraction , the results show that the boride and nitride layers revealed the presence of FeB, Fe₂B, CrN, Fe₃N and Fe₄N compounds. The thickness of boride layers and nitride layers was found to be 50 and 11 µm, respectively. The hardness of the boride compounds formed on the surface of the samples was in the range of 1050 to 1200 HV_{0,2}, whereas Vickers hardness values of the nitrided samples was 750 HV_{0,2}. Corrosion tests which effected in a 1M Hcl solution have shown the beneficial effect of boriding and nitriding treatments on treated steels. The mechanical and corrosion properties of 25CrMo4 steel treated by boriding process are better than those of the steel treated by nitriding process

Keywords: nitriding ‘ boriding ‘microhardness ‘ low alloy steel ‘ corrosion.



ID: Mat-P-06

Caracterisation of Cupric Oxide (CuO) thin Films obtained by Electrodeposition

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Abstract: Recently, the materials have become attractive alternatives to traditional materials thanks to their outstanding electronic, optical, and chemical properties. Cupric oxide has aroused great interest for its optical, catalytic, mechanical and electrical properties and its use in many technological fields. CuO, a n-type semiconductor with a direct band gap of about 1.2 eV, has been widely employed in gas sensors, catalysts, solar energy conversion, biosensors, and magnetic storage devices. In this work, A simple electrochemical deposition technique is developed for the synthesis of CuO nanostructures on fluorine-doped tin-oxide (ITO)-coated glass substrates from Cu(II) sulfate solution with C₆H₈O₇ chelating agent. The textural and structural properties of the films were characterized by atomic force microscopy (AFM), X-ray diffraction (XRD). Mott-Schottky measurements and UV-Visible spectroscopy showed that n-type CuO with an optical gap vary between (1.25-1.50) eV. From the SEM and AFM analysis, a significant change in morphology is observed, for CuO a nodular structure. The surface roughness (RMS) also increases with increasing deposition time for the cupric oxide.

Keywords: CuO ; AFM; SEM; Mott-Schottky.



ID: Mat-P-07

Ceramic waste: a resource for sustainable and ecological construction

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Abstract: Ceramic by-products are generated in large quantities by the ceramics industry but are often under-exploited. These materials can be valorized in concrete and mortar composites, with several potential benefits, including reducing dependence on natural resources, improving material performance and durability, and contributing to environmental sustainability. This study examined opportunities for the use of these by-products in the concrete industry. A literature review was conducted to identify and analyze recent research. The methodologies include chemical, physical, and mineral characterization of ceramic materials, as well as mechanical strength tests and durability assessments of composites containing these materials. The results show that ceramic waste can improve the performance and durability of concrete and mortar composites. It can substitute for cement or aggregates or be added to existing mixes to enhance properties. Studies demonstrate advantages like increased mechanical strength, improved long-term durability, enhanced fire resistance, reduced air pollution, and lower energy consumption. Incorporating ceramic waste into the concrete industry offers promising prospects for sustainable construction materials. These materials provide environmental, economic, and technical advantages while addressing ceramic waste disposal. However, further research is needed to optimize mixes, understand material interactions, and assess long-term behavior in various applications.

Keywords: Ceramic waste ; Building materials ; Sustainability ; Environment ; Economy.



ID: Mat-P-09

Concrete Integrity Assessment using Acoustic Emission Techniques and Machine Learning

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Abstract: Ensuring the reliability and quality of social infrastructures like bridges, dams, and wind farms is crucial for public safety and investment. Regular health monitoring is essential to prevent failures that could lead to loss of life and capital. Structural Health Monitoring (SHM) addresses this need by using embedded sensors to provide real-time data on a structure's condition. This is more efficient and cost-effective than traditional Non-Destructive Testing (NDT) methods. Acoustic Emission (AE) has emerged as a promising SHM technique for detecting various types of damage, such as defects and leaks. Advances in data processing and machine learning have further enhanced AE's capabilities by enabling automated defect identification through feature extraction from AE signals.

Keywords: Structural Health Monitoring; Nondestructive Testing; Acoustic Emission; Signal Processing; Machine Learning.



ID: Mat-P-10

Consequences of thermal aging of low alloy steel used in mechanical construction on
resilience, hardness and corrosion

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Abstract: The effect of thermal aging at a temperature of 180°C for holding times of 3, 6 and 9 hours of a low alloy steel of the 35CrMo4 type, used in mechanical construction, on the mechanical properties of hardness and resilience has been examined. Its corrosion behavior in a 3% NaCl solution was studied by plotting the drop and polarization curves. After austenitization and water quenching followed by aging treatments, hardnesses of 573, 433.33 and 544 HV were measured for a raw state of 306 HV. A remarkable decrease in the resilience of steel after ageing, it goes from 163.97 j.cm⁻², its raw state, to values of 16.66, 7.29 and 31.57 j.cm⁻² for the holding times of 3, 6 and 9 hours, respectively. This decrease in toughness testifies to the amplitude of work hardening of this steel. Corrosion tests on this steel, after ageing, record corrosion density values of 0.42, 9.5.10⁻³ and 0.48 mA.cm⁻² at 3, 6 and 9 h, respectively. Polarization resistance was measured for this steel after ageing. Values of 39.76, 2030 and 38.43 Ohm.cm² were recorded for 3, 6 and 9h of ageing, respectively. Optical micrographs revealed the microstructural state of this steel before and after ageing. The diffracted phases and the types of carbides formed after aging were identified by XRD.

Keywords: thermal aging; strain hardening; hardening; hardness; resilience; corrosion.



ID: Mat-P-11

Corrosion resistance of Zr thin films deposited by GLAD PVD for biomedical application.

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Abstract: Ti6Al4V and CoCrMo alloys are widely used for artificial joints in biomedical implants due to their excellent mechanical properties, good biocompatibility, and high corrosion resistance [1]. In order to overcome or minimize the problem of degradation, Zr coatings (DC magnetron sputtering) are proposed as a protective film. The hemispherical shape of the joint head is modelled by inclined substrates of Ti6Al4V, CoCrMo and silicon. The substrates inclination angle presents a variation from 15 ° to 90° corresponding to a zirconium flux incidence angle from 0° to 75°. After deposition, the electrochemical behaviour of the films as a function of the tilt angle was investigated. The corrosion resistance revealed several points or critical zones compared to the substrate inclination angle. It is first improved by the presence of the film but dramatically worsen for high substrate inclination angles. The use of NASCAM [2] allows simulating the growth of the different films. The numerical and experimental morphologies are compared and explain the reported corrosion behaviour.

Keywords: Biomaterials; thin films; Corrosion behavior; DC magnetron sputtering.



ID: Mat-P-12

Digimat modeling of sandwiches with core honeycomb forms reinforced by woven date palm fibers in Gypsum layers with different weights and varied orientations

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Abstract: The finite element method was used in Digimat to simulate bending at four points for several sandwich panels, where the core is a layer of (Acrylonitrile Butadiene Styrene or ABS) in the shape of a hexagonal honeycomb with a thickness of five millimetres and three, four, five, or six layers symmetrical to the core layer and five millimetres thick. Since we adjusted the weight fraction of fibres to total material from 10%, 20%, and 30%, these layers varied in weight fraction. Woven fibers identify the layers' angles (-45° , 0° , -45° , and 90°) when placed on top of each other. These layers are made of Gypsum and woven Rachis palm fibers from the Algerian Deglet-Nour palm tree near Tolga-Biskra. More layers and a higher weight fraction of reinforced fibres woven inside them reduced Deflection values and Stress on the layers and the honeycomb-shaped core layer. The sandwich's weight, thickness, and woven reinforced Rachis fibers within Gypsum layers cause this, and the values are virtually comparable regardless of layer orientation (-45° , 0° , -45° , and 90°). The varied sandwiches raise Strain values on the X3 in the three layers corresponding to the core layer. They are greater at degrees (-45° , $+45^\circ$) than at (0° , 90°) when we increase fiber weight fractions, and vice versa at four to six layers. Overall, these findings were positive and may be used in urban buildings to protect the environment.

Keywords: Composite Material, Date Palm, Woven, Honeycomb, Sandwich panels, 4-point bending test.



ID: Mat-P-14

Effect of Carbon content on microstructure and properties of Cr/XC100 system

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Abstract: The primary objective of this research is to investigate the impact of the element C on various properties of the binary Cr–N/XC100 system. The microstructural characteristics and mechanical properties of the sample were analyzed via the use of X-ray diffraction (XRD), scanning electron microscopy (SEM), and nanoindentation techniques. The evaluation of the film adhesion of coatings was carried out through the utilization of a scratch test. The Cr–C–N coatings, which possess a carbon content of ≤ 12.4 at. % or less, have been seen to exhibit a combination of nano-sized crystallite phases consisting of chromium nitrides and carbides. When the carbon content exceeds 25 at. %, the coatings are composed of nitride and carbide phases. In this case, the bigger carbon atoms are incorporated into the structure by the Cr–N and Cr–C systems. The hardness of the Cr–C–N coatings was found to be dependent on the proportion of carbon present in the coatings. The coating with a carbon content of 28 at. % achieved a maximum hardness of 28.3 GPa.

Keywords: Microstructure, Hardness, adhesion, Chromium nitrides.



ID: Mat-P-16

Effects of PVD glancing angle: Comparison of TaN and ZrN thin films.

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Abstract: Nitride thin films have been known to have excellent properties and are commonly used as protective coatings, while oblique angle deposition (OAD) is known to produce films with an inclined microstructure associated with specific properties. In this work, OAD and DC reactive magnetron sputtering (DC) are combined to synthesise TaN and ZrN films [1, 2]. Six substrate inclination angles θ varying from 15 to 90°, corresponding to six flux incidence angles α varying from 0 to 70°, are used to model the deposition on a hemispherical shape (e.g., the head of an artificial joint). The morphology showed a well-aligned, slanted nanocolumnar structure, which comes from the OAD technique. Increasing the deposition angle led to high adatom energy and an enhanced collision effect during film deposition. The columns showed obvious changes in diameter, length, and tilt angle. Moreover, the porosity of the films increased with the deposition angle [1]. Additionally, the mechanical properties of both nitride films were investigated as a function of the tilt angle. It can be observed that the stress is largely compressive for the ZrN films and shows mixed behaviour for the TaN films. while the hardness showed a decreasing trend with the increasing tilt angle. The wear rate was calculated, and all prepared samples showed low values compared with dense TaN and ZrN films because of the porous structure. The coatings revealed critical zones in comparison to the tilt angle.

Keywords: Thin films; Glancing angle deposition; Magnetron sputtering; Zirconium and Tantalum nitride; Tilted films; hardness.



ID: Mat-P-18

Ellipsometric study on electrical properties of AZO thin films deposited by DC reactive sputtering in oxygen concentration

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Abstract: This study delves into the comprehensive analysis of the electrical attributes exhibited by AZO thin films, which have been intricately deposited using the direct current (DC) reactive sputtering technique. By employing spectroscopic ellipsometry, the spectrum has been meticulously measured with the intent of investigating the impact of varying oxygen concentrations on the electrical characteristics of these AZO thin films. Particularly, the charge carrier density and mobility are of focus, with their variations being closely correlated to the angle phase (Δ) within the ellipsometry spectrum. As the wavelength is manipulated, the electrical properties illustrate a discernible alteration, highlighting the pronounced influence of oxygen concentration adjustments on the electrical behavior of the AZO thin films.

Keywords: Spectroscopic Ellipsometry; Sputtering magnetron; Thin film; Mobility; Charge carrier density.



ID: Mat-P-20

Experimental study of cracked orthotropic materials

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Abstract: The present work consists in studying experimentally a cracked orthotropic material (here is the wood) by testing its resistance under tension test. This study is made in a fatigue machine (MTS +/-100KN) at the Laboratory of Development in Mechanics and Materials LDMM in Ziane Achour University of Djelfa. The first step was to create the specimens and then to test this latter. The tests were carried out by playing on a few parameters of fiber orientation, wet state and type of wood red and hard. The obtained results give global ideas on the behavior of wood.

Keywords: Orthotropic material; wood; experimental; MTS machine; Tension; behavior.



ID: Mat-P-21

First Principal Calculations of Structural, Electronic and Magnetic Properties of
Ca_{0.75}Fe_{0.25}S Compounds Using GGA and mbj-GGA: FP-LAPW Calculations

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Abstract: In the present paper, we investigate the structural, electronic magnetic properties of ordered dilute ferromagnetic semiconductors Ca_{0.75}Fe_{0.25}S using the full-potential linearized augmented plane-wave (FP-LAPW) method. We adopt the Perdew-Burke-Ernzerhof (PBE) generalized gradient approximation (GGA), and the modified Becke-Johnson exchange potential for the exchange-correlation energy and potential. The spin-polarized electronic band structures and density of states of Ca_{0.75}Fe_{0.25}S calculated by GGA-PBE, mBJ-GGA-PBE show that the minority spin channel has metallic nature and the majority spin channel has a half-metallic, respectively. The magnetic study revealed a strong contribution to the value of the total magnetic moment of the compounds, with low contributions coming from the non-magnetic atoms Ca and S. Finally, our prevision results confirmed that Ca_{0.75}Fe_{0.25}S could be considered as a promising candidate material for spintronic applications

Keywords: Spintronics; half-metals; dilute magnetic semiconductor; Fe-doped CaS semiconductor; DMS; DFT



ID: Mat-P-22

First principles study on half-metallic properties of Heusler compounds RhCoSb

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Abstract: Structural, electronic and magnetic properties of RhCoSb Half- Heusler compound have been investigated according to density functional theory and generalized gradient approximation. We have found that structurally these compounds are stable with lattice constants less than 6.00 Å. We have computed their band gaps in both the spin-down and spin-up channels. It is revealed that they have spin-up channels conducting and spin-down channels having a band gap. Furthermore, investigation of magnetic properties shows that our calculations predicate the half-metallicity of this alloy with total magnetic moment of 2.000 μ_B per formula unit, well consistent with Slater-Pauling rule.



ID: Mat-P-24

Harnessing the Potential of Schiff Bases for Corrosion Control

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Abstract: Schiff bases are ideal candidates to be used as corrosion inhibitors for different metal/electrolyte systems. These compounds become effective by adsorbing on the metallic surface through their electron rich centers including $>C=N-$ (imine) bond. SBs are mostly used as inhibitors for mild steel and carbon steel alloys, therefore their use as anticorrosive species for other metals and alloys, especially for copper and aluminum. Most of the SBs behave as mixed- type corrosion inhibitors and they become effective by retarding both Tafel reactions. Mostly their adsorption followed the Langmuir adsorption isotherm model. proper combination of hydrophilicity and hydrophobicity is essential for effective corrosion inhibition of SBs as too high hydrophobicity adversely affects their corrosion inhibition performance by decreasing their solubility in polar electrolytes. It was also noticed that most of the SBs are tested as corrosion inhibitors in less aggressive media. Therefore, their use should be explored for industrial based processes such as acid pickling; acid descaling, oil-well acidification and acid cleaning that generally employ highly acidic solutions such as 15–28% HCl and H₂SO₄ solution.

Keywords: Schiff bases, Corrosion inhibitors, Metal/electrolyte systems, Mild steel, Carbon steel alloys.



ID: Mat-P-27

Impact de l'ajout poudre carbonate calcium sur les propriétés mécaniques du matériau biocomposite (fibres de palmier-dattier/époxy)

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Abstract: Les matériaux composites renforcés par des fibres naturelles suscitent un grand intérêt dans l'industrie en raison de leurs excellentes propriétés mécaniques et de leur légèreté, ainsi que de leur isolation thermique efficace. Les fibres naturelles sont de plus en plus perçues comme une alternative économique et durable, ce qui est soutenu par diverses études. Cependant, les composites de fibres naturelles peuvent encore être améliorés, tant au niveau mécanique que de la surface, en incorporant des matériaux améliorants. Dans ce contexte, une étude a été menée pour améliorer les composites de fibres naturelles en ajoutant de la poudre de carbonate de calcium à leur composition. Cette addition a conduit à des améliorations significatives des propriétés mécaniques et de surface de ces matériaux. Par exemple, le module de flexion a augmenté de 9,1 % lorsque 6 % de carbonate de calcium ont été incorporés. De plus, la dureté de surface et la résistance aux chocs ont augmenté de manière linéaire de 20 % et 25 %, respectivement, lorsque 9 % de carbonate de calcium ont été ajoutés. Ces résultats encourageants ouvrent la voie au développement de composites de fibres naturelles améliorés par l'incorporation de poudre de carbonate de calcium. Cette approche permet de créer des matériaux composites performants qui présentent également des avantages environnementaux, ce qui en fait une alternative attrayante aux composites traditionnels dans diverses applications industrielles.

Keywords: Carbonate de calcium ; Fibres de palmier-dattier ; Matériaux biocomposites ; Caractérisation mécanique ; Amélioration des performances .



ID: Mat-P-28

Influence des différents milieux agressifs sur le béton de sable à base de sable d'oued Rtem

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Abstract: Les exigences de la construction moderne mettent l'accent sur de nouveaux défis en réduisant coûts et améliorer la durabilité des ouvrages, devenue une préoccupation majeure dans les centres de recherche afin de maintenir les bonnes performances du béton et la sécurité des installations en béton et en béton armé contre les milieux agressifs grâce à ce que l'on appelle l'amélioration de la durabilité du béton et du sable. Le sable est un matériau nécessaire à la formation du béton, nous avons donc choisi le sable d'oued R'tem avec l'amertume comme matériau local. Et dans ce but, ce sujet a été mis en lumière afin de suivre l'évolution de la durabilité du béton de sable et soumises à des milieux agressifs et avec des concentrations comme suite (5% Na₂SO₄ et 0.3% HCl) et en plus de ça, a été fait en immersion d'autres échantillons dans de l'eau douce. Les résultats de l'immersion d'échantillons de béton de sable avec de l'acide indiquent une diminution le poids des échantillons et l'apparition de porosité dans le béton de sable, ainsi que comme une diminution de sa résistance à la compression, chaque fois que le pH est élevé. Alors que le béton, les échantillons immergés dans l'eau douce n'a pas été affecté.

Keywords: Béton de sable, milieu agressif, sable, durabilité, pression.



ID: Mat-P-29

Investigating the interrelation of fluidization parameters concerning both spherical and non-spherical solid particles within a cylindrical fluidized bed through the utilization of artificial intelligence methodologies.

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Abstract: Fluidized beds play a crucial role in various industrial processes, where the behavior of solid particles under fluidization conditions is of paramount importance. This study delves into the intricate relationship between fluidization parameters and the distinct characteristics of spherical and non-spherical solid particles within a cylindrical fluidized bed. This study embarks on a thorough and exhaustive investigation into the complex interdependencies among the fundamental factors dictating bed expansion within the designated systems. Moreover, the potential for predicting the initial void ratio (ϵ_0/ϕ_s) is actualized by employing a bipartite feedforward architecture, distinguished by a configuration comprising fifteen hidden neurons. Clearly, the model achieves an Average Absolute Relative Deviation (AARD) of 4.87%, thus providing substantial evidence of its exceptional accuracy. Moreover, the model demonstrates a minimal Mean Squared Error (MSE) of 0.0021, concurrently attaining a regression coefficient (R) of 0.961. These results robustly validate the model's precision in prognosticating outcomes with a significantly high level of reliability.

Keywords: Cylindrical Fluidized beds, neural networks, void ratio, spherical and non-spherical solide particles.



ID: Mat-P-30

LaFeO₃, a competitive material for wastewater treatment

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Abstract: This study has shown that successfully synthesized a single stable phase of LaFeO₃ prepared through the sol-gel method (calcined at 600°C /12h). Also, its crystal structure has been refined by the Rietveld method. The results show that its structure is orthorhombic, with a Pbnm (N°.62) space group. Moreover, its lattice parameters are: $a = 5.554196\text{\AA}$, $b = 5.566655\text{\AA}$, and $c = 7.8534446\text{\AA}$. The final reliability factor values are $R_b = 14.64\%$, $R_{wp} = 24.76\%$, and $\chi^2 = 1.16$. Furthermore, the average crystallite size is $D = 42.72\text{ nm}$, and the dislocation density is $\delta = 5.48.10^{10}/\text{cm}^2$. The infrared spectra (IR) detected the metal oxide (M-O) stretching vibrations and a few functional groups. The optical energy gap of LaFeO₃ equals 2.2 eV. Therefore, it can be an efficient catalyst under visible light. It can be used to eliminate toxic O-toluidine blue from water under sunlight. LaFeO₃ displayed good degradation of O-toluidine blue within a reaction period of 60 min at a rate of 79.5%.

Keywords: LaFeO₃; sol-gel; Pbnm; optical energy gap; O-toluidine blue; degradation.



ID: Mat-P-32

Modélisation statistique de la variabilité de la résistance à la compression

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Abstract: La variabilité de la résistance mécanique est un phénomène expérimental observé lors des essais d'écrasement sous un chargement uni-axial. En effet, les éprouvettes confectionnées et conservées dans les mêmes conditions, les résistances nominales varient d'une éprouvette à l'autre. Cette variation peut être négligeable, mais parfois elle est significative. Cette variabilité influe sur la fiabilité des structures, cela impose d'en tenir compte dans les calculs de dimensionnement et lors de la conception des pièces réalisées par ce matériau, et d'intégrer ce paramètre dans l'élaboration des modèles de prédiction, c'est ce que justifie la nécessité d'utiliser des approches statistiques probabiliste basées sur la notion d'une probabilité acceptable. Ce travail présente une modélisation statistique de la variabilité de la résistance à la compression du béton, confectionné avec des matériaux locaux. Des essais d'écrasement ont été réalisés sur des éprouvettes cylindriques de dimensions (16x32) cm² à différents âges. Les résultats obtenus ont montré des écarts importants de résistance pour tous les âges étudiés. Pour tenir compte de la dispersion des réponses mesurées, le modèle statistique de Weibull à deux paramètres a été utilisé.

Keywords: Béton, statistique, variabilité, Weibull.



ID: Mat-P-33

Monomer Effect on the structural properties of the Bi-2223 superconducting phase using photo-polymerization based method

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Abstract: Three samples of Bi-2223 were synthesized using the photopolymerization reaction method with change of the photo-initiator (EGDMA, DEGDMA and TEGDMA monomers). The X-ray results of the final samples showed that the Bi-2223 phase is the most dominant phase in the case of the samples prepared with TEGDMA and EGDMA, with a very minor presence of Bi-2212 and Bi-2201 phases. While the total absence of the Bi-2201 phase was observed in the case of the sample prepared with DEGDMA. Le Bail refinement results of the X-ray diffraction revealed that the crystal structure changes from orthorhombic to pseudo-tetragonal when the DEGDMA is the catalytic monomer, while the space group “Amaa” didn’t change for all samples. Furthermore, the c cell parameter decreases when the hydrogen bonds in a monomer increases. Otherwise, the cell volume v showed a fluctuation between the three samples.

Keywords: Photo-polymerization; Bi-2223 phase; HTC Superconductors; X-ray diffraction; monomers.



Mat-P-34

New nanomaterials preparation

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Abstract: Layered Double hydroxides (LDHs) are nanomaterials possessing a substantial specific surface area which empowers them to seize various substances via adsorption or anion exchange due to their interlayer flexibility. This ability to trap anions is employed in applications for soil and water decontamination. Numerous studies have been conducted to investigate how LDHs, whether calcined or non-calcined, can trap various oxoanions (such as CrO_4^{2-} , PO_4^{3-} , $\text{Cr}_2\text{O}_7^{2-}$, SO_4^{2-}) and simple anions (like F^- , Br^- , I^-) in different matrices. Materials based on titanium synthesized by co-precipitation method at pH constant and characterized using techniques such as X-ray diffraction (XRD), infrared spectroscopy (IR), energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM). Furthermore, we explored the application of these materials for environmental purposes using the anion exchange method. This study aimed to assess the materials capacity to capture inorganic anions like Cl^- , SO_4^{2-} and CrO_4^{2-} present in wastewater.



ID: Mat-P-35

Particle Shape Effect on the Thermal Conductivity of Transformer Oil-Based Nanofluids:
Modeling Using COMSOL Multiphysics Software

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Abstract: High thermal conductivity is one of the most important properties that must be available in insulating oils used in transformers to transfer heat generated by internal parts to the external environment. In this work, we modeled the thermal conductivity of nanofluids (NFs) based on mineral oils (MO) using the finite element method (FEM) by COMSOL Multiphysics software to study the effect of volume fractions and the shape of the particles (NPs) on improving the thermal conductivity of NFs. We used aluminum oxide (Al_2O_3) with different concentrations (0.005%, 0.01%, 0.015%, and 0.02%) and different shapes (Sphere, Brick, Cylinder, and Platelet). The results showed that the volume fraction and the shape of the particle play an important role in increasing the thermal conductivity, while the best value of the thermal conductivity is for the NFs based on the Platelet-shaped NPs with volume fraction of 0.02%, and the thermal conductivity of all samples decreased with increasing temperature.

Keywords: COMSOL Multiphysics ; nanofluids ; nanoparticles ; particle shape ; thermal conductivity ; transformer.



ID: Mat-P-36

Photoelectrochemical conversion of CO₂ with a-SiC nanowires photoelectrode

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Abstract: In this work, we have elaborated amorphous SiC nanowires (Nanowire Amorphous SiC, NWASC) for a CO₂ photoelectrochemical reduction. The NWASC were prepared through two steps: the first one is the formation of silicon nanowires on p-type silicon with low resistivity, by chemical etching assisted by Ag. The second, is to deposit a thin layer of hydrogenated amorphous SiC, on silicon nanowires, by magnetron RF sputtering, with a thickness of 90 nm. Different characterization techniques were used for study the structural and optical properties of elaborated NWASC such as scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FTIR), UV-Vis spectrophotometry, and photoluminescence (PL). The results show the formation of vertical NWASCs, with high photoluminescence intensity. Due to its high stability, NWASC have been used for fabrication of a photocathode.

Keywords: SiC nanowir; CO₂ converion; photoelectrochemical reduction; photoelectrode.



ID: Mat-P-37

Photoluminescence of silicon nitride co-doped with erbium and ytterbium

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Abstract: In this work, we report the deposition of silicon-rich SiNx:H films co-doped with erbium and ytterbium (SRSN). Silicon nanocrystals were produced by thermal annealing of a SiNx thin film obtained by low pressure chemical vapor deposition and co-doped with Erbium and ytterbium deposited on silicon nitride by spin coating technique. We used several means of characterizations. We started, first, with the presentation of SEM and DRX characterization results which confirm the successful insertion of Er³⁺ and Yb³⁺ in the silicon nitride and finally we present a photoluminescence result.

Keywords: Erbium; Ytterbium; silicon nitride; sol gel; photoluminescence.



ID: Mat-P-38

Physical properties of ternary anti-perovskites ScBX_3 , ($\text{X}=\text{Rh}, \text{Pd}$)

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Abstract: We did an ab initio calculation which is based on density functional theory (DFT). We calculate the structural, electronic, mechanical and optical properties of compounds (ScBX_3 ; $\text{X}=\text{Rh}, \text{Pd}$) using the CASTEP code, in the generalized gradient approximation (GGA), and the Local Density Approximation (LDA), to calculate the exchange and correlation potential (V_{xc}) for calculating structural properties, electronic properties, elastic properties (elastic constants, the elastic modules and optical properties (dielectric coefficient, refraction index and absorption coefficient ...), and the results obtained agree experimental results available.



ID: Mat-P-39

Polarization and Strain phenomena in uni-axially stretched beta-form Polyvinylidene fluoride at low frequency electric field: experiments and modeling

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Abstract: The study of the electric field-induced thickness strain of ferroelectric polymers is very interesting because of their high actuating capabilities and various applications; as electroactive materials for artificial muscles or as active materials of membranes, due to their flexibility. This paper reports the effect of quasi-static triangular applied electric field E (100 mHz, on the strain properties of uni-axially stretched β -form Polyvinylidene fluoride (PVDF). For this level of applied electrical field, the strain is proportional to the square of the electric field. The strain is mainly due to the electrostriction effect, linked to the induced reversal polarization and to the interlaminar charges. This paper presents a new model, based on equivalent electrical circuit (capacitance, resistance ...), which has been developed to evaluate the induced electric current and strain phenomenon. A good agreement between simulations and experimental results was obtained.

Keywords: piezoelectricity, electroactive polymers, electrostriction, ferroelectric polymers



ID: Mat-P-40

Simulation and Analysis of Lead-Free Hybrid High-Performance Perovskite Solar Cell CH₃NH₃SnI₃ with different ETM Using SCAPS-1D

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Abstract: Solar energy is widely considered to be one of the most promising renewable energy sources for future green technology. Scientists have recently become quite interested in perovskite solar cells (PSCs) because of their extraordinary efficiency and low cost. In this study, we utilized numerical analysis with SCAPS-1D software to explore and examine Lead-Free Perovskite Solar Cell CH₃NH₃SnI₃ with different electron transporting layers (ETLs) to investigate an appropriate ETL. We also simulated the influence of temperature, absorber layer thicknesses, electron transport layer thicknesses and defect density of the absorber on solar cell performance characteristics. Our findings state that the Photovoltaics Parameters such as Power Conversion Efficiency (PCE), Fill Factor (FF), Short circuit current density (J_{sc}) and open circuit voltage (V_{oc}) are significantly affected. At temperature 300K, The PSCs with zinc oxide (ZnO) and titanium dioxide (TiO₂) as ETL exhibited superior device performance with power conversion efficiency (PCE) of 20.10%, 20.08%; open-circuit voltage (VOC) of 0.78V; 0.78V; current density (JSC) of 33.58 mA/cm²; 33.54 mA/cm²; fill factor (FF) of 76.09 %; 76.11 % respectively. This study reveals a valuable insight into the factors that influence perovskite solar cell efficiency and propose a suitable material for designing a high-performance and sustainable perovskite solar cell for practical applications in the future.

Keywords: perovskite Solar cells, SCAPS-1D, CH₃NH₃SnI₃, ETM, performance.



ID: Mat-P-42

structural, elastic and electronic properties of Na_3BrO

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Abstract: In this work we performed an ab initio study on the structural, electronic and mechanical properties of potassium-based anti-perovskite of formula K_3OBr , using first principals calculation based on the density functional theory (DFT) combined with the full potential linearized augmented plan wave (FP-LAPW), and the generalized gradient approximation (GGA) combined with the Tran-Blaha modified Becke-Johnson (TB-mBJ) approach to describe the exchange-correlation potential. The agreement of the our calculations including internal atomic relaxations, with the experimental data is very good. For the elctronic structure, the use of GGA approximation predicted a direct band gap about 0.93 eV, whereas, the implementation of mBJ approach improved the E_g to 3.59 eV. The calculated elastic constants are positive and they clearly satisfy the Born stability criteria, suggesting that our anti-perovskite is mechanically stable. Other relevant quantities such as shear modulus, Young's modulus, Poisson's ratio, anisotropy factors, and Debye temperature have been calculated and discussed.

Keywords: Anti-perovskite, elastic properties, band gap.



ID: Mat-P-44

Study by spectroscopic ellipsometry of the optical properties of hydrogenated amorphous silicon nitride deposited by DC magnetron sputtering

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Abstract: In this work, we study hydrogenated amorphous silicon nitride thin films deposited by DC magnetron sputtering. This technique consists of sputtering a silicon target with a plasma containing a mixture of argon, molecular nitrogen and molecular hydrogen ($\text{Ar}+\text{N}_2+\text{H}_2$). The silicon nitride layers are deposited without intentional heating of the substrates. Their temperature is measured as a function of time during deposition. The optical and physicochemical properties of the deposited material are explored by spectroscopic ellipsometry and infrared absorption spectroscopy. The exploitation of the ellipsometric spectra is carried out by two methods, in the first the Tauc-Lorentz dispersion model is used while in the second two dispersion models are used, the Sellmeier model and the Gauss model. For both methods a single optical model is used, consisting of a silicon substrate, a main layer of silicon nitride and two transition layers, interface and roughness layers. The second method offers better fit quality for all samples. When the hydrogen flow rate decreases from 2.6 to 0.2 sccm the refractive index increases from 1.8 to 1.94 and the optical gap decreases from approximately 4.2 to 3.4 eV. The infrared absorption spectra show characteristic absorption bands of Si-N, Si-H and N-H bonds. In this work we present the effect of hydrogen flow on the optical and physicochemical properties of the deposited material.

Keywords: Spectroscopic ellipsometry, Silicon nitride, Sputtering, FTIR.



ID: Mat-P-45

Study of the optical properties of Li-doped NiO

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Abstract: Nickel oxide is a strong contender in many current technology applications, including smart windows and solar cells. As a result, NiO thin films with varying amounts of Li doping were created using a simple and low-cost process known as spray pyrolysis. In this work, some physical properties of pure and Li-doped NiO thin films were investigated. We will be interested in determining a variety of optical parameters such as absorption, transmittance, and band gap, in addition to taking the optical and electrical conductivity of each sample, because these physical properties play a significant role in improving efficiency in technological applications. The findings demonstrated that through changes in values while increasing the percentage of lithium, the concentration of doping has an impact on both the optical characteristics and the conductivity of the films.

Keywords: Nickel oxid; Optical proprieties; Optical conductivity; thin films.



ID: Mat-P-47

Synthesis and characterization of ZnCo_2O_4 spinel-modified silicon nanowires

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Abstract: Due to its fascinating and unique physicochemical properties, spinel structured metal oxide-based materials have attracted great interest in different fields such as energy conversion and storage and catalysis. Similarly, silicon nanowires (SiNWs) as typical one-dimensional nanomaterials have also attracted a lot of interest in recent years due to their good properties and wide range of possible applications. Thus, it is interesting to synthesize a composite based on spinel metal oxide and silicon nanowires in order to combine their excellent properties and benefit from their synergistic effect. In this work, zinc cobaltite (ZnCo_2O_4)-modified silicon nanowires (SiNWs) were synthesized using two cost-effective techniques. Indeed, SiNWs were synthesized by a metal-assisted chemical etching process and coated by ZnCo_2O_4 using the hydrothermal method. The deposition time of ZnCo_2O_4 was changed from 30 to 120 min in order evidenced its impact on the morphology. The samples were characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS). The obtained results indicate that zinc cobaltite deposits in the shape of nanosheets and their density is controlled by the deposition time. This gives the structure a large specific surface which allow it to be used as a high efficiency photocatalyst and an electrode of a high performance supercapacitor for energy storage.

Keywords: silicon nanowires, spinel ZnCo_2O_4 , deposit time, energy storage.



ID: Mat-P-48

The effects of boriding thermochemical treatments on the microstructure and high temperature oxidation resistance of XC38 steel

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Abstract: In this work, the effects of boriding thermochemical treatment in solid medium on the microstructure and surface properties of XC38 steel were studied. The layers obtained are characterized by optical microscopy, X-ray diffraction and Vickers microhardness. The study shows the formation of a 70 μm diffusion layer with a significant improvement in the microhardness value which reaches 1422 HV. the evaluation of the oxidation resistance of the boronated and non-boronized samples shows that the boron coating provided significant improvements in the resistance to oxidation of XC 38 steel at temperatures between 700 and 900°C.

Keywords: boriding ,borides, thermochemical treatment, microhardness, oxidation resistance.



ID: Mat-P-50

Thermal Conductivity and Lattice Dynamics of Thermoelectric Oxychalcogenide BiCuTeO

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Abstract: Recently, BiCuTeO is considered as one of the promising thermoelectric materials due to its ultra-low thermal conductivity. For this reason, the thermoelectric characteristic of this material has been studied to evaluate the lattice thermal conductivity () from first-principles calculations which are based on solving linearized Boltzmann transport equations (LBTE) through the relaxation time (RTA) approximation. These calculations are used to predict the behavior of phonons in order to understand the origin of the ultra-low thermal conductivity of BiCuTeO. The lattice thermal conductivity of BiCuTeO is reproduced with high accuracy. Our calculations predict that BiCuTeO announces a strong anharmonicity, which is the cause of the very low value of the thermal conductivity. This results in very high group speeds. Moreover, the calculations of the elastic properties, dielectric constants, phonon group velocities, lifetimes, and Grüneisen parameters shows that the lattice thermal conductivity exhibits an obvious anisotropy.

Keywords: BiCuTeO ; Thermal conductivity ; Vibrational properties ; mechanical properties; Grüneisen parameters.



ID: Mat-P-52

Utilization of Algerian Desert Plant Species for the Development of High-Quality Composite Materials

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Abstract: This research presents a comprehensive environmental assessment of composite manufacturing processes. We investigate the sustainability implications of two widely used processes: vacuum infusion molding and compression molding, as well as their impact on the environment in comparison to the traditional hand lay-up method. Our study highlights the potential of vacuum infusion molding and compression molding to enhance part consistency, reduce labor costs, and improve overall product quality. Additionally, we explore the environmental benefits and considerations associated with replacing NaOH in fiber treatment with citric acid, examining aspects such as biodegradability, waste management, energy consumption, and resource availability. The results for composite materials showcase mechanical properties, including tensile, flexural, and compressive strengths, along with a high Young's modulus (1.4 GPa to 2.35 GPa), these composites exhibit outstanding impact resistance, with the ability to absorb energies ranging from 15 J to 50 J, making them highly appealing to industries emphasizing both durability and energy dissipation. Moreover, their sustainability and potential cost-efficiency further position natural fiber composites as transformative materials in engineering.

Keywords: Natural fiber, composite, compression molding, vacuum infusion, Tensile, impact.



ID: Mat-P-56

Waste Foundry Sand as a Sustainable Alternative to Natural Sand in Concrete Production

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Abstract: The increasing demand for concrete has led to a shortage of natural sand, a key component in its production. Meanwhile, metal casting industries generate large amounts of waste foundry sand, which is often discarded without proper utilization. This study aims to investigate the feasibility of using waste foundry sand as a partial replacement for natural sand in concrete production. X-ray diffraction (XRD) and energy dispersive X-ray spectroscopy (EDX) analyses were performed to determine the physical and chemical properties of waste foundry sand. Optical microscopy was also employed to examine the morphology of the material. Concrete mixtures were prepared with varying proportions of foundry sand (0, 5, 10, 15, 20, 25, and 30 wt%) replacing natural sand. The fresh and hardened properties of these mixtures were evaluated through compressive strength, slump, and density measurements. This study explored the effects of foundry sand replacement on concrete's compressive strength and density at 7 and 28 days of curing. The results indicate that up to 10% foundry sand replacement enhances compressive strength in both the early and later stages of curing. However, the density of the concrete decreases with increased foundry sand replacement. These findings have significant implications for sustainable concrete production, as they suggest that waste foundry sand can enhance the mechanical properties and reduce the environmental impact of concrete manufacturing.

Keywords: waste foundry sand ; natural sand ; concrete production ; sustainability ; density ; partial replacement.



ID: Mat-P-57

Ab-initio calculations of the distribution of charge density of t-Se and t-Se(D).

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Abstract: In this research, we calculate the distribution of charge density of trigonal Selenium (t-Se) and t-Se containing a defect (t-Se(D)) utilizing the WIEN2k code; because it has basic information about the nature of chemical bonding between atoms and also to know the defect effect on the nature of chemical bonding between atoms of our materials. The structural properties show that the calculated structural parameters are in good agreement with other experimental and theoretical studies. The t-Se(D) has the same structural parameters as the t-Se ones except a change in the dihedral angle at the position of the defect. The anisotropic nature of t-Se and t-Se(D) materials emerged from the charge density distributions at different planes and also from the nature of the intra-chain and inter-chain bonding. Furthermore, the study of different planes of the investigated materials appear that our materials have a strong anisotropy which favors to increase the sensitivity optic for them and also our defect does not have the same effect on all planes; which may be useful for optical applications. Our defect can be used to control the properties of the t-Se.

Keywords: t-Se; defect; WIEN2k code; charge density distribution; sensitivity optic.



ID: Mat-P-58

Ab-initio calculations of the optical properties of the t-Se1-xTex system for $x = 0.03, 0.04$ and 0.08 .

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Abstract: In this research, we explore the optical properties of t-Se1-xTex for $x = 0.03, 0.04$ and 0.08 utilizing WIEN2k code. The structural properties show that the calculated structural parameters are in good agreement with other experimental studies. The optical properties of t-Se1-xTex system for $x = 0.03, 0.04$ and 0.08 appear almost similar properties in the topology. Moreover, our studies show a close agreement between experimental and calculated optical properties results; this indicates the reliability of our results. Furthermore, when x increases, the different optical spectrums shift to weaker energies; this is due to the decrease in the gap with x . Further, the anisotropic nature of t-Se1-xTex system is more obvious by $\epsilon_1^{xx}(0)$ and $\epsilon_1^{zz}(0)$ values where $\epsilon_1^{zz}(0)$ compound is the predominant in all our concentrations. This is confirmed by the difference in the static refractive index between the two directions. This favors to increase the sensitivity optic for them; which may be useful for optical applications. Similarly, it is clear that t-Se1-xTex system have a higher absorbance in ultraviolet region where $x = 0.03$ and in visible region where $x = 0.04$ and 0.08 . Hence, our systems can be used as possible materials for ultraviolet rays and for visible rays. Consequently, the Te concentration affected the optical properties of the t-Se1-xTex system.

Keywords: t-Se1-xTex; WIEN2k code; optical properties; anisotropic nature; sensitivity optic.



ID: Mat-P-60

The effect of Mn concentration on Zn-Ni-Mn coating nucleation and corrosion behavior

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Abstract: The study focuses on Zn-Ni-Mn coatings deposited on a Cu substrate at room temperature. It explores how the concentration of Mn^{2+} ions in the bath affects the coatings. The electrodeposition process is analyzed using cyclic voltammetry (CV) and chronoamperometry (CA). The study investigates the nucleation process based on the Scharifker and Hills model and finds that Mn^{2+} concentration significantly influences the nucleation mode. Energy dispersive X-ray (EDX) analysis reveals the composition of the coatings, with Zn as the major element. Scanning electron microscopy (SEM) shows that the coatings have a uniform, compact morphology with pyramidal-shaped particles. The coatings also exhibit a coexistence of η -Zn and $NiZn_3$ phases known to enhance corrosion resistance. Corrosion resistance is further investigated using linear polarization plots and electrochemical impedance spectroscopy (EIS).

Keywords: Keywords: Ni-Mn, Zn-Ni-Mn coatings, electrodeposition, corrosion resistance, S-H, nucleation, growth.



ID: Mat-P-61

Elaboration of Co-Fe powders by a new chemical process

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Abstract: يتركز عملنا على تطوير طريقة كيميائية غير مائية جديدة لإعداد مساحيق أكسيد الحديد وفريت الكوبالت CFO. تم تكوين مسحوق أكسيد الحديد عن طريق الضغط والتلييد عند درجتى 400 درجة مئوية و 450 درجة مئوية، وهو في جلايكول الإيثيلين. $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$: غير هيدرات (III) المسحوق الناتج من تجفيف المحلول لكمية مذابة من حديد بعد تلييد محلول كثيف عند 450 درجة مئوية (CFO) ومع ذلك، تم الحصول أيضًا على مساحيق أكسيد الكوبالت-الحديد المذابة في خليط من حمض ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$, $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$) يحتوي على كمية من الحديد وكلوريدات الكوبالت ونترات ($\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$) الأسكوربيك والماء المقطر، أو بواسطة إذابة نترات الحديد في كمية معينة من جلايكول الإيثيلين، مع التحريك على طبق ساخن عند درجة حرارة ($\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$) الكوبالت. تصل إلى 200 درجة مئوية والتليين عند درجة حرارة 450 درجة مئوية في الهواء.

(γ -Fe₂O₃) ورامان لمسحوق أكسيد الحديد المعالج عند 400 و 450 درجة مئوية وجود أطوار الماغميت XRD يُظهر تحليل وتحسن في الجودة البلورية والأحجام البلورية مع تعزيز درجة الحرارة، في حين أن (α -Fe₂O₃) والهيماتيت (α -Fe₂O₃) Cobalt-Fer والدرجة البلورية العالية لمسحوق CoFe₂O₃ كشفت عن تكوين مرحلة CFO النتائج المقابلة لمساحيق الصلب عند 550 درجة مئوية.

Keywords: مسحوق؛ تلييد CFO أكسيد الحديد؛ الكوبالت؛



ID: Mat-P-62

First-principles studies of the structural, elastic, phonon, and thermodynamic properties of nonlinear chalcogenide LiGaTe₂ under pressure

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Abstract: First-principles calculations for the structural, elastic, thermal and vibrational properties of LiGaTe₂ under pressure up to 5GPa have been systematically investigated within the framework of the density functional theory. The lattices parameters found *a*, *c* and the bulk modulus *B* under zero pressure and zero temperature are close with the experimental data and the theoretical results. The analysis of the mechanical constants and the frequencies of the phonons found, confirms that the compound LiGaTe₂ is dynamically and mechanically stable up to 5GPa. The effect of pressure on elastic constants *C_{ij}*, bulk modulus *B*, Young's modulus *E*, Poisson ratio *ν*, shear modulus *G*, and compressibility *k* of LiGaTe₂ are also successfully obtained and discussed. In addition, the thermal properties of LiGaTe₂, such the heat capacity *C_V* and *C_p*, the grüneisen parameter *γ* and the thermal expansion coefficient *α* are predicted by the quasi-harmonic approximation (QHA).

Keywords: LiGaTe₂, LO-TO splitting, Elastic, Vibrational, Thermal properties.



ID: Mat-P-63

Luminescence features of Pr^{3+} doped $\text{Sb}_2\text{O}_3\text{-M}_2\text{O-WO}_3$ ($\text{M}=\text{Na}$ and Li) glasses for photonic applications

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Abstract: Pr^{3+} -doped $\text{Sb}_2\text{O}_3\text{-M}_2\text{O-WO}_3$ ($\text{M}=\text{Na}$ and Li) glasses, UV-Vis-NIR optical absorption and luminescence features, fluorescence decay times of the $1\text{D}_2 \rightarrow 3\text{H}_4$ transition including (CIE) coordinates were studied and discussed. Using a UV-VIS-NIR absorption spectrum, Judd-(J-O) Ofelt's theory analysis was applied to predict spectroscopic properties : radiative transition probabilities (AR), branching ratios (βR), radiative lifetimes and integrated emission cross-section (Σ) of all Pr^{3+} ion's luminescence levels. Several factors taken into account when developing visible laser systems were analyzed for the identified blue emission in both bands upon 449 and 485 nm optical pumping. Pr^{3+} : Li ions containing glass have high spectroscopic quality factors, high AR, large stimulated emission cross-section (σ_{em}), better quantum efficiency, high gain bandwidth, and important optical gain for $1\text{D}_2 \rightarrow 3\text{H}_4$ transition for a significant prospective reddish orange lasing action. Furthermore, from visible fluorescence emission spectra, coordinates, (CCT), CRI, and purity were derived, and the deduced CIE and CCT values reflect the orange or reddish-orange light region. The above findings indicate that Pr^{3+} -doped $\text{Sb}_2\text{O}_3\text{-M}_2\text{O-WO}_3$ glasses may be best suited for photonic device applications.

Keywords: Sb_2O_3 -rich glasses; Pr^{3+} ; Judd-Ofelt analysis; spectroscopic properties; Visible emission.



ID: Mat-P-64

Modeling 2DEG Density and Capacitances in AlGa_N/Ga_N HEMTs: A Physical Simulation Study

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Abstract: Circuit simulations heavily depend on stable and efficient compact models that accurately represent device behavior across all operational modes. However, the practical application of physical models [1-3] is often limited due to their computational complexity and time requirements, posing challenges for circuit simulations. As a result, researchers have been actively exploring simplified models based on device physics to address these issues. Over the past few decades, one particularly intriguing area of research has been the density of the two-dimensional electron gas (2-DEG) in high electron mobility transistors (HEMTs). The equation governing the sheet concentration of the 2-DEG, which is influenced by the Fermi energy and multilevel energies, is inherently complex [4-9]. To overcome this complexity, various models have been proposed to provide practical approximations.

Keywords: 2-DEG, AlGa_N/Ga_N HEMTs, TCAD.



ID: Mat-P-67

Revêtements composites Nickel-Alumine sur substrat d'acier

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Abstract: La nécessité d'améliorer les revêtements avec une meilleure résistance à la corrosion a été développée par l'utilisation d'électrodépositions composites, qui consistent à ajouter des particules solides dans la structure du nickel, comme l'oxyde d'aluminium (Al_2O_3). L'objectif de cette recherche est l'étude de la résistance des revêtements composites nickel-alumine sur des substrats en acier (plaque noire), obtenus à partir d'un bain de galvanoplastie, à différents niveaux de concentrations d' Al_2O_3 . La caractérisation est faite par des tests de corrosion dans deux solutions électrolytiques différentes 0,5M K_2SO_4 et 0,5M $NaCl$, et des analyses physico-chimiques telles que la diffraction des rayons X (DRX) et la microscopie électronique à balayage (MEB). Le comportement électrochimique des revêtements composites dans des solutions corrosives a été vérifié par des méthodes de polarisation potentiodynamique. Les différents essais, réalisés dans ces conditions, ont révélé que les particules d' Al_2O_3 ajoutées au bain diminuent la tendance à la corrosion des aciers recouverts. Ils ont également déterminé la concentration d' Al_2O_3 , ajoutée au bain, qui assurait une protection optimale contre la corrosion.

Keywords: Électrodéposition; Revêtement composite Ni- Al_2O_3 ; Polarisation potentiodynamique.



ID: Mat-P-68

Effects of water immersion on the fatigue endurance limit of glass/polyester

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Abstract: The behavior in bending cyclic fatigue of a multidirectional glass/polyester composite material is studied for different life times then after immersion in the water during various periods. The mechanisms of damage and fracture after the process of fatigue and that of the ageing are examined. The state of damage in fatigue is generally characterized by a combination of density and orientation of the microcracks which seem to be affected by the loading as well as the states of conditioning of test specimens. This damage in the case of the studied composites is mainly due to mechanisms of microcracking of the matrix, the exfoliation inter facial, of fibers debonding and fracture. The mechanism of water absorption and the kinetic parameters are analyzed, what allowed to identify the mechanism of diffusion in the tapwater of the glass/polyester composite which is not Fickien and anomalous. The results of the cyclic tests (curves of Wöhler) present a characteristic important dispersal of these materials and are modeled by fit lines of linear regressions which give of the average mean part a rather good representation.

Keywords: Glass/Polyester ; Fatigue ; Immersion ; water ; Diffusion.



ID: Mat-P-69

Alloying elements contribution to the improvement of the mechanical properties and wear resistance of spheroidal graphite cast iron

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Abstract: This work, relates to the improvement of the ferritic-pearlitic ductile iron by addition of alloying elements for obtain an improved properties. Microstructure, mechanical proprieties (tensile strength, hardness, microhardness, resilience) and wear resistance (weight loss and friction coefficient) are structural and mechanical characterizations applied to ductile iron. This material is particularly adapted to severe environments. Thanks to its mechanical properties that are comparable to some high-strength steels. A comparison is made between the properties of a base metal (unalloyed cast iron) and a cast-iron alloyed with Ni (1%), Mo (0.2%), Ti (0.1%), and Nb (0.1%). The results of these characterizations show that the properties are improved.

Keywords: Ductile iron, ferrite; perlite; alloying elements; mechanical properties; wear resistance.

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ID: Mat-P-73

Numerical simulation of impact in functional gradient materials: A finite element analysis

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Abstract: Functionally graded materials (FGM) are attracting increasing interest due to their unique properties, which vary gradually through their thickness. In this paper, we used the finite element method to study the impact at low velocity in an FGM plate. Our study aimed to deepen our understanding of the responses to dynamic loads in these complex materials. We started by describing the numerical modeling of the FGM plate, taking into account its variation in composition and material properties along the thickness. Next, we conducted a series of impact simulations using representative scenarios of impact loads and speeds. Our results revealed crucial information about the strength, deformation, and stress distribution inside the FGM plate. This study demonstrated that the finite element method is a powerful tool for analyzing the impact in FGM, allowing an accurate assessment of the performance and sustainability of these innovative materials. Additionally, our findings have important implications for the design and engineering of structures where FGMs are used, particularly in the aerospace, automotive, and defense fields.

Keywords: FGM plate; dynamic impact; Stress distribution; material deformation; finite elements.



ID: Mat-P-76

Béton confiné par polymère renforcé de fibres de carbone : Fiabilité des modèles contrainte-déformation

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Abstract: Plusieurs chercheurs ont élaboré des modèles contrainte-déformation visant à prédire la résistance et la déformation du béton confiné par des polymères renforcés de fibres. Cela a pour objectif de faciliter l'utilisation de cette technologie pour renforcer le béton. La fiabilité d'un modèle repose sur sa capacité à fournir une représentation précise et pratique dans une application donnée. Cette précision est confirmée par la validation expérimentale et son adaptabilité aux conditions réelles. Dans cette optique, le but de ce travail est d'évaluer la précision de trois codes de conception : la Fédération Internationale du Béton (2001), l'Association Canadienne de Normalisation (R2017) et l'Institut Américain du Béton (2017), ainsi que trois modèles contrainte-déformation (Wang et al., 2018 ; Guo et al., 2019 ; Gharaei-Moghaddam et al., 2023). Cette évaluation se fait en comparant les résultats expérimentaux du béton totalement et partiellement confiné. Lors des comparaisons de ces modèles, nous avons constaté des variations dans les résultats et la précision en fonction du type de confinement. Les prédictions de Guo et al. et Gharaei-Moghaddam et al. se sont avérées très proches des résultats expérimentaux lorsqu'un confinement total était utilisé, avec une différence allant de 1 à 2 MPa. En revanche, les prédictions de la FIB et le modèle de Wang et al. étaient plus proches des résultats des essais en cas de confinement partiel, avec des écarts maximums de 2 MPa.

Keywords: matériau composite; polymère renforcé de fibres; modèles contrainte-déformation; béton renforcé ; prédiction ; validation expérimentale.



ID: Mat-P-77

Calculation and Analysis of the Percolation Threshold in Polymer Nanocomposites with Graphite Nanoplatelets

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Abstract: This research endeavor is dedicated to the development of two fundamental models: the excluded volume theory and the average interparticle distance (IPD) model. These models have been tailored to offer valuable insights into predicting the percolation threshold in polymer nanocomposites incorporating graphene nanoplatelets. The investigation is conducted while considering two distinct possible distributions of graphene nanoplatelets: a bidimensional (2D) arrangement and a tridimensional (3D) arrangement. To encompass the full spectrum of nanoplatelet structures, our analysis encompasses various nanoplatelet shapes, including circular, rectangular, and elliptical forms. The study extensively explores the intricate interplay of several critical parameters influencing the percolation threshold in polymer/graphene nanocomposites. These parameters encompass interparticle distance, which encompasses the tunneling phenomenon, as well as the thickness and diameter of the nanoplatelets, and the orientation angle of these nanoplatelets within the composite matrix. The results of our meticulous analysis reveal a profound and intricate influence of these parameters on the percolation threshold. This sheds light on the underlying mechanisms governing the electrical conductivity behavior in these nanocomposite materials.

Keywords: Polymer Nanocomposites, Percolation Threshold, Graphite Nanoplatelets, Excluded Volume Theory, Average Interparticle Distance.



ID: Mat-P-79

Comparative study of the properties of iron and cobalt catalyst cluster

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Abstract: The geometry and low-energy electronic structure of the nickel (Fen) and nickel (Con) clusters were determined, respectively. The number of atoms n constituting these clusters was varied from 2 to 10 based on density functional theory (DFT) with the generalized gradient approximation (GGA) derived from the SIESTA method. New low-energy structures were searched for clusters with new low-energy structures. For each cluster size, the average bond length, binding energy, and perpendicular ionization potential (VIP) were calculated. The low-energy structures of the clusters are linear in-plane even for values of $n > 6$, and stability shows that the Fe10 and Co10 clusters have the highest values of binding energy; VIP shows clear oscillations for even and odd values, with the Fe2,6,8,10 and Co3,7,9 clusters having the highest values and higher vertical ionization potentials than the Co2,6,8,10 and Co3,7,9 clusters. These clusters are more stable than adjacent clusters. In this study, several iron and cobalt clusters were investigated by DFT and their structural aspects were discussed in addition to their catalytic properties.

Keywords: Density functional theory (DFT), Fen and Con clusters, binding energy, Stability structure, vertical ionization potential (PIV), chemical catalysis.



ID: Mat-P-81

COMSOL simulation of interface states in MOS (Metal-Oxide-Semiconductor) structures

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Abstract: This work consists in the study of the influence of interface states (Dit) situated at the oxide/substrate interface in a MOS (Metal-Oxide-Semiconductor) capacity. For this, we will analyse the Capacitance – Voltage characteristics $C(V)$, obtained by resolving both one dimensional “Poisson” and “Schrodinger” equations. Our study treats precisely the influence of interface states (Dit) - situated at the oxide/substrate interface - on the capacitive behavior of our structure by simulating its capacitance-voltage characteristics $C(V)$. We will particularly study, the influence of their concentration, the type of charge which they introduce and also the effect of the substrate’s doping on their activation. Our MATLAB simulations are validated by COMSOL ones, in order to learn more about this efficient simulation tool.

Keywords: Interface states; MOS structure; $C(V)$ characteristics; Schrodinger; COMSOL.



ID: Mat-P-82

Crack Investigation In Functionally Graded Materials

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Abstract: Functionally Graded Materials (FGMs) have emerged as highly successful advanced composite materials with widespread applications across essential fields. This paper delves into the ongoing research aimed at comprehending and mitigating damage within these materials. The foundation of this investigation rests upon fracture mechanics theories and empirical testing, providing crucial technical support for the design and manufacturing of FGMs. Researchers actively explore the influence of external loads, material geometry, and crack tip behavior under varying boundary conditions. A central focus of this research is the development of notable theories based in the principles of continuum solid mechanics and thermodynamics. These theories play an important role in establishing criteria for fracture initiation and propagation within FGMs, with consideration of how material grading impacts stress distribution. Furthermore, this manuscript offers a comprehensive review of investigative techniques employed in the study of crack tips, encompassing both straight and kinking cracks. This summary serves as a valuable bibliographic resource, facilitating researchers' access to critical information vital for their investigations into the mechanics of fractures and cracks within FGMs.

Keywords: Functionally Graded Materials; Crack; Kinking Crack; Crack Tip.



ID: Mat-P-83

First principle study of structural, bonding, elastic and isotropy of AEIn_2As_2 (AE: Sr and Ca)

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Abstract: AEIn_2As_2 (AE=Sr and Ca) compounds were successfully elaborated by the Bridgman–Stockbarger technique by Bobev et al. The structural, bonding and elastic properties of the experimental peculiarities were in details investigated using an accurate exchange and correlation pseudo potential (GGA-PBEsol 08) implemented in castep code also other full potential (TB-mBJ GGA) implemented in Wien2K code. The present results which based at AB initio computer calculations were in good agreement and confirm well the previous theoretical and experimental find.

Keywords: DFT, semiconductors, TB-mBJ GGA, bonding properties.



ID: Mat-P-85

Effect Of A-Site Gd³⁺ Substitution On Structural And Optical Properties Of La_{0.8}(Ca_{1-x}Gd_x)_{0.2}MnO₃ Manganites

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Abstract: This work was focused on the preparation using the sol-gel method and study of doping effect on the structural and optical properties of a perovskite compound with general chemical formula La_{0.8}(Ca_{1-x}Gd_x)_{0.2}MnO₃ ($0 \leq x \leq 0.20$). The infrared spectroscopy results showed that all the organic bonds disappear after the sintering stage. The crystallographic structure was determined using the "Rex- Powder diffraction" refinement program, based on the "Rietveld" method. It was found that the compound crystallizes in the Pnma space group, and that the cell volume changes with doping. The calculation of the estimated grain size showed that all samples were nanometric ($15\text{nm} \leq D \leq 20\text{nm}$). Using the UV absorption spectrum, the energy gap (E_g) value for each sample, was determined and it was ranged between 2.6 eV and 3 eV.

Keywords: Sol-gel method, doping, La_{0.8}(Ca_{1-x}Gd_x)_{0.2}MnO₃, X-Ray Diffraction, FTIR, UV-Visible..



ID: Mat-P-87

EFFECT OF CONCRETE CLASS, MAXIMUM AGGREGATE SIZE AND SPECIMEN SIZE ON THE COMPRESSIVE STRENGTH OF CORES AND CAST SPECIMENS

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Abstract: Core sampling is the most accurate method of evaluating the compressive strength of concrete structures. However, it is preferable to take only small cores to avoid damaging the structures. It turns out that various elements influence the strength of compressed cores. This study examines the influence of specimen size, aggregate size, concrete class, and curing method on compressive strength. Three aggregates measuring 3/8, 8/15, and 15/25 mm are used to make six sets of concrete compositions with strengths of 25 MPa and 30 MPa. Nine specimens are made, one for each variety of aggregate and concrete. Cores of 100 mm, 75 mm, and 50 mm sizes are made. These cores are extracted from concrete blocks curing in the outside air to simulate the real concrete curing environment. Cast specimens cured in water and air with diameters of 50 mm, 100 mm, and 150 mm are also made.

Keywords: Concrete; compressive strength; cast specimens; cores; aggregate size; specimen size.



ID: Mat-P-88

Effect of date palm and Polypropylene fiber in High-Performance Concrete

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Abstract: High-Performance Concrete (HPC) is a material that is known for having great engineering and long-lasting qualities. This research looks into what happens when date palm fiber and polypropylene fiber are added to HPC as long-lasting supports. Date palm fiber, which is a natural farming waste, and polypropylene fiber, which is a man-made addition, are both being looked at to see if they can improve the structure and performance of concrete. A lot of tests are being done on both new and hardened concrete as part of the study to see how these fibers affect the workability, strength, and stability of the concrete mix. The addition of date palm fiber should make the concrete last longer, and the addition of polypropylene fiber should make it stronger and less likely to crack. The study's results will show if it is possible and useful to use date palm and polypropylene fibers in the production of HPC, with the goal of making the material last longer and be more structurally stable. As part of the global push for safe and durable infrastructure, this study helps to make building materials that are better for the environment.

Key words: HPC, silica fume, Polypropylene Fiber, date palm fiber.



ID: Mat-P-91

Effect of Sn doping on the structural and optical properties of NiO thin films

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Abstract: In recent years, Nickel Oxide (NiO) based thin films have drawn more attention in optoelectronics applications because of their superior optical and electrical properties.

The aim of this work was to study the effect of Sn doping on structural, and optical properties of NiO thin films. Sn-doped NiO (0–3 wt%) thin films were synthesized on ITO glass slides using cost-effective nebulized spray pyrolysis technique process. The X-ray diffraction patterns revealed that all synthesized films are polycrystalline in nature and correspond to the cubic crystal structure with predominant orientation along the (111) plane. From UV-vis analysis, it is found that all samples exhibit good optical transparency, in the visible region, while the optical band gap values were found to be changed as a function of Sn doping content. Further, Urbach energy the refractive index and extinction coefficient, were also determined.

Keywords: Thin films, nebulized spray pyrolysis, X-ray diffraction, Optical properties, NiO.



ID: Mat-P-92

Effects of solution deposition and heat treatments on the Nickel Silicides (NiSi) phase formation in the electrodeposited Nickel (Ni) seed layer for copper solar cell contacts

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Abstract: This work investigates the effects of solution deposition and heat treatments on the Nickel Silicide (NiSi) phase formation in the electrodeposited Nickel (Ni) seed layer for copper solar cell contacts. The electrodeposition of the Ni layer on Si substrate was performed at temperature of 60 °C and deposition current density of $I = 4 \text{ mA/cm}^2$ using two solutions: one in prepared in Lab referred as Ni-Lab consisting of (NiSO_4 , $(\text{NH}_4)_2\text{SO}_4$, Na_2SO_4 and H_3BO_3) and the other solution is a commercial referred as Ni-DZ. SEM analysis and sheet resistance variation showed that structural and electrical properties depends on the deposition solution. Afterwards, the electrodeposited Ni layers were annealed at temperatures ranging between 300°C to 500°C under nitrogen atmosphere and under vacuum in order to form the NiSi phase, which reduces the contact resistance between the Ni layer and the Si substrate. Optical micrographs showed a burning of Ni layers at temperatures above 400°C, revealing that the optimum temperatures for the annealing of the Ni layers are below 400°C. The FTIR results in showed that the maximum fraction of the NiSi phase is obtained at annealing temperature of 350°C under vacuum for the Ni layer deposited from Ni-Lab solution while the maximum fraction of the NiSi phase in the Ni layer deposited from Ni-Dz is obtained at annealing temperature of 400°C under N_2 atmosphere.

Keywords: NiSi phase, Ni seed layer, Si solar cells.



ID: Mat-P-94

Study of the Influence of Welding Parameters on the Microstructure and Mechanical Behavior of Steel-Steel Assemblies Obtained by Arc Welding

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Abstract: The study of the electric arc welding effect as well as the influence of the welding parameters on the welded joints are important to meet the needs of manufacturers and the requirements of users in order to be able to study their consequences on the chemical composition, microstructure and micro-hardness of the steel studied. Initially, it is based on experimental work to study the influence of welding parameters on the quality of pipeline welding. Then, the experimental results will be used to determine the optimal arc welding parameters. For the realization of our work, the use of different characterization techniques is recommended such as X-ray fluorescence spectrometry (FRX), atomic absorption spectrometry, optical microscopy (MO), scanning electron microscopy (SEM) associated with EDAX, micro-hardness (HV) and X-ray diffraction (XRD).

Keywords: Welding; Electric Arc; Microstructure; Steel.



ID: Mat-P-95

Experimental investigation of water bypass phenomenon in light oil reservoirs using a glass micromodel and sand cores with a hydrophobic material

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Abstract: The new predictive experimental mixed wettability capillary micromodel based on glass and PVC capillaries as well as sand cores with PVC debris was developed for accurate prediction of water bypass phenomenon effect caused by hydrophobic materials deposition in light oil reservoirs. Different parameters including wettability (WI), relative permeability (k_{rw} , k_{ro}), and oil recovery were used to assess the mixed wettability capillary micromodel accuracy and performance as well as to compare it with the previous capillary micromodels. The results illustrated that the proposed micromodel estimates oil trapping and oil recovery under oil-wet conditions with the highest accuracy compared to other micromodels. In addition, core flooding experiments were done for showing the effect of the proposed surfactant solution on the wettability of the altered cores and the oil-relative permeability. Results showed that in mixed wettability porous systems, the use of a mixture of SDBS, Tergitol 15-S-12, and pentanol as a co-surfactant at specific concentration leads to higher oil recovery and restoration of the initial wetting state for hydrophobic zones in the rock.

Keywords: Contact angle; oil recovery; PVC; surfactant injection; water bypass; wettability alteration.



ID: Mat-P-96

Exploring the structural and optical properties of Mg-doped zinc oxide thin films

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Abstract: Zinc oxide (ZnO) has attained significant interest in the last few years due to its attractive physical properties and widely used for solar cells, laser diodes, and gas sensors. In this study, pure and Mg-doped ZnO (MZO) with different Mg doping concentrations (0%, 3% wt) thin films were synthesized on glass slides using nebulized spray pyrolysis technique process. The impact of Mg doping concentration on the structural and optical properties was examined using X-ray diffraction and UV visible spectroscopy, respectively. The X-ray diffraction patterns revealed that the (0 0 2) peak is observed in all deposited films with a hexagonal wurtzite phase. The optical properties were calculated using ultraviolet (UV) transmission spectra. The blue-shift in UV spectra with an increase of Mg concentration were showed which confirmed a gradual increase in the optical band gap of films. The calculated bandgap of ZnO thin films was observed to be increased with increase of Mg concentration.

Keywords: Thin films, nebulized spray pyrolysis, X-ray diffraction, Optical properties, ZnO.



ID: Mat-P-101

Influence of Deep levels defaults and Auger Recombination on the Silicon Solar Cells' Performances

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Abstract: This paper presents an in-depth study of the effects of the deep levels and Auger recombination on the operation of an N+PP+ type silicon solar cell to optimize its structure and improve its performance. The simulation with the COMSOL software made it possible to illustrate the link between the device's technology studied, the recombination phenomena, and the different characteristics and parameters obtained at the output. It was observed that at low doping levels, the influence of Auger recombination effects remains relatively negligible and that the recombination effects due to the deep defects are responsible for the deterioration of the solar cell performance. Furthermore, increased doping and thickness of the emitter significantly improved the performance of the cell studied [1]. However, from a particular high doping threshold, the influence of Auger recombination effects becomes dominant compared to those induced by the deep defects, particularly for higher emitter thicknesses, where a significant decrease in short-circuit current, voltage in open circuit, efficiency, and form factor was observed [2]. To this end, it was demonstrated that all these parameters could be significantly improved by reducing the thickness of this emitter in the range of 0.4 μm [2-3].

Keywords: solar cell ; deep level defects ; Auger recombination ; optimization.



ID: Mat-P-102

Influence of Dune Sand on the Physico-mechanical Behavior of Eco-mortar after Curing

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Abstract: Recently, the depletion of natural aggregate reserves and the challenges associated with finding new quarries have prompted the search for alternative sources of supply. The valorization of dune sands is now considered a promising solution to address the gap between production and consumption. Several researchers have developed cementitious materials based on dune sand. The objective of this study is to demonstrate the effectiveness of continuous wet curing on an eco-mortar containing dune sand, which underwent various preservation methods over a 28-day period: water curing and open-air curing in the laboratory. Five different eco-friendly mortar mixes were created, each with varying levels of desert dune sand substitution with recycled sand, while maintaining a constant water-to-cement (W/C) ratio and cement content. The experimental results unequivocally highlight the optimal performance achieved with substitution ratios of 40/60 and 60/40. Notably, water curing emerged as the most effective preservation method, resulting in reduced porosity and improved resistance to compression and bending. A decrease in sorptivity was also observed, providing insights into the internal structure of the processed material.

Keywords: Eco-mortar, dune sand, recycled sand, curing, physico-mechanical properties.



ID: Mat-P-103

Synthèse des nanoparticules de SnO₂ par co-précipitation

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Abstract: La technique de co-précipitation a été utilisée pour l'élaboration des nanoparticules d'oxyde d'étain (SnO₂). La diffraction des rayons X, la spectroscopie UV-Visible et la spectroscopie FT-IR ont été utilisées pour étudier ces poudres. En utilisant la diffraction des rayons X pour caractériser la structure des films, cette dernière a été déterminée par sa forme cristalline avec une structure tétragonale. Le spectre FT-IR confirme la composition chimique, la mesure de l'absorption optique permet d'estimer le type de transition et la bande interdite des nanoparticules produites. Les nanoparticules élaborées (avec ces propriétés montrées par les différentes méthodes analytiques utilisées dans cette étude) peuvent entrer dans nombreux domaines (dans notre étude ses particules sera utilisé comme élément de renforcement pour les polymères (PLA)).

Keywords: SnO₂ ; Oxyde métallique ; Nanoparticules ; Co-précipitation..



ID: Mat-P-107

Synthesis and characterization of char and activated carbons from Jujube tree

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Abstract: The recovery of residues and waste from agriculture is a very important research activity for the protection of the environment. Thus, Lignocellulosic materials constitute the most abundant raw material for the production of activated carbons used for the adsorption of numerous molecules. The microporous properties of activated carbons depend both on the nature and structure of the precursor but also on the experimental conditions of the carbonization and activation steps. The aim of this study was the elaboration of activated carbons by chemical activation of jujube bark and jujube kernels from east Algerian region whose name is Annaba and means City of jujube and their characterization in the purpose of testing them for the removal of micropollutants present in an aqueous solution. Activated carbons were elaborated with two activating agent and by two different methods of chemical activation. The planning of activated carbon activation experiments was carried out using the experimental design methodology. The conditions of preparation were modified at each experiment in order to find the optimal conditions which give an activated carbon with a large specific surface and a homogeneous porous structure. The activated carbons obtained have more or less specific surface areas (between 0 and 500 m²/g) and a well-developed microporous structure. The effects of the preparation parameters on the properties of activated carbons have been statistically studied.

Keywords: Bark and nuclei of jujube; one and two step Chemical activation; Characterization.



ID: Mat-P-110

THE EFFET OF SERIES RESISTANCE IN THE MOS STRUCTURES

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Abstract: Several works and researches focused on conduction mechanisms in metal-oxide-semiconductor (MOS) capacitors in many ways., in particular when the Pool-Frenkel (PF) currents and the Fowler-Nordheim (FN) current are present at the same time. In this work, in addition to the existence effect of two charge transport mechanisms such as the Pool-frenkel current and the Fowler-Nordheim current, we examine the effect of the presence of the series resistance on the current-voltage (I-V) characteristic in MOS devices.

Keywords: conduction mechanisms, Current mechanisms, Fowler Nordheim, MOS. Pool-Frenkel, series resistance..



ID: Mat-P-111

The Structural Characteristics Study of Evaporation-Deposited Cerium-Doped Silicon-Rich Nitride

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Abstract: In this work, we are interested in the development and characterization of thin layers of cerium-doped silicon nitride deposited by a combination of low pressure vapor deposition technique (CVD)[1] and thermal evaporation doping was used. , then annealed at different temperatures in a N₂ environment[2]. The objective of this research was to develop an efficient method to deposit thin layers of cerium-doped silicon nitride[3] and to study their structural properties. The main results obtained in this study can be summarized in the following points: Raman spectra show that amorphous silicon bands weaken with increasing temperature, while crystalline silicon bands become more pronounced at higher temperatures. Electron microscopy analysis revealed a porous layer of 50.3 nm with grains increasing in size at high temperature. The spherical nanostructures showed less agglomeration with increasing temperature[4]. A spectrophotometer in reflectance mode was used to determine the different gap energies of nanostructured layers and to adjust these values for a photovoltaic application[5,6].

Keywords: Cerium, evaporation, silicon nitride, SEM.



ID: Mat-P-112

The usability of artificial ground freezing (AGF) as a new soil improvement technique in Algeria. Case study: Djebel El-Ouahch tunnel (east-west highway)

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Abstract: Soil swelling or water leaking due to the presence of substantial groundwater is a problem in sandy clay soil, which led to cracks and the collapse of the Djebel El-Ouahch tunnel in Algeria. This study proposes an on-site solution that has not been applied yet in Africa via the artificial ground freezing (AGF) method; this technique allows the creation of a frozen wall around the tunnel, assists in the intervention and repair of damages effectively, and avoids their occurrence if used before project realization.

Keywords: Artificial ground freezing (AGF) method ; Soil swelling ; Water leaking ; Tunnel; Frozen wall.



ID: Mat-P-113

Utilisation de matériau polymère renforcé de fibres de carbone dans le confinement spiral du béton

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Abstract: L'état actuel de l'art s'est principalement concentré sur le béton entièrement enveloppé avec des feuilles de polymères renforcés de fibres (FRP), et peu d'essais ont porté sur le béton partiellement enveloppé. En raison du manque significatif d'études concernant le confinement partiel, le débat sur son efficacité persiste. L'efficacité de confinement partiel des cylindres (320 mm x 160 mm) en béton par des bandes spirales est évaluée dans cet article. Cette étude présente 3 groupes de cylindres renforcés avec un confinement partiel à l'aide de bandes CFRP disposées en hélice. Les résultats obtenus avec le confinement partiel spiral, en variant l'espacement des bandes à 65, 45 et 30 mm, ont été comparés avec un groupe totalement confiné et un groupe non confiné de résistance moyenne (21,42 MPa). Les essais montrent clairement que l'augmentation d'espacement diminue l'amélioration en résistance et ductilité des cylindres renforcés. Si l'on prend en considération la quantité de matériaux composites utilisée, on constate qu'un confinement partiel spiral avec un espacement de 30 mm, qui donne la plus grande augmentation de la capacité de charge (26,11 MPa), entraîne une amélioration non significative de la résistance de 21,90 %. Par conséquent, le confinement partiel avec une bande CFRP en spirale s'est révélé non efficace. Des prévisions théoriques ont également été comparées aux résultats des essais pour évaluer la précision de deux modèles existants de béton confiné.

Keywords: polymères renforcés de fibres ; matériau composite ; béton ; renforcement ; confinement partiel spiral.



ID: Mat-P-114

Functionalized Cu₂O nanoparticles as hole transport layer for perovskite solar cells

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Abstract: The extraction of free carriers in a Perovskite solar cells (PSC) depends on the electron and the hole transport layers. The more efficient hole transport materials (HTM) used in PSCs are high cost conducting polymers with water-absorbing additives which decompose the perovskite layer. Owing to their excellent stability, high hole mobility, and low cost, several metal oxides are promising materials to replace organic HTMs in perovskite devices. For the deposition of high quality HTM films on the surface of the perovskite, low-cost solution-processing methods such spin coating are selected. Nonpolar reagent should be used as nanoparticle dispersion solvents to prevent perovskite damage. However, inorganic nanoparticles are hardly dispersed in nonpolar solvents. Herein we propose the surface modification of cuprous oxide (Cu₂O) by hydrophobic groups to improve the dispersion of the nanoparticles in nonpolar solvents. Cu₂O nanoparticles were synthesized and functionalized using Tetraethyloxysilane (Ethyl-Cu₂O) or decylphosphonic acid (Decyl-Cu₂O) coupling agents. To verify the performance of functionalized Cu₂O nanoparticles as HTMs, we fabricated compact TiO₂/perovskite/functionalized Cu₂O/Ag solar cell structures. The perovskite layer was processed in ambient atmosphere with a formula of Cs_{0.1}(FA_{0.83}MA_{0.17})_{0.90}(I_{0.83}Br_{0.17})₃Pb. Owing to the long hydrophobic chains, PSCs based on Decyl-Cu₂O HTM exhibited higher power conversion efficiency than PSCs based on Ethyl-Cu₂O HTM.

Keywords: Perovskite solar cells; Inorganic hole transport materials; Functionalized Cu₂O.



ID: Mat-P-115

Zn_{0.33} V₂O₅ nanocomposite materials as cathode for lithium-ion batteries

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Abstract: In the present work, Zn_{0.33}V₂O₅ nanocomposite has been synthesis by hydrothermal method as cathode materials for lithium-ion batteries. The crystallinity, morphology and electrochemical proprieties of as prepared nanocomposite were studied by XDR, MEB and CV. The results demonstrate that the Zn_{0.33}V₂O₅ nanocomposite is a promising cathode material for lithium-ion batteries due to their nanosized particle and to their nanoribbon morphology which is benefit for the lithium-ion diffusion and structural stability of material.

Keywords: V₂O₅/ZnO nanocomposite; Hydrothermal method; Cathode; Li- ion batteries; Lithium storage performance.



ID: Mat-P-123

Enhanced finite element for linear analysis of two dimensional thermoelasticity problems

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Abstract: This article presents an evaluation of a quadrilateral 8-node finite element based on the so-called "space fiber rotation" (SFR) concept in linear structural analysis under thermal load. This concept includes additional DOFs that enhance the accuracy of the displacement field; the element denoted as PFR8 (PFR8: Plane Fiber Rotation) uses a complete scheme of Gauss points. The elements performance was evaluated through a series of well-known benchmarks from the literature in thermoelasticity. The PFR8 element has successfully shown good accuracy and efficiency with less sensitivity to mesh distortion in 2D structural applications compared to the other reference solutions.

Keywords: Finite element; Quadrilateral; Plane Fiber Rotation ; Thermal load analysis ; Rotation degrees of freedom ; Linear analysis ; 2D structures ; Thermoelasticity



ID: Mat-P-126

Study of the structural and electrical properties of the new ceramic system

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Abstract: This work has for objective, the synthesis and development, the survey of the dielectric and piezoelectric properties of a new material made by ceramics PZT type of structure perovskite in the ternary system : $\text{Pb}_{0.98-x} \text{Ba}_x \text{Ca}_{0.02} [(\text{Zr}_y \text{Ti}_{1-y})_{0.94} - (\text{Zn}_{1/3} \text{Ta}_{2/3})_{0.03} - (\text{In}_{1/3} \text{Sb}_{2/3})_{0.03}] \text{O}_3$ with $x = (0, 1, 2, 3, 4, 5 \text{ and } 6 \%)$, $y = 52\%$. A substitution in site A and B was carried out in order to ameliorate its physical properties. The samples chosen for this survey have been prepared by a synthesis method in strong way. The samples have undergoes a sintering with: 1100, 1150, 1180 °C successively, in order to optimize the temperature of sintering where the density of the sample is maximal (near to the theoretical density) and therefore the product of better physical quality. Different techniques of characterization have been used for this survey as, the diffraction of the X-rays, the scan electronic microscopy (SEM), Raman and the electric measures .

Keywords: ceramic PZT, Scan electronic microscopy (SEM), X-rays diffraction, rhombohedral phases ,tetragonal phases , dielectric properties.



ID: Mat-P-128

Microstructural Characterization of dental amalgam

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Abstract: The interest of this study is to describe the properties of the microstructure of dental amalgam. The Ag-Sn-Cu alloy in powder form was characterized by X-ray diffraction (XRD), yielding two phases with different structure and grain size. The analysis of the tails of the grains of each line for the two phases demonstrated nanometric values, which result that our alloy is nanocrystalline. The values of the crystalline parameters are comparable to those of the literature.

Keywords: Dental Amalgam; XRD; Microstructure; Ternary Alloy; Nanometric.



ID: Mat-P-129

Removal of Methylene Blue and Rose Bengal Dyes from Water Using ZnO–SiO₂ Composite.

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Abstract: Textile industry wastewater pollutes natural water, harming aquatic life and ecosystems. Effective methods are vital for removing toxic substances. We compared the removal of Methylene Blue and Rose Bengal using a ZnO-SiO₂ nanocomposite through a catalytic/photocatalytic approach. The ZnO-SiO₂ nanocomposite was fabricated through an environmentally friendly synthesis, utilizing zinc chloride and SiO₂ as precursors for ZnO and SiO₂, respectively. The resulting nanocomposites underwent thorough characterization to evaluate their structure, morphology, crystallinity, and stability. This involved employing analytical techniques such as scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), X-ray diffraction (XRD), and Fourier-transform infrared spectroscopy (FTIR). The ZnO-SiO₂ nanocomposite showed high potential in degrading dyes like Rhodamine B and Nile Blue under light exposure. Its catalytic efficiency was assessed by monitoring chemical structure changes in the dyes. Notably, it demonstrated an impressive removal rate of 99.3% for Methylene Blue and 98.0% for Rose Bengal dyes.

Keywords: wastewater, Nanocomposites, photocatalysis, catalytic degradation, XRD, Rose Bengale.



ID: Mat-P-132

Modeling and simulation of the nonlinear behavior of fiber concrete plane structures

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Abstract: This work is a contribution to the nonlinear modeling and numerical simulation of any plane structure in fiber concrete. A computer program written in Fortran 90 language allowing numerical simulation is developed. It is based on a finite element formulated using the Navier-Bernoulli theory and the secant stiffness method for solving the nonlinear system. For modeling the behavior of fiber concrete in tension, we have adopted the Kachi model and Sargin's law in compression. Finally, several examples taken from the literature have been tested, the comparison of the results obtained with theoretical and experimental results is very satisfactory, demonstrating the successful functioning of the approach used.

Keywords: Fiber concrete; Modeling; Nonlinear analysis; Numerical simulation.



ID: Mat-P-135

Synthesis, characterization, antimicrobial activity and BSA interaction of functionalized graphene oxide nanoparticles with N-ferrocenylmethyl-N-phenylacetamide

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Abstract: The present study describes the synthesis of a novel nanocomposite, GO@APTES@FMCON, which involves the utilization of Graphene Oxide (GO) nanoparticles prepared via the modified Hummers method. The GO nanoparticles were subsequently functionalized with N-ferrocenylmethyl-N-phenylacetamide (FMCON) linking by (3-aminopropyl)triethoxysilane (APTES). The resulting nanocomposite was then subjected to characterization using various techniques, including Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDX), ultraviolet-visible spectroscopy (UV-vis), and X-ray diffraction (XRD). The goal of this study is to investigate the bioactivity interaction between the nanocomposite GO@APTES@FMCON and bovine serum albumin (BSA), as well as evaluate its antibacterial properties. The investigation of the binding relationship between the nanocomposite under study and BSA was conducted using cyclic voltammetry, as well as UV-visible methods. The results of the binding tests indicated that the nanocomposite exhibited spontaneous interaction with Bovine Serum Albumin (BSA) in the static binding mechanism. The antimicrobial activity of the GO@APTES@FMCON nanocomposite was evaluated using the good diffusion method against gram-negative bacterial pathogens, namely *Pseudomonas aeruginosa* (*P.aeruginosa*) and *Escherichia coli* (*E.coli*), as well as the gram-positive bacterial pathogen, *Staphylococcus aureus* (*S.aureus*). Additionally, the nanocomposite was tested against *Candida albicans* (*C.albicans*), a yeast, and the inhibition zones were determined. The studied nanocomposite GO@APTES@FMCON showed significant antibacterial and antifungal properties against the pathogens investigated.

Keywords: Graphene Oxide, Functionalization, Anti-microbial activity, Cyclic voltammetry, BSA binding,, Spectroscopic study, N-ferrocenylmethyl-N-phenylacetamide.



ID: Mat-P-136

An eco-friendly synthesized selenium nanoparticle alleviates lipid metabolism disturbance induced by a high fructose diet in Albinos Wistar rats

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Abstract: Nanotechnology is utilized in nanomedicine. Selenium is essential element for the living beings life. Recently, selenium nanoparticles (SeNPs) attracted the interest of many researchers due to their biocompatibility, bioavailability, and low toxicity. In this study, we were evaluated the effect of selenium nanoparticles biosynthesized using *Sonchus maritimus* aqueous extract (SmE-SeNPs) on lipid profile changes induced by high fructose diet (HFD) in rats. The nanoparticles were characterized using Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Analysis (EDX). 24 male rats were haphazardly divided into 4 groups (n=6); Control, HFD, HFD + SmE-SeNPs and HFD + metformin. Biological markers were assessed for all groups. The SEM analysis revealed that the particles size registered around 26.48 nm with abundance of Se and O elements in sample as obtained in EDX spectrum. In-vivo results, HFD showed a significant change in lipid profile markers levels including a significant increase of cholesterol, triglyceride, LDL levels while a significant decrease in HDL level. The treatment by the SmE-SeNPs and Metformin assured a partial amelioration in noticed parameters compared to HFD group. As conclusion, *Sonchus maritimus* can be use as biocatalyst or natural stabilizers for SeNPs synthesis, SmE-SeNPs seems its powerful to treat complications of fructose-induced metabolic disorder.

Keywords : Lipid metabolism, *Sonchus maritimus*, ecofriendly, SeNPs, Rats



ID: Mat-P-137

Comparison between the antioxidant activity of copper nanoparticle synthesized using leaves and rhizomes of *Phragmites australis*

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Abstract: This study intends to use leaves and rhizomes of the Algerian *Phragmites australis* aqueous extract to phytosynthesize copper nanoparticles (CuNPs) and to investigate their antioxidant activity. Both synthesized nanoparticles were characterized using different techniques such as : UV-Vis spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM). Results of DPPH assay show an important antioxidant power of both leaves and rhizomes mediated synthesized copper NPs where Diclofenac was used as standard. However; IC 50 levels of rhizomes' synthesized copper nanoparticle exhibited more antioxidant potential than leaves' synthesized copper NPs. To conclude, both parts of *P. australis* used as reduced agent for copper NPs are a valuable natural resource of bioactive compounds that can be used against oxidative stress diseases.

Keywords: *Phragmites australis* ,leaves , rhizomes , phytosynthesized copper NPs, Antioxidant activity



ID: Mat-P-138

Subchronic Metribuzin herbicide environment exposure induces cholestasis and an alteration in the immune cells account: an experimental study on Wistar rats

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Abstract: Metribuzin considered as pre and post emergent herbicide used to remove a wide range of grass weeds. The aim of this study was to evaluate the effect of environmental metribuzin exposure on some biochemical markers of cholestasis and immune cell activity in Wistar rats. Twelve healthy adult male Wistar rats were randomly divided into 2 groups (n=6); the first group used as a control group. The second group exposed to low dose of metribuzin in drinking water (220 mg/kg/day) for 60 days. Various hematological and enzymatic markers were estimated. The results obtained showed a sign of cholestasis characterized by an increase in the activity of alkaline phosphatase (PAL) and Glutamyl gamma transferase (GGT). On the other hand, exposure of rats to metribuzin showed a disturbance in the number of immune cells, as we observed a significant increase ($p<0.05$) in the WBC, Lymph, Mid, and Gran. The present study exhibits the toxic effects of metribuzin on liver's enzymes and immune cells which could prove that metribuzin in high doses in drinking water can cause inflammatory and liver diseases.

Keywords: Metribuzin, Cholestases, Immune Cell, GGT, PAL, Environnemental Pollution.



ID: Mat-P-139

Ab initio prediction of the structural and elastic properties of $\text{In}_x\text{Ga}_{1-x}\text{N}$ alloys

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Abstract: The important of the Semiconducting group III metal nitrides in the last years in different applications such as in optoelectronics which they have the direct band gaps for instant, 0.65-0.69eV for InN, through 3.50-3.51eV for GaN, up to 6.1eV for AlN. In the other hand they have the ability to form ternary and quaternary alloys, open an exciting perspective for tuning the band gap which is of crucial importance for optoelectronic applications. Using the pseudopotential specific implementation of the virtual crystal approximation (VCA), presented in the ABINIT package, we studied the wurtzite (WZ) and zinc blende (ZB) $\text{In}_x\text{Ga}_{1-x}\text{N}$ alloy from first principles. The research were aimed on structural properties (the equilibrium geometries), elastic properties (elastic constants and their pressure derivatives), and on the band-gap. Values of all the quantities calculated for parent InN and GaN have been compared with the literature data and then calculated as functions of composition x on a dense, 0.05 step, grid. A minor deviation from linearity of the lattice parameters and some elastic constants has been found to be due to the lack of the local relaxation of the structure in the VCA. The big bowing of the band-gap, characteristic of the clustered structure, is also mainly due to the lack of the local relaxation in the VCA. Our results are predicted for the future.

Keywords: semiconductor alloys $\text{In}_x\text{Ga}_{1-x}\text{N}$, virtual crystal approximation, elastic constants, band-gap bowing.



ID: Mat-P-140

Effect of the Synthesis Method, Complexing Agent and Solvent on the Physicochemical
Properties of NiFe_2O_4

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Abstract: NiFe_2O_4 nanopowders are synthesized by sol–gel and sol-gel combustion methods using citric acid, ascorbic acid and sucrose as chelating agents, and ethanol and water as solvents. The precursor thermal decomposition towards the final solid was analyzed by X-ray diffraction, differential thermal analysis and thermogravimetric techniques which were also used to provide the adequate temperature of calcination (1000°C) for achievement of the final perovskite. After calcination, the nanocomposites were characterized by powder size distribution, Fourier transform infrared spectroscopy and X-ray diffraction.

Keywords: Spinel ; NiFe_2O_4 ; Sol-gel; Combustion; Chelating agent; Solvent.



ID: Mat-P-141

CHARACTERIZATION OF $\text{La}_{1-x}\text{Ni}_x\text{MnO}_3$ ($0 \leq x \leq 0.3$) NANOPOWDERS
SYNTHESIZED BY DIFFERENT METHODS

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Abstract: Lanthanum manganite (LaMnO_3) partially substituted with Ni in the site A ($0 \leq x \leq 0.3$) were prepared by different synthesis methods (sol-gel, sol-gel combustion and auto-combustion) using citric acid or glycine as complexant or fuels and water as solvent. Thermogravimetric analysis technique (TGA) was used to explore precursor decomposition and to establish adequate calcination temperature for achievement of the perovskite structure in the nanoparticles. The samples obtained after calcination at 800°C were characterized by XRD, FTIR, PSD, and UV-Vis. Structural and vibration/electronic characteristics were examined on such basis and as a function of the preparation method employed.

Keywords: LaMnO_3 , sol-gel, auto-combustion, TGA.XRD. FTIR, powder size distribution.



ID: Mat-P-142

Valorization of Biomass Through Chemical Activation for Phenol Removal

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Abstract: The increasing demand for adsorbent materials for water depollution and environmental protection is further stimulating research into the cost-effective production of materials, particularly activated carbon as a pollutant adsorbent. The objective of the following study is to demonstrate the valorization of Ziziphus tree fruit kernels to prepare activated carbons with sulfuric acid and their applications in treating effluents loaded with organic pollutants. The preparation of the precursor (activated carbon) through chemical activation with sulfuric acid, followed by the pyrolysis at temperatures that can reach up to 600°C. Of finely particles with sizes smaller than 0.5 mm. The synthesis yields of the prepared activated carbons fall within the range of 28.56% to 47.03%. Increases the concentration of functional groups on the surface of the carbons, was examined through the use of Fourier transform infrared (FTIR) and scanning electron microscopy (SEM). The impact of operational adsorption parameters, including adsorbent dosage, pollutant concentration and contact time on the removal of phenol, was investigated.

Keywords: biomass, pollution, chemical activation, adsorption, phenol.



ID: MatP-143

CORROSION INHIBITION OF X70 STEEL IN 1M HCL SOLUTION

A Comparative Study of Artemisia campestris and Anvillea radiata Extracts.

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Abstract: The work presented is focused on the study of the inhibition of corrosion of X70 steel in an aggressive medium of hydrochloric acid HCl 1M, by the extract of plants (Artemisia campestris (D) and Anvillea radiata (N) as a green inhibitor Followed by a comparative study of the inhibitory effectiveness of the two extracts. The effect of temperature, acid concentration and immersion time on the corrosion rate of carbon steel in HCl solution in the absences and in presence of Artemisia campestris and Anvillea radiata extracts was also studied. Potentiodynamic polarization curves indicated that the plant extract behaves as mixed-type inhibitors. Values of corrosion inhibition efficiency calculated from weight loss technique were in good agreement with those obtained from potentiodynamic polarization test. The results obtained showed that the inhibition efficiency increases with the increasing concentration of extracts and decreases with increase in acid concentration. Also the results obtained by both gravimetric and electrochemical methods confirm that inhibitor (D) with 75.0 % efficiency is more effective than the inhibitor (N) 72.0 % efficiency. And the extracts could serve as an effective inhibitor for the corrosion of X70 steel in hydrochloric acid.

Keywords: green inhibitor, steel corrosion, weight loss method, electrochemical method.



ID: Mat-P-144

Determination of phenolics and Antioxidant Activity in Phenological Stages of Seven Date Varieties Grown in Algeria

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ABSTRACT: In the present study, the methanolic extracts of fruits of seven date palm varieties (Deglet-Nour, Mech-Deglet, Ghers, Arechti, Ytima, Taouri, Tantboutche) grown in Biskra, Algeria were assessed for their total phenolics, and flavonoid content and antioxidant activity at three edible maturity stages namely Khalal, Rutab and Tamar according to the standard Iraqi Arabic nomenclature. Polyphenols expressed as mg of gallic acid equivalents (GAE) per g of dry matter (DM) were found to be relatively higher in Khalal (1.705 - 8.620), from 0.303 to 4.787 in Rutab, and from 0.161 to 1.993 in Tamar. On the other hand, the flavonoids content calculated as quercetin equivalents (QE) per g of DM was found to vary between 0.282 and 0.627 in Khalal, from 0.210 to 0.491 in Rutab and from 0.008 to 0.075 in Tamar. Moreover, the antioxidant activity was conducted using DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical assay. Important scavenging ability was recorded with almost all varieties in the Khalal and Rutab stages (average IC₅₀ of 30.417 µg/ml for Khalal and 30.415 µg/ml for Rutab), however the Tamar fruits displayed the weakest activity (average IC₅₀=107.00 µg/ml). A positive correlation was observed between total phenolics and antioxidant ability in different stages and varieties suggesting that phenolics were the main contributor to this activity.

Keywords: Phoenix dactylifera; date fruit; phenological stages; Total Phenolic; flavonoids; Antioxidant activity .



ID: Mat-P-145

Thermal Effect on Pollutant Dispersion in Urban Street Canyon

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Abstract: In this paper, the effect of buoyancy on flow and pollutant dispersion within street canyon is studied by using of computational fluid dynamics code (Ansys-cfx). We consider a neutral boundary layer approaching a 3D street canyon assuming a wind direction perpendicular to the street canyon. The Boussinesq hypothesis for incompressible fluids is chosen for modelling buoyancy. We distinguish three cases: leeward, ground and windward wall heating. Thermal effects on both the flow and dispersion are investigated for several Richardson numbers. The analysis focuses on the influence of street canyon geometry on flow and temperature distribution, by considering aspect ratio $W/H=1.2$, where W is the width and H the height of the street canyon. Three-dimensional effects are observed, depending on L/H , where L is the length of the canyon. Results obtained for the case with a large Richardson number show that dispersion patterns in a street canyon differ substantially the isothermal case. In case with windward heating large concentration values are found close to the windward wall. Our findings can be of interest for many urban environment applications in which natural ventilation and thermal comfort are being of concern.

Keywords: CFD, Street Canyon, Thermal effect, pollutant dispersion.



ID: MPh-O-01

Dirac Oscillator in a Non-Abelian Algebra

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Abstract: The non-relativistic Oscillator is one of the simplest and most useful systems in physics. However, despite its simplicity, there is no well established relativistic generalization in the literature. The search for a quantum relativistic harmonic Oscillator (RHO) has a long history that may be traced back to the days of Yukawa, followed by the work of Feynman. Finally, Ito introduced a Dirac oscillator, which is linear in both coordinates and momenta. In this work, which is based primarily on the research of Ito, we outline a novel proposal for RHO for the Dirac version; this construction is based on non-Abelian algebra. We examine how the general form of the Dirac oscillator equation will change, discuss the new components, and analyze the resulting energy.

Keywords: Dirac oscillator equation, quantum relativistic harmonic Oscillator, Non-Abelian Algebra



ID: MPh-O-02

Feshbach–Villars oscillator in Kaluza-Klein theory

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Abstract: This research focuses on exploring the relativistic quantum dynamics of spin-0 scalar massive charged particles within the framework of the relativistic Feshbach-Villars oscillator (FVO) in the context of the Kaluza-Klein Theory (KKT). Specifically, we investigate the behavior of these particles in the presence of a cosmic string space-time within the framework of the Kaluza-Klein theory. To begin, we solve the Feshbach-Villars equation in the background of a cosmic string space-time by considering the principles of the Kaluza-Klein theory. We obtain the eigenvalue solution, which provides valuable insights into the behavior of the system.

Keywords: Kaluza- Klein Theory , Feshbach-Villars.



ID: MPh-O-03

Intense Laser-Matter Interaction

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Abstract: The demand of extreme lasers is driven by many challenging experiments such as inertial confinement fusion, particle acceleration, and particle creation in vacuum using lasers. Whether a laser pulse is considered to be intense or not depends on the force it exerts as compared to the binding forces that compete the dissociation (even without laser). In this talk we present the theory formulated by Bauer's group (PRA 102,053112, 2020) to calculate of high harmonic generation spectra (HHG) from condensed matter. Furthermore, we apply this finding to calculate HHG spectra for Su-Schrieffer-Heeger (SSH) chain.

Keywords: Extreme Lasers, High Harmonic Generation, Su, Schrieffer, Heeger.



ID: MPh-O-05

Transformation Optics

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Abstract: In the four-dimensional formulation of electrodynamics Maxwell's equations in non-Cartesian coordinates can be written in straightforward manner. This becomes clear when one considers that, for example, the contraction of two (contravariant) vectors uses the metric tensor, which describes the geometry of spacetime. In this talk we want to investigate how changing the geometry of space affects the propagation of electromagnetic waves. This allows us to delve into unusual phenomena in photonics such as metamaterials.

Keywords: Transformation Optics, Electrodynamics, Metamaterials.



ID: MPh-O-06

Transport Coefficients of H Plasma

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Abstract: The transport properties of plasmas such electrical conductivity and diffusion offer an important diagnostic tool. Many methods , e.g. kinetic and linear response theories, have been applied to the calculation of the transport coefficients. Since the later is related to the interaction of the particles in plasma, the determination of the effective potential is the fundamental issue for this purpose. In this work, we will present our first results which shows some effective potentials and the corresponding microfield autocorrelation functions.

Keywords: Transport properties ;. Effective potential ;. H plasma.



ID: MPh-O-07

Using fuzzy logic methods for assessing the environmental safety of irrigated land.

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Abstract: The article is attempted to use the mathematical apparatus of fuzzy logic for processing the initial data of the model of an intellectual system for assessing the environmental safety of irrigated agricultural land and assessing the risks arising in the course of economic activity in the conditions of differentiated placement of crops. There is a proposed scheme for formalizing indicators set at a qualitative level which is based on membership functions. To determine the form of the membership function, limit, critical and high values of the level of environmental safety are identified. When describing model elements, we use a set of fuzzy situations that characterize the space of possible states of these elements, as well as a set of relationships between them. The developed model allows us to formulate recommendations on the set of necessary measures to prevent damage and minimize losses, as well as to evaluate the effectiveness of their execution in each specific case.

Keywords: Fuzzy logic; Mamdani type; The function of Zadeh.



ID: MPh-O-08

Utilisation des méthodes mathématiques de MarcCormak, Lax-Friedrichs et MOC pour la résolution numérique des équations hyperboliques: application aux calculs des écoulements transitoires

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Abstract: Cette communication résout, modélise et simule, par trois méthodes différentes, le système d'équations aux dérivées partielles de type hyperbolique (S.E.D.P.H) gouvernant l'écoulement transitoire dans le cas d'une conduite gravitaire alimentée à partir d'un réservoir et équipée d'une vanne à l'autre extrémité. Le calcul des paramètres hydrauliques les plus influents en écoulement transitoire par les méthodes de Lax-Friedrichs, caractéristiques et MacCormak conduit à faire une étude comparative permettant de choisir la méthode la plus raisonnable pour résoudre (S.E.D.P.H) d'une part et d'autre part choisir un système de sécurité fiable du système hydraulique contre les effets néfastes de la variation subite de ces paramètres. Pour rendre ce travail plus merveilleux et plus attractif, laissez nous prendre en considération les deux lois de fermeture de vannes les plus couramment utilisées en pratique (les lois linéaire et quadratique) et en cas de fermeture rapide et lente de la vanne. Les résultats obtenus montrent que la méthode de MarcCormak aboutit, en fermetures rapide et lente à des valeurs très proches en donnant des représentations graphiques plus logiques au phénomène engendré, la méthode de Lax-Friedrichs peut rejoindre de MarcCormak mais avec une autre allure de la représentation des pressions et la méthode des caractéristiques néglige certains paramètres à l'instar de l'inclinaison de la canalisation.

Keywords: Ecoulement transitoire; S.E.D.P.H ; méthodes de résolution; Etude comparative; fiabilité de la méthode.



ID: MPh-O-10

Analytical and numerical study for a fractional boundary value problem with a conformable fractional derivative of caputo-fabrizio and its fractional integral

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Abstract: In the text, we investigate the existence and uniqueness of the solution of a fractional boundary value problem with conformable fractional derivation of the Caputo-Fabrizio type. In order to study this problem we used a newdenition of fractional integral as an inverse of the conformable fractional derivative of Caputo-Fabrizio, therefore, so we transformed the problem to a equivalent linear Volterra-Fredholm integral equations of the second kind.

Keywords: Caputo-Fabrizio; fractional derivative; fractional integral; Volterra-Fredholm; integral equation.



ID: MPh-O-11

On the time behavior of some thermoelastic problems with various laws of thermal effects

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Abstract: In this work we study the longtime behavior of a linear thermoelastic porous system free of second spectrum, Here the heat conduction is given by Fourier's law. We use the energy method and the Lyapunov functional to prove that the solution of (1) decays exponentially regardless any restriction on coefficients.

Keywords: Fourier's law; decays exponentially ; second spectrum; porous system.



ID: MPh-O-12

Solutions of scalar bosons oscillator in topologically charged Ellis–Bronnikov-type
wormhole spacetime

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Abstract: we study the relativistic quantum motion of scalar bosons spin 0, we choose the DKP equation spin-0 in the topologically charged Ellis–Bronnikov-type wormhole spacetime as an example for our study, first in the absence of scalar and vector potential, in the second we choose some types of potentials Linear, Coulomb and Cornell-Type Potential. The results of wave functions is the form of hypergeometric and Heun function and we have the energy by using the Frobenius method.

Keywords: DKP equation; solutions of bound states; topological defects



ID: MPh-O-13

Hybrid Monte Carlo Technique and Gaussian bosonic BFSS model

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Abstract: The BFSS model is an infinite matrix size which was conjectured to capture the entire dynamics of M-theory, such as the BMN model.

We focus on the Gaussian bosonic BFSS model by putting it on a lattice and then we use a Hybrid Monte Carlo technique. we finally showed that this model has a phase transition.



ID: MPh-O-14

Analysis and Control of the Magneto-Hydrodynamic Pump

Fatima Merdj 1, Said Drid 1.

Abstract: This work deals with the design and analysis of insulin Magneto-hydrodynamic MHD micro-pump. The pump is a main part of the artificial pancreas. It could improve the quality of life for diabetes people. The proposed MHD pump has some benefits, such as no moving parts and can be placed directly on veins. The injection of the insulin on the blood can avoid the delay of the glycemic response. This pump can be easily controlled by low DC voltage source. The typical configuration of this mini-pump is very simple; mini-channel, two walls bounded by electrode-generating field, and two walls bounded by opposite-polarity magnetic-field-generating permanent magnets. The analytic and numerical simulations analysis for the adopted model was implemented in order to verify the pump operation mechanism. The results confirm the effectiveness of the proposed system.

Keywords: microsystems, mini-pumps, magneto-hydrodynamic, DC-MHD. Lorentz force, flow rate.



ID: MPh-P-01

Application of Special Functions in Physics

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Abstract: The use of special functions is essential in mathematical physics. They are specific mathematical operations that have standardized names and notations as a result of their significance in applications such as functional analysis, geometric analysis, mathematical analysis, physics, and other fields. They're used to explain a variety of physics phenomena, such as how particles, waves, and fields behave. Examples of special functions include Bessel functions, Legendre functions, hypergeometric functions, and gamma functions. Particle creation is a fundamental process in particle physics that has been studied in various contexts. It plays a crucial role in understanding the behavior of particles and fields in the universe. Particle creation is a process in which new particles are produced from existing particles or energy. The phenomenon of the creation of scalar particles using the formalism of the Klein-Gordon equation in a non-commutative space-time in the presence of an electric field is examined. Our objective is to investigate how the electric field influences the formation of particles from vacuum. We studied the number density of created particles from solutions in terms of special functions using Bogoliubov transformations technique.

Keywords: Special function; Non-commutative Klein-Gordon equation; particles creation.



ID: MPh-P-02

Finite element analysis of plate behaviour with length variation

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Abstract: In this paper, a simple and efficient finite element model is developed for static analysis. Special interest is therefore given to the formulation and/or improvement of new elements. Based on the deformation approach and satisfying Airy functions, a new simple and efficient finite element with four quadrilateral nodes and two borehole rotations is developed. The developed element can be used for linear elastic analysis. The displacement field of this element is based on the assumed functions for the different deformation components that satisfy the compatibility equation. It has three degrees of freedom. Several numerical results have shown that the proposed deformation-based element has excellent performance on a set of problems in regular and deformed meshes.

Keywords: Finite element method, Airy functions, Deformation approach, Analytical integration, Plate .



ID: MPh-P-04

Numerical Solution of Bratu's Equation For The Effective Potential Energy in Dense Plasma

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Abstract: In this work, we have calculated the effective potential energy (EPE) of a charge particle in a plasma. This potential describe the energy interaction between an electric charge and the rest of the electrostatic system consisting of negative and positive charges (i.e. plasma medium). For obtaining EPE we shall construct an integral equation governing this potential which is a nonlinear integral equation. Then, we derived the differential equation governing this effective potential which is known as the Bratu's equation. These Integral -Differential equations for EPE are solved numerically for two types of ion-electron interactions namely Deutsch and HGK potentials by using fixed point method and Verlet's method.

Keywords: Bratu's Equation; Deutsch Potential; HGK Potential; The Effective Potential Energy; Plasma.



ID: MPh-P-05

Propriétés statistiques de l'oscillateur de Klein-Gordon unidimensionnel dans l'espace-temps de Rindler

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Abstract: dans ce travail , nous étudions les bosons de spin zéro relativistes influencés par l'oscillateur de Klein-Gordon dans l'espace-temps de Rindler. La forme obtenue du niveau d'énergie de l'oscillateur est utilisée pour trouver les propriétés thermodynamiques à travers la fonction de partition. Cette fonction de partition est terminée en utilisant la méthode basé sur la fonction zêta via la transformation de CahinMellin, toute la thermodynamique des propriétés telles que l'énergie libre, l'énergie totale, l'entropie et la chaleur spécifique ont été déterminées et l'influence de l'accélération de notre espace-temps.

Keywords: Oscillateur de Klein Gordon , espace temps de Rindler , fonction de partition , fonction zêta de Hurwitz.



ID: MPh-P-06

THE SPACE-TIME FRACTIONAL DIFFUSION EQUATION TREATMENT FOR
DEGASSING A METAL SHEET IN VACUUM BY USING CAPUTO-FABRIZIO
FRACTIONAL DERIVATIVES

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Abstract: In this paper, the space-time fractional diffusion equation is treated for degassing a metal sheet in a vacuum. We used the recently fractional derivative without singular kernel, introduced by Caputo and Fabrizio. An exact solution was obtained and we observed that the fractional-order derivative plays an important role in the numerical simulations.

Keywords: Fractional derivative Caputo-Fabrizio; the space-time fractional diffusion equation; metal sheet.



ID: MPh-P-09

Theory of Laser-Matter Interactions in the Strong-Field Regime

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Abstract: We used the theory formulated by Bauer's group (PRA 102,053112, 2020) to calculate the high harmonic generation (HHG) spectra for Su-Schrieffer-Heeger (SSH) chain. SSH chain is the simplest solid system that display topological features and it is described by 2x2 Bloch Hamiltonian. No simplifications in the calculations such as tight-binding, dipole approximation, and negligible depletion of the valence band are made. To achieve this goal, we have solved numerically the corresponding equation of motion in reciprocal space k to determine energies and eigenstates. HHG spectra is obtained via Fourier transforming the acceleration of the recombined electrons into the valence band.

Keywords: Topological phases; Quantum dynamics; Attosecond physics; High harmonic generation.



ID: MPh-P-10

A study of the motion of boson particles with interaction in the Global Monopole space time

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Abstract: In this work, we study scalar bosons with vector potentials in a global monopole space time background. We choose DKP equation spin 0 with a position dependent mass via transformation $m \rightarrow (m + S(r))$ for three different types of potential, such as linear type and Coulomb type and we obtain a second order differential equation known as the hypergeometric and the corresponding confluent Heun function. Finally, we solve the wave equation by the Frobenius method as a power series expansion around the origin and obtain the energy levels and the wave function.

Keywords: Global Monopole . boson particles . DKP equation.



ID: MPh-P-11

Density functional theory investigation of physical properties of ScP1_xAsx ternary Alloys:
optoelectronics Application

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Abstract: Understanding the physical properties of a material is crucial to know its applicability for practical application. In this study, we investigate the phase stability, elastic, electronic properties of the ternary alloying of the scandium arsenide and phosphorus for different compositions. To do so, we apply a density functional theory DFT based scheme of calculations named as full potential linearized augmented plane wave plus local orbitals, method realized in the Wien2k computational package. At first, the phase stability of investigated compositions of the mentioned alloy is determined. The analysis of our calculations shows that alloy is stable in rock salt phase, next to that the elastic of the studied ternary alloy at all above said composition were done at the level of Wu-cohen generalized approximation PBE-GGA, the electronic band structure were determined used the mBj method. The obtained result for the optical properties may be a suitable candidate for the application in optoelectronics devices.

Keywords: Phase stability, Elastic properties, DFT, bandgap and Wien2K.



ID: MPh-P-12

Analysis of Magneto-Hydrodynamic micromixer for the mixing of two electrolyte solutions
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Abstract: In recent years, microfluidic devices have been widely used in various fields, such as biotechnology, biomedicine, chemistry and environmental technology. In these applications, it is often necessary to pump fluids from one part of the device to another. Meanwhile, efficient mixing of the fluids is also required. The characteristic length of the microchannel is generally very small, and the time required for mixing is too long with low diffusivity. Consequently, a more efficient microdevice is needed to accelerate the mixing process. Magnetohydrodynamics (MHD) offers a relatively practical means of pumping and mixing. A new magnetohydrodynamic micro-mixer is proposed in this study and consists of the numerical analysis of the mixing characteristics of two different electrolyte solutions. In this device with a uniformly applied magnetic field. In this paper, a micromixer coupled with a pumping function will be studied. The COMSOL Multiphysics code is used to analyze in detail flow characteristics such as fluid velocity, current density, pressure and fluid mass fraction. The effect of the magnetohydrodynamic phenomenon on the characteristics of the pumping and mixing functions across the different voltages applied to the electrodes will be discussed.

Keywords: Lorentz force; Micromixer; Mixing performance; Micropumps, Magneto-hydrodynamic (MHD).



ID: MPh-P-13

Collision Operator for Isolated Ion Lines in Plasma: with Applications to the Quantum Effect in the Lyman- α Transition.

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Abstract: Line broadening has become an important means of measuring temperatures across the full range of densities of plasma gas-forming species. Stark effect is one of the mechanisms of broadening the spectral line, it occurs when an atom, a molecule, or an ion, which emits light in a gas, is perturbed by its interactions with the other constituents of the plasmonic gas, such as other atoms, molecules, ions, or electrons. Among the most used theories in this field is the so-called classical path approximation which has presented these effects and has attracted much attention in recent years. It is based on the classical consideration, where the dynamics of the perturbers is governed by the laws of classical mechanics. Thus, the classical path approximation assumes that each perturber can be located and followed on a classical trajectory. In this work, in the case of a quantum mechanics, the interaction ion-electron is described by a quantum scattering cross section developed with a new effective potential. This potential of ion-electron interaction, taking into consideration both quantum-mechanical effects of diffraction, and also screening field effects, is presented. The amplitude of the electronic collision operator is calculated for isolated ion lines in plasma and compared with the amplitude which has been derived by Griem (classical Coulomb interaction).

Keywords: screening effect, quantum effect.



ID: MPh-P-15

Relativistic Quantum Contribution of Binary Ion-Electron Collisions in the Width of Isolated Lines: Lyman-a Case for Hydrogenic Ions in Plasma.

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Abstract: The lines obtained in plasma spectroscopy are not infinitely thin and have a profile which gives the intensity distribution in the line. The profile reflects the physical properties of the plasma: the Doppler and electronic contributions can be at the center of the line while the ionic effect is on the wings. The analysis of the electronic contribution is necessary for precise spectroscopic observations, and can also provide useful indications and information on the conditions and concentrations in the plasma. In this work, we have developed an estimate of the relativistic contribution of binary ion-electron collisions in the width of isolated lines, where the fine structure of the emitting ion is neglected. We have calculated the amplitude of relativistic electron operator of the dipolar radiation of an ion immersed in plasma, within the framework of the impact approximation and the semi-classical approximation. In this operator's calculation we used a new effective potential. This potential is considered to include both the diffraction (quantum) and the screening field effect. The amplitude of the relativistic collision operator is developed for Hydrogenic ion lines in plasma and compared with Alexiou's result which taking into account the Coulomb interaction between the emitting ion and the perturbed electron.

Keywords: screening effect, quantum effect, relativistic operator.



ID: MPh-p-16

Modélisation de l'effet de potentiel de confinement sur les configurations les plus stables d'un plasma fortement couplé

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Abstract: Les systèmes fortement couplés représentent un système de particules chargées dans lequel l'énergie d'interaction interparticules est supérieure à l'énergie d'agitation thermique. A très basse température, ces systèmes s'organisent de façon ordonnée pour constituer un cristal coulombien. Dans ce travail on utilise la simulation par la méthode de Monte Carlo, combinée avec l'algorithme de Newton-Raphson. Nous allons étudier l'effet de potentiel de confinement sur les configurations d'équilibres pour des particules à charge constante ainsi l'effet de la température. On s'intéresse aux transitions de phase et les phénomènes critiques associés aux cristaux.

Keywords: plasma, grain de poussière, simulation, Monte Carlo.