ICGE'25

MAY 12-13, 2025

People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
University of Mohamed El Bachir El Ibrahimi, Bordj Bou Arreridj
Faculty of Sciences and Technology

CERTIFICATE OF PARTICIPATION

PROUDLY PRESENTED TO

Abderrahim Siassi, Rabie Amari, Abdelhalim Kahoul, Deghfel Bahri, Messaoudi Fathi, Daoudi Salim

for presenting their paper at The First International Conference on Green Engineering (ICGE-25), held on 12-13th May, 2025 at the university of Mohamed El Bachir El Ibrahimi, Bordj Bou Arreridj in Algeria.

Paper entitled:

Study Of The Effects Of Precursor Concentration On The Structural And Optical Properties Of Manganese Oxide Thin Films

Green Engineering Conference

Chair of Conference

Conference Chair
Dr. KESSAL Oussama

Study of the effects of precursor concentration on the structural and optical properties of manganese oxide thin films

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***Abstract*—due to the high demand for better and more efficient energy storage devices and super capacitors, transition metal oxide thin films have been the interest of researchers in that matter. We report a study on the effect of precursor concentration on the structural and optical properties of manganese oxide thin films prepared via sol sol-gel spin coating route for the potential future use as energy storage devices. XRD analysis has shown the successful formation of the alpha-Mn_2O_3 phase, and a slight improvement of thin film crystallinity is also reported with the increase of precursor concentrations. However, a decrease in the optical band gap of the prepared samples has been noticed.**

Keywords sol-gel, thin films, energy storage, manganese oxide

I. INTRODUCTION

Manganese oxides (MnO, Mn_2O_3, MnO_2, Mn_3O_4) have attracted significant attention due to their diverse structural forms, excellent electrochemical properties, and wide range of applications in catalysis.[1], energy storage[2]optoelectronic devices[3]. The sol-gel method has emerged as an efficient and cost-effective technique for the preparation of manganese oxide thin films, offering advantages such as low-cost fabrication and precise control over composition and morphology. This wet-chemical process involves the formation of a colloidal sol, followed by gelation, drying, and subsequent thermal annealing to obtain the desired phase and crystallinity. Compared to other deposition methods, such as sputtering[4], hydrothermal synthesis[5], or spray pyrolysis[6], sol-gel[7] Processing allows for better control of film thickness, porosity, and surface roughness, which are critical for optimizing the material's functional properties.

In this study, we investigate the structural, and optical properties of manganese oxide thin films synthesized via the sol-gel method combined with spic coating technique. The impact of precursor concentration on the film's characteristics is explored. The optical band gap, crystallinity are analysed to address the suitability of these prepared films for optoelectronic and energy-related applications.

II. EXPERIMENTAL DETAILS

Manganese oxide thin films have been fabricated on glass substrates via the sol-gel method, we used Manganese acetate tetrahydrate ((CH3COO)2Mn.4H2O) and Monoethanolamine (MEA)(NH2CH2CH2OH) as precursors, and ethanol as a solvent. A mixture with different precursor concentrations of Manganese acetate tetrahydrate (0.2M, 0.3M) was mixed and stirred at 45 °C for almost 3 hours. MEA was added to the mixture. The prepared solution was then left to age for 48 hours. The glass substrates were cleaned using acetone and water. In another step in the process, the obtained solution was deposited onto the glass substrates using spin coating at a speed of 2500 rpm for 30 s. After each layer, the sample was left drying at 100°c for 3 minutes, and the process was repeated 10 times until the final film was formed. The films were further heat-treated in a furnace at 450°c in air for 1.5 hours.

III. RESULTS AND DISCUSSION

Thin films were characterised with the X-ray diffraction technique (XRD) to reveal the structural properties of these thin films, and the uv-vis spectroscopy was utilised to determine the optical characteristics of our prepared films.

The structural properties of the Mn2O3 thin films were characterized by an X-ray diffractometer (XRD) (Bruker 8 Advance) with Cu Kα radiation (λ =1.5406 Å). Figure 1 displays the obtained XRD pattern of the fabricated films. The peaks for the 0.2M, and the 0.3M samples are identified as (211), (222), (321), (400), (431), (440), and (622) reflection

planes for the cubic Mn2O3 crystal according to pure cubic bixbyite α-Mn2O3 structure (JCPDS file No. 41-1442)[8]. Results revealed that the lower concentration sample has poor crystallinity, while the higher concentration sample exhibits sharper and defined peaks, which perfectly demonstrates the effect of precursor concentration on the structural properties of manganese oxide thin films.

Further investigations on the structural properties of thin films consist of calculating different parameters, such as the crystal size, using the known formula of Debye-Scherrer.[9], and the lattice parameters for the cubic crystalline structure, following the equation:

$$\frac{1}{d^2} = \frac{h^2 + k^2 + l^2}{a^2}$$

The results are shown in Table 1 below, the increase in crystallite size and the lattice parameters with the increase in precursor concentration further confirms that the higher concentration sample has a better crystallinity than the lower concentration sample.

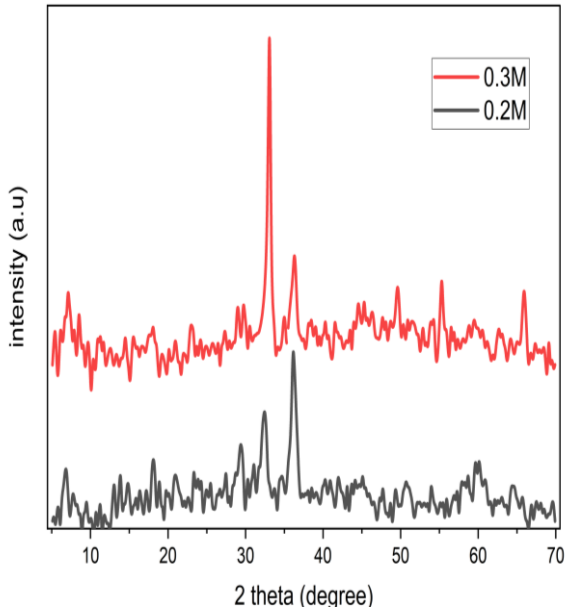

Fig. 1. XRD pattern of the prepared samples.

Figure 3 shows the FT-IR transmittance spectrum for the prepared films. Three main peaks are observed and noted on the graph between 400 and 900 cm-1, which can be attributed to the stretching bond of Mn-O.[10]. This observation confirms the formation of the Mn_2O_3 cubic phase, which is in line with the earlier XRD finding, a slight increase in the intensity of the peaks whith the increase in precursor concentration is observed, which also confirms the better crystallinity of thin films with higher precursor concentration.

The optical characteristics demonstrate that an elevation in precursor molarity leads to a marginal enhancement in the absorbance of the sample, as illustrated in Figure 2. This phenomenon can be ascribed to the increased particle density, which facilitates a greater contribution to absorption owing to the existence of a higher number of absorbing centers.

Band gap estimation using Tauc's method has been performed :

$$(\alpha h\upsilon)^n = C(E_g - h\upsilon)$$

Where C is a constant, hυ is the energy of the incident photon, Eg is the optical gap energy, α is the absorbance coefficient calculated using the formula (α=2.303×A/t), where A is the absorbance and t is the thickness of the film.[6]. The estimated direct band gap for Mn2O3 samples is 2.72 eV for the 0.2M concentration and 2.70 eV for the 0.3M concentration. The resulting gap energy is acceptable and within the range of findings in the literature. [11]. A slight decrease in the band gap is observed with the increase in the molar concentration of the precursor, this confirms that tuning band gap is possible by only controlling the precursor concentration. This gives insights to the possibility of improving light harvesting performance of this thin films only by altering the precursor concentration.

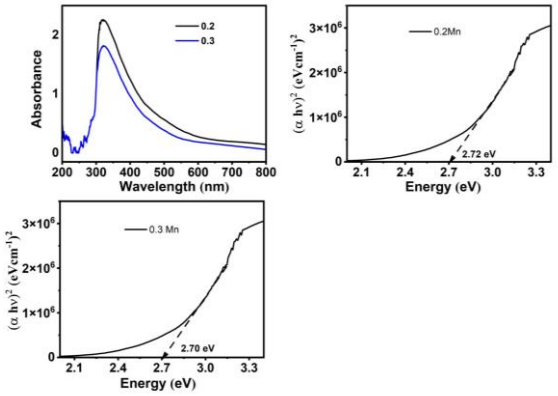

Fig. 2. Absorbance, direct band gap Tauc's plot for the prepared samples.

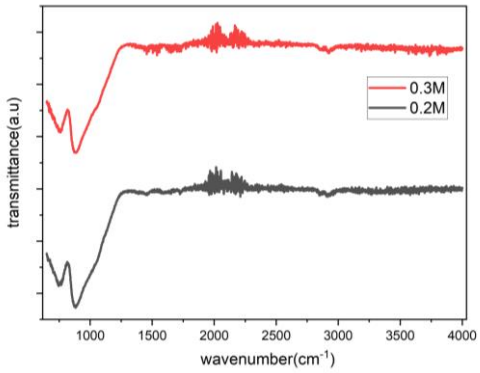

Fig. 3. FT-IR spectrum of the prepared samples.

TABLE I

Structural Parameters Of The Prepared Samples.

M	*Lattice parameters(Å)*	*Crystallite size (nm)*
0.2M	9.3	9.6
0.3M	9.35	9.28

CONCLUSION

This investigation proficiently synthesized manganese oxide (Mn_2O_3) thin films via the sol-gel methodology in conjunction with spin coating, elucidating the impact of precursor concentration on their structural and optical characteristics. X-ray diffraction (XRD) analysis substantiated the emergence of a cubic bixbyite α-Mn_2O_3 phase, exhibiting enhanced crystallinity, augmented crystallite dimensions, and elevated lattice parameters at increased precursor concentrations, a conclusion further corroborated by Fourier-transform infrared (FT-IR) spectroscopy. Conversely, UV-Vis spectroscopy disclosed that elevated precursor concentrations augment optical absorbance, presumably due to a heightened density of absorbing centers. Moreover, band gap assessment utilizing Tauc's method illustrated a marginal reduction in the optical band gap from 2.72 eV to 2.70 eV as precursor molarity escalated, signifying that band gap modulation is feasibly attainable through concentration manipulation, leading to possible enhancements in light harvesting capabilities of these thin films. These results substantiate the prospective utility of Mn_2O_3 thin films in the domains of optoelectronic and energy-related devices, wherein precise band gap engineering is imperative. Subsequent investigations may delve into the utilization of the synthesized thin films as electrodes in electrochemical energy storage systems.

Based on the outcome derived from this investigation, it is preferable to conduct a more thorough examination of the electrical characteristics of Mn_2O_3 thin films, specifically focusing on parameters such as conductivity, carrier mobility, and charge storage capabilities in order to more accurately evaluate their potential for optoelectronic applications. Moreover, optimising sol-gel synthesis parameters is necessary to improve their structural and optical properties.

As a further step in our research perspective, we consider the incorporation of these films into functional devices, such as active layers in optoelectronic applications. In summary, these findings provide a strong foundation for the development of Mn_2O_3 thin films towards practical applications within the realms of energy and electronic technologies.

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CONFERENCE PROGRAM

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First day	
Monday May 12th, 2025	
The Opening Ceremony • **Verses from the holy Quran** • **Algerian national anthem** • **Prof. Bouazza Boudersaya** Rector of the Univ. of Bordj Bou Arreridj • **Dr. Ammar Noui** Dean of the Faculty of Sciences and Technology • **Dr. Oussama Kessal** General chairman of the **ICGE'25**	**09:00 to 09:30**
First Plenary by **Prof. El-Hadj Kadri** from Cergy-Pontoise University France	**09:30 to 10:00**
Second Plenary by **Prof. Amar Benazzouk** from University of Picardie Jules Verne, France	**10:00 to 10:30**
Third Plenary by **Prof. Noureddine Hamdi** from Higher Institute of Water Sciences and Techniques, Tunisia	**10:30 to 11:00**
Fourth Plenary by **Dr. Malek Boualem** from France Telecom Orange Labs, France.	**11:00 to 11:30**
Q&A Session	**11:30 to 12:00**
Second day	
Tuesday May 13th, 2025	
First Plenary by **Prof. Ladjel Bellatreche** from National Engineering School for Mechanics and Aerotechnics (ENSMA), Poitiers, France	**09:30 to 10:00**
Second Plenary by **Dr. Katiba Mezreb** from University of Picardie Jules Verne, France	**10:00 to 10:30**
Third Plenary (Virtual) by **Prof. Ali Chamkha** from Kuwait College of Science and Technology	**10:30 to 10:11**
Q&A Session	**11:00 to 11:30**
Closing ceremony	**11:30 to 12:00**

Monday May 12th , 2025 **14:00 to 16:00**	**4 Oral conferences**	**6 Online conferences**
Monday May 12th, 2025 **16:00 to 16:30**	**Coffee Break**	**Posters Session 1**
Tuesday May 13th, 2025 **08:30 to 09:30**	**Posters Session 2**	

Monday May 12th, 2025 Session 1 (Oral presentations *in-person*) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 1 : Sustainability of Eco-friendly Materials	30	Synthesis and Characterization of Agar-Alginate Composite Beads Impregnated with Phosphonium-Based Ionic Liquid for Green Engineering Applications. Author(s): Kacel Tinhinane	**14:00 – 14:10**
	56	Carbon footprint of mortar based on limestone, marble powder, and natural pozzolana: a comparative study . Author(s): makhlouf ali, Douadi Abdellah, Cheniti Hamza, Drouiche Abdelmadjid, Aissi Adel	**14:10 – 14:20**
	63	Engineering properties of non-loading hollow concrete blocks based on recycled waste of plastic . Author(s): Deboucha Sadek, Ziani Hocine, Amriou Abderrachid, Guelmine Layachi	**14:20 – 14:30**
	110	Optimizing Cork's Compressive Recovery for Green Buildings: Critical Effects of Strain, Anisotropy and Steam Treatment. Author(s): Yahiaoui Cylia, Mouadji Youcef, saadallah younès	**14:30 – 14:40**
	136	Integrating Crack Detection and Pipe Shape Optimization for Enhanced Sewage System Durability. Author(s): ElSherif HossamEldin, Megri Ahmed, Hamoush Sameer	**14:40 – 14:50**
	175	Contribution to the formulation and characterization of a sustainable building material. Author(s): AISSI Adel, makhlouf ali	**14:50 – 15:00**
	190	Bio-based Building Solutions: A Comprehensive Review of Plant Fibers and Organic Phase Change Materials for Sustainable Construction. Author(s): kehli khadidja	**15:00 – 15:10**
	218	Modern Approaches to Historic Facade Restoration: 3D Scanning and Engineered Stone Integration. Author(s): Megri Ahmed, Hamoush Sameer, Amankwah Yaw , Yu Yao	**15:10 – 15:20**
	224	Evaluating Energy Audit Software for Sustainable Building Performance: A Case Study of energoaudits.eu. Author(s): bouchama ziad	**15:20 – 15:30**
	45	The diffusion angle distribution of slow electron/positron impinging in semi-infinite solids: analytic calculation Author (s) : Abdelouahab Bentabet	**15:30 – 15:40**
	212	From Agro-Waste to High-Performance Biofillers: Dual-Scale Cellulose Extraction from Date Palm Fibers for Sustainable Composite Applications. Authors : Amina Hachaichi, Benalia Kouini.	**15:40 – 15:50**
	87	Manganese-rich layered oxides electrode materials for symmetrical supercapacitor application. Author: Fatsah Moulai	**15:50 – 16:00**

Monday May 12th, 2025 Session 2 (Oral presentations *in-person*) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 2: Green Thermal Engineering	100	Study of the thermal behavior of a radiant cooling panel in different climatic zones of Algeria. Author(s): Wassiaa Farah Mahmouche	**14:00 – 14:10**
	162	Thermal Melting Analysis of a Non-Newtonian Phase Change Nanocomposite (OM08-MWCNT) in a Semi-Cylinder. Author(s): ADNANI Massinissa, SAHI Adel, BENSLIMANE Abdelhakim, KOLSI Lioua, CHEFFAR Louiza, EL GANAOUI Mohammed, J. Chamkha Ali	**14:10 – 14:20**
	197	Drying Food Products Using an Indirect Hybrid Solar Dryer.. Author(s): BEN RABAH Athmane, Happy sinkala Happy, Khelladi Mohammed , HEMIS Mohamed	**14:20 – 14:30**
	201	Data-Driven Assessment of Heat Pump Efficiency for Residential Climate Control. Author(s): Megri Ahmed, Yu Yao, ElSherif HossamEldin , Hamoush Sameer	**14:30 – 14:40**

Monday May 12th, 2025 Session 3 (Oral presentations *in-person*) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 3: Green Materials and Applications	07	The Importance of Watershed Characteristics in Developing Effective Flood Protection Structures in Algeria. Author(s): Herizi Toufik	**14:00 – 14:10**
	41	Reuse of dam sediments in the production of an eco-cement . Author(s): Ghouti Mustapha nadir, Hafida MAROUF , Sidi Mohamed Aissa Mamoun, Mohamed Salah Mouaissa	**14:10 – 14:20**
	43	Assessment of an eco-binder based on dam sludge. Author(s): Chikouche Mohamed Aziz, Boualleg Saida, Baali Laid, Bibi Mekki	**14:20 – 14:30**
	109	Artificial Neural Networks for Predicting earth material Thermal Conductivity: Role of Feature Scaling Techniques in Model Accuracy. Author(s): LAIMECHE Abderrahim, Derfouf Feth-Ellah Mounir , Mekaideche Khalfallah , Abou-Bekr Nabil	**14:30 – 14:40**
	137	Machine Learning Tools to Identify Soil Properties Using Subsurface Ground Penetrating Radar (GPR). Author(s): Akbakri Hamzeh, ElSherif HossamEldin, Megri Ahmed, Hamoush Sameer	**14:40 – 14:50**
	152	The effects of slag treatment on the consistency and friction angle of sliding soil Tikejda. Author(s): Saoudi Nacira, CHERFA HAYET , SAOUDI Brahim	**14:50 – 15:00**
	153	Green Engineering in Reverse Logistics: Eco-friendly vs. Standard Packaging for a Circular Economy . Author(s): BENHAMMA Fahima, Bellaouar Ahmed , Abdelli Safia, Bensouyad Meriem, Benhamma Zina	**15:00 – 15:10**
	164	Study of the correlation in Rydberg atoms for qubits conception. Author(s): Grar Nabila, Leila Chia.	**15:10 – 15:20**
	189	Investigation of Longitudinal and Transversal Repair orientations for Cracked Concrete Beam in Bending: A Numerical Study. Author(s): amina lazizi, salima abdelbari, Belabbes Bachir Bouidjra	**15:20 – 15:30**
	198	Impact of the lightening factor on the thermal and mechanical properties of lightweight concrete: Case of wood and polystyrene aggregates.. Author(s): Meziane Lylia, Ziregue Ahmed, Ziregue Belkacem, Guasmia Amel Kenza	**15:30 – 15:40**
	89	Sustainable approach on the swelling behavior of the clayey soil in the region of n'Gaous-Batna, Algeria.. Author(s): BENABDELMOUMENE ZAKARIA, Baheddi Mohamed, Bougouffa Imene	**15:40 – 15:50**
	159	Development of a Green Mobile Application for an Eco-Friendly Lifestyle in Algeria. Author(s): Attia Safa, Bekkai Mohib Eddine, Marah Ayoub	**15:50 – 16:00**

	194	Recovery of granulated slag and dune sand in road engineering. Aouthors(s): Hayet CHERFA, NACIRA SAOUDI, BRAHIM SAOUDI, ALI SMAIDA.	**16:00 – 16:10**
	117	High-performance roller-compacted concrete for dry ports and storage facilities. Author(s) : Wafa Hamla	**16:10 – 16:20**
	194	Recovery of granulated slag and dune sand in road engineering. Authors: Hayet CHERFA, BRAHIM SAOUDI, ALI SMAIDA.	**16:20 – 16:30**

Monday May 12th, 2025 Session 4 (Oral presentations *in-person*) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 4: Green Intelligent Systems	48	Advanced Machine Learning and Swarm Intelligence for Enhanced Cyanobacterial Bloom Prediction: A Comparative Study. Author(s): Oumaima Bounekhla, Meriem Hemici, Nadjette Dendani	**14:00 – 14:10**
	58	Optimal Effective Electricity Markets Monitoring in Deregulated Environment Including Renewable Energies. Author(s): Selkim Djamel, Kouba Nour EL Yakine, Nait Seghir Amirouche	**14:10 – 14:20**
	119	A Review of Key Factors Influencing Energy Consumption in Electric Traction Systems. Author(s): Noui Meryem, Lashab Abderezak , Benidir Mohamed , Noui Ammar	**14:20 – 14:30**
	124	Performance Evaluation of Unambiguous Tracking Techniques for BOC-Modulated GNSS Signals Under Challenging Conditions. Author(s): Bengherabi Ayoub, FLISSI Mustapha, Rouabah Khaled	**14:30 – 14:40**
	161	Machine Learning for Misbehavior Detection in Next-Generation Vehicular Networks: Towards Safer and Greener Mobility. Author(s): MOUSSAOUI BOUBAKEUR, Mekhfi Baya, Madi Ahmed Salah Eddine	**14:40 – 14:50**
	179	Energy enhancement in PV arrays driven modern and conventional optimization techniques under mismatching conditions. Author(s): bennia rachid, BELHACHAT Faiza , LARBES Cherif , Yousfi Abderrahim , Saidani Okba , Zerrougui Raouf	**14:50 – 15:00**
	207	Embedded Solutions for Optimizing Performance in Photovoltaic Systems. Author(s): BELHACHAT Faiza	**15:00 – 15:10**
	111	Implementation of a fuzzy approach to ensure better efficiency of a photovoltaic system with extraction of their maximum power. Authors: Amel Sabrine Amari, Ahmed Hafaifa, Abdelhamid Iratni, Ilhami Colak, Nadji Hadroug	**15:10 – 15:20**
	149	Design of PV Panel Emulator Based on ANFIS and Fuzzy Logic Control. Author : Abdelkarim CHOHRA, Mohammed BENMILOUD, Khaled AMEUR, Aboubakeur HADJAISSA,Nabil ABOUCHABANA, Abdelhamid RABHI	**15:20 – 15:30**
	106	A Novel Jute-Based Cooling System for Enhanced Solar Power Generation.Author(s): Mahmoud Chaabani,Sami Zdiri, Slah Sbika	**15:30 – 15:40**

Monday May 12th, 2025 Session 1 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 1 : Sustainability of Eco-friendly Materials	29	Towards a Lower Carbon Footprint: Synthesis of a Sediment-Based Geopolymer. Author(s): Mohamed Salah MOUAISSA	**14:00 – 14:10**
	65	Improving the Mechanical and Physical Properties of Sustainable Mortars through the Use of Chemically Treated Recycled Aggregates. Author(s): mohamed chems eddine antouri, tarek djedid, fatma zohra melais, mohamed mani, djaafar salemi, amirouche berkouche	**14:10 – 14:20**
	102	Thermal Resistance Properties of Environmentally Sustainable Flowable Sand Concrete Using solid waste . Author(s): BELADZAR ZAHRA	**14:20 – 14:30**
	108	Eco-friendly plaster-based composite mortars: sustainable integration of recycled plastic waste. Author(s): Farid Brahim HOUTI, Ahmed Soufiane BENOSMAN , Mohammed MOULI , Abdelhaq BADACHE , Omar TALEB, Imane Fatema Zohra MESLI , Houssam HACHEMI , Baghdad Adel ZOUGHAR	**14:30 – 14:40**
	64	Designing High-Performance PBSA-Based Biopolymers: A Step Towards Green Materials. Author(s): BENSALEM Zineddine, Chabane Houssém, MEKKI Ahmed	**14:40 – 14:50**
	105	Evaluation of Powdered Activated Carbon in Enhancing the Coagulation–Flocculation–Sedimentation Process. Author(s): Benhachem Fatima Zahra, Bendjelloul Meriem, Miraoui Abdelkader	**14:50 – 15:00**
	138	Characterization of Adobe Bricks Reinforced with Date Palm Fibers. Author(s): Guettatfi Lamia, Himouri Khedidja, Hamouine Abdelmadjid	**15:00 – 15:10**
	177	Impact of Stabilization and Reinforcement with Plant Fibers on Water Durability of Earth Concrete. Author(s): Guettatfi Lamia, Himouri Khedidja, Hamouine Abdelmadjid	**15:10 – 15:20**

Monday May 12th, 2025 Session 2 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 2 : Green Thermal Engineering	44	Enhanced Melting of PCM in Finned Tube for Latent Heat Thermal Energy Storage Unit.. Author(s): ilias Benyahia	**14:00 – 14:10**
	160	Hybrid Power Supply System Based on Pv,Boost Converter ,and Battery Storage. Author(s): lagoune meryem	**14:10 – 14:20**
	1	Enhanced Energy Transfer Efficiency Through Advanced Waveform Design. Author(s): BENHAMOU Abderrahim, TELLACHE Mohamed	**14:20 – 14:30**
	32	Study of Performances of a Chapel-Type Solar Still . Author(s): DELIOU Adel	**14:30 – 14:40**
	120	Type of thermal insulation suitable for Algerian housing. Author(s): khelifa kerfah ilyas	**14:40 – 14:50**
	135	Analysis of Heat Transfer, MHD Flow, and Double-Diffusive Convection in a Porous Medium under Thermal Equilibrium and Joule Heating effect . Author(s): Lahrech Abdelhakim, Tayebi Tahar	**14:50 – 15:00**
	156	Sustainable Retrofitting of a Historic School Building in Algeria: Balancing Energy Efficiency and Conservation. Author(s): Khledj Samir	**15:00 – 15:10**
	203	Optimizing Environmental Building Performance in Response to Climate Challenges Using Digital Tools. Author(s): Oussama Kadi	**15:00 – 15:10**

Monday May 12th, 2025 Session 3 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 3 : Green Materials and Applications	55	Application of Nettle Leaves as bio coagulant for the removal of suspended pollutants in industrial wastewater: Modelisation and optimization by Box-Behnken design. Author(s): taibaoui safia, morsli amine, Yadoun Bouchra, benhamou abdellah, Chergui Nacera, debab abdelkader	**14:00 – 14:10**
	78	Performance analysis of CsSnI3 based perovskite cells: Simulation study. Author(s): RAZIKA ADJOUZ, ZEHOR ALLAM , Loumafak Hafaifa	**14:10 – 14:20**
	91	Chalcone, Aurones for Sustainable Materials: Reactivity, Functionalization, and Practical Applications. Author(s): Kelbouz Mehdi	**14:20 – 14:30**
	144	Impact of conductive materials on simulation results of a 2D radial flux permanent magnet eddy current coupler PMECC. Author(s): Naima Amina	**14:30 – 14:40**
	148	Green Valorization of Eggshells into Doped Hydroxyapatite Catalyst for Phenol Hydroxylation. Author(s): Yacine BOUZALEKH	**14:40 – 14:50**
	199	Hydroalcoholic gel produced using bioethanol from Algerian date waste. Author(s): Fatima Zohra BAOUCHE, Cherifa KARA MOSTEFA KHELIL, Ihssen Hamzaoui , ELHADJ Djilali Djilali , Fatiha AMRANE, MESNOUA Souad , Houria KHEROUS	**14:50 – 15:00**
	222	Green Extraction of Bioactive Compounds from Olive Leaves for Antidiabetic Applications: Integrating Circular Economy in Sustainable Extraction Methods. Author(s): KADDOUR Taous, Chaher-Bazizi Nassima, Saidene Naima, Hanifi Lamia, Karou Lydia, Kadi Radia, Atia Amina, Bachir-Bey Mostapha	**15:00 – 15:10**
	2	Development of Multi-Frequency Rectenna Using Metamaterial Structures. Author(s): BENHAMOU Abderrahim	**15:10 – 15:20**
	33	Study of mechanical behaviour of composites Kevlar/Epoxy. Author(s): DELIOU Adel	**15:20 – 15:30**
	18	Behavior of Shotcrete Wall Reinforced With Anchor Nails in 2D “Case Study” BNP PARIBAS BAB EZZOUAR Project - (Algiers). Author(s) : KIYYOUR SAMI	**15:30 – 15:40**

Monday May 12th, 2025 Session 4 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 3 : Green Materials and Applications	94	Adsorption of Malachite Green (MG) Dye on cost-effective mesoporous material Al-MCM-41 Synthesized from Local Clay. Author(s): Hadja Alia TABTI, Mehdi ADJDIR, Samira DERKAOUI, Hakima HEDJAR	**14:00 – 14:10**
	114	Eco-innovative process for the valorization of saline industrial effluents and solid organic waste for the treatment of polluted water. Author(s): Nouioua Asma, Ben Salem Dhirar , Ouakouak Abdelkader	**14:10 – 14:20**
	151	Breakdown Effects on Power Transformer Mineral Oil and Sunflower Oil Impedance in the MegaHertzian Frequency Range: A Comparative Analysis. Author(s): berrah abderrachid, reffas abderrahime, aissa oualid, AMARA Makhloufia, moulai hossine, Talhaoui Hicham , BENNIA Abderazak	**14:20 – 14:30**
	168	Empirical Calculation of Jump Factor J_k for Element-Selective. Author(s): HAMIED Imane	**14:30 – 14:40**
	181	The Role of Optical Fiber in Energy-Saving Systems. Author(s): Mecelti Amel	**14:40 – 14:50**
	185	Application Of A Novel Biomaterial As An Adsorbent Support In The Retention Of Methyl Green Dye. Author(s): Bendjelloul meriem, benhachem Fatima Zahra, Miraoui Abdelkader, Aichouni Sara	**14:50 – 15:00**
	202	Design and Optimization of Functionalized Adsorbents for Contaminant Extraction: Isotherm and Process Modeling. Author(s): Abdelkader Miraoui, Fatima Zahra Benhachem, Bendjelloul Meriem	**15:00 – 15:10**
	95	Incorporating Waste Plastic of PET as an Additive in Asphalt Mixtures through a Dry process. Author(s): AMINE BEKHEDDA, Tourkia GUERZOU	**15:10 – 15:20**
	130	Kinetics of méthylène blue adsorption on kaolin. Author: Naima Bakhtaoui	**15:30 – 15:40**
	189	Investigation of Longitudinal and Transversal Repair orientations for Cracked Concrete Beam in Bending: A Numerical Study. Author(s): amina lazizi, salima abdelbari, Belabbes Bachir Bouidjra	**15:40 – 15:50**

Monday May 12th, 2025 Session 5 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 4 : Green Intelligent Systems	60	Maximum Power Point Tracking controller for photovoltaic system using third-order sliding mode control . Author(s): Achouri Houcem, Belkhir kamel-salim, Bektache Abdeldjebar	**14:00 – 14:10**
	84	Enhanced Power-Sharing Performance of Three-Phase Paralleled VSIs in a Standalone MG Using MSOGI Virtual Impedance Control Scheme. Author(s): Ait Hammouda Camelia, BRADAI Rafik, BOUKENOUI Rachid, KHERBACHI Abdelhammid , BENDIB Ahmed	**14:10 – 14:20**
	104	Indirect Adaptive Fuzzy Controller Based MPPT for PV Systems. Author(s): Yahia AZZEDDINE	**14:20 – 14:30**
	147	Power Quality Improvement of a Grid-Connected PMSG-Based Wind Energy System Using a Multilevel Converter. Author(s): Ihssen Hamzaoui,Fatima Zohra Baouche, Fatima Zohra Baouche, Farid Bouchafaa	**14:30 – 14:40**
	169	Sustainable Energy Management in Marine Microgrids: A Comparative Assessment of Two Advanced Strategies. Author(s): BOUDOUCHA Aimad, KOUBA Nour El Yakin	**14:40 – 14:50**
	184	Intelligent frequency control using PSO- PID and fuzzy logic controller for Microgrid system based on renewable enrgies . Author(s): BENALI ALOUACHE	**14:50 – 15:00**
	193	Influence of Pulse Width Modulation Signal's Frequency and Duty Cycle on Boost Converter. Author(s): Kaouane Mohamed	**15:00 – 15:10**
	20	Evaluation of the minimum self-excitation capacity of an induction generator used in a wind energy conversion system. Author(s): Belynda Fares , radia Abdelli, Ahcene Bouzida, Safia Azzougui , Abderrezak Aibeche	**15:10 – 15:20**

Monday May 12th, 2025 Session 6 (Online presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 4 : Green Intelligent Systems	86	Energy-Efficient Intelligent Skyline Queries for Sustainable Public Service Placement Using Parallel and GPU-Accelerated Techniques. Author(s): khames walid	**14:00 – 14:10**
	107	Potato Plant Leaf Disease Classification Using Multiple Classifiers. Author(s): kourtiche Ikram, Bendjima Mostefa, Kourtiche Mohammed El Amin	**14:10 – 14:20**
	121	Sound-Based Bird Localization Using Lightweight Convolutional Neural Networks and Internet of Things. Author(s): Bouarouguene Chakir, Moufida Maimour Moufida, Kadri Ouahab, Abderrazak Benyahia Abderrazak , Rondeau Eric	**14:20 – 14:30**
	183	Trash Image Classification Using Deep CNN Features and Random Forest Classifier. Author(s): El Ouanas Belabbaci, Tounsi Mohamed , Chennana Ahmed , Chouchane Ammar , Teta Ali, El Amine Mihoubi Mohammed, Mohamed Rafik Aymene Berkani	**14:30 – 14:40**
	220	Towards Sustainable Smart Maintenance for Electric Vehicles: Applying Machine Learning Techniques in Fault Prediction and Operational Efficiency Enhancement. Author(s): Moussa ATTIA, Zoubir Aoulmi, merwan Saadsaoud, Leyla Younes, Rabah Daouadi	**14:40 – 14:50**
	5	The smart cities, a forward-thinking approach towards sustainability: a review. . Author(s): Bencheikh Darda, Merzoug Wissam	**14:50 – 15:00**
	205	Optimization for standalone Photovoltaic system using Starfish Optimization Algorithm. Author(s): bouguerra tarek, zarour laid	**15:00 – 15:10**
	186	Application of Machine Learning Techniques for Fault Detection and Classification in Photovoltaic Systems. Author(s): KARA MOSTEFA KHELIL Cherifa, HAMZAOUI Ihssen, BAOUCHE Fatima Zohra, Ben Allal Mohamed	**15:10 – 15:20**

Monday May 12th, 2025 Session 1 (Poster presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 1 : Sustainability of Eco-friendly Materials	21	Review-The Different Methods of Recycling Aggregate Treatment and Their Incorporation into Concrete. Author(s): Allal Meftah , zeghichi Leila., Larkat Karima, .belmorkretar karim	**16:00 – 17:00**
	25	Contribution to the study of the correlation of mechanicals and microstructurale properties in binary cements. Author(s): Boualleg Saida, chikouche mohamed aziz, belgraa larbi	
	47	Influence of glass waste on the mechanical properties of self-consolidating concrete. Author(s): BENMILOUD Abdelkhalek, NAOUI Anes	
	76	A Comparative Analysis of Destructive and Non-Destructive Testing for Mineral Admixed Concrete Properties. Author(s): messaouda belouadah	
	81	The resistance of geopolymers to carbon dioxide and their valorization as a sustainable resource. Author(s): hanene zadri, Nadia TEBBAL, Nadia TEBBAL, Mekki MA**talbi** ZA	
	113	Effect of Plastic waste on Self-Compacting Concrete. Author(s): Noura Djebri, Zine El Abidine Rahmouni , Larbi Belagraa	
	115	Study of the effect of incorporating aggregates and fibers on the mechanical characteristics of stabilized clay concrete. Author(s): Abderrachid AMRIOU, Deboucha Sadek, Ziani Houcine , SEDDIKI Ahmed, MEKKI Lakhdar, BENCHEIKH Mohamed	
	116	Recycling and reusing of polypropylene in food packaging. Author(s): khouloud feryal BENMOHAD, Ghania AIT CHERIF	
	128	Study of the Behavior of Eco- Self Compacting Concrete based on Marble Powder Addition. Author(s): BELAGRAA Larbi, DJEBRI Nora, Aissi Adel, Bakir Nassima, Ladjal Djelloul, BOUALLAG Saida	
	132	Effect of Alkali Treatment on the Mechanical Properties of an Eco-Friendly Composite Material Reinforced with Stipa Tenacissima Fibers. Author(s): ZITOUNI Khalida	
	139	Geoplymerisation Mechanism And The Influence Of Temperature “Literature review”. Author(s): nour elhouda benghalem, tebbal nadia, zine elabidine rahmouni, maza mekki	
	140	Development of the mechanical properties of recycled HDPE composites reinforced with date palm fibers. Author(s): Hadda BENACEUR	
	163	Experimental study of the variation of capillary pressure and the collapse of collapsible soil after its treatment with fiberglass.. Author(s): Bakir Nassima, Tallah Naoui, Belagraa Larbi, Menasri Youcef	

	182	From Waste to Resource: Mechanical and Physicochemical Characterization of Recovered Aluminum Sheets from Beverage Cans. Author(s): bouras loubna, Abdelghani Khaldi, Laurent Tabourot	
	188	Characterization of SCC Based on Recycled Aggregates and Silica Fume Using Non-Destructive Testing (NDT). Author(s): Omri Imen Yamina, Allali Ibtissem	
	82	Exploring the Physical and Mechanical Properties of Bio-Enhanced Raw Earth Bricks. Author(s): meriem Lammari, Bencheikh Mohamed, Benazzouk Amar	

Monday May 12th, 2025 Session 1 (Poster presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 2 : Green Thermal Engineering	62	Effects of expanded perlite on the thermal And mechanical performances of plaster mortar. Author(s): LAOUBI Hamza, Meddah Abdelaziz	**16:00 – 17:00**
	80	Evaluating the Performance of WRF-Solar for Photovoltaic Power Forecasting. Author(s): Abdelhak Bahlouli	
	155	Parametric Study of the Thermal Insulation of Recycled Aggregate Concrete.. Author(s): Benguedouad Ouissam	
	187	Ammonia-Syngas Combustion Under MILD and Conventional Regimes: A Computational Comparison Using a Jet-in-Hot-Coflow Burner. Author(s): benbouaziz oussama, abdelbaki mameri, youcef Maalem, seifeddine chehaidia	
	211	3D Numerical Study of Heat Transfer Enhancement in a Hybrid PV/T Solar Panel Using CuO-Cu/Water and CuO-Al2O3 /Water Nanofluids. Author(s): Benkherbache Souad, Bakhti Fatima Zohra, Moussaoui Nafissa	

Monday May 12th, 2025 Session 1 (Poster presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 3 : Green Materials and Applications	10	Ab Initio Analysis of Zintl Phase Hydrides XGaSiH (X = Sr, Ca, Ba) for Sustainable Hydrogen Storage: Insights into Structural Stability, Electronic Properties, and Thermodynamics. Author(s): Hadjer Ammi	16:00 – 17:00
	19	Synthesis of Iron Oxide Nanoparticles and Their Structural and Optical Characteristics and the Adsorption Enhancer EB Evans Blue as Application. Author(s): labbi asma , Mammi MOUNIRA, Zaouche Chouaieb, Dahbi Laid, Benhaoua Boubaker	
	23	Comparison and Characterization of Doped NiO Thin Films Prepared by Spray Pyrolysis. Author(s): Mammi Mounira, Labbi Asma, Zaouche Chouaieb, Dahbi Laid, BenRamache Said BenRamache	
	31	Mechanical Behavior of Mud Bricks Stabilized with Two Types of Stabilizer. Author(s): touahria sabah, Bencheikh Mohamed	
	46	The performance of mortar incorporating plastic waste at high temperature. Author(s): Abdelli Houssam Eddine, Kennouche Salim, Boudjellal El Mouatez Billah	
	51	Investigating the Corrosion Inhibition Effect of Mint Essential Oil: A Phytochemical, Spectroscopic, and DFT Study. Author(s): Baaziz Sonia	
	57	Impact Of Substitution Rate With Treated Sediment On Workability, Strenght And Porosity of SCC. Author(s): Tourkia GUERZOU, KHALIL BELGUESMIA, NADIA BELAS, ABDELKADER MEBROUKI, AMINE BEKHEDDA, MOHAMED FELLOUH	
	59	Effects of Glass Powder and Cement Kiln Dust on Drying Shrinkage Behavior of Self-Compacting Mortars. Author(s): HAMMOUCHE Redha, Belebchouche Cherif, Berkouche Amirouche	
	66	Study of the effects of precursor concentration on the structural and optical properties of manganese oxide thin films. Author(s): abderrahim siassi, rabie amari, abdelhalim kahoul, deghfel bahri, messaoudi fathi, daoudi salim	
	69	Multifaceted Properties of Double Perovskite Oxide Ba2CoMoO6 : A DFT Perspective on electronic and magnetic Features. Author(s): Guendouz Atika	
	79	"Design and implementation of an innovative alkali-activated binder using bio-based materials for sustainable solutions.". Author(s): leila briki, Kessal oussama	
	83	Numerical Studies on Optimizing Drilling Mud and Bit Combinations for Enhanced Performance in Algerian Oil and Gas Operations. Author(s): Mekedeme Abdellah	
	134	Fe3O4 Nanofluid Effect on a Jeffrey Hamel Flow in Divergent Channels Using the Duan Rach Approach. Author(s): Yahiaoui Imane	

	142	V2FeNiGe2 and Hf2FeNiSb2 materials for green energy. Author(s): Diaf Mohamed	
	154	Investigation of structural, electronic and thermoelectric properties of a quaternary chalcopyrite alloy. Author(s): BOUGAA Samira	
	174	Study of the mechanical and physical properties of alkalins activated mortars based on industrial wastes as alternatives to cementitious materials. Author(s): Omri Imen Yamina, Rahmouni Zine el abidine, Tebbal Nadia, Allali Ibtissem	
	195	Impact of Cement Class on the Geotechnical Properties of Red Soil from M'sila, Algeria. . Author(s): Mekki Lakhdar, seddiki ahmed, amriou Abderrachid, belagraa larbi, Chikouche Mohamed Aziz	
	213	Thermal efficiency improvement of a cylindrical-parabolic collector with Syltherm 800/Al2O3 nanofluid. Author(s): fatima zohra BAKHTI, Nafissa MOUSSAOUI, Souad BENKHERBACHE	
	238	Determination of the fundamental natural frequency of a cracked beam. Author(s): AYAS HILLAL	
	206	Computational study, speed of sound, and viscosity measurements for binary mixtures of 1,4-dioxane + 1-butanol, at temperature T= 288.15-338.15 K and at atmospheric pressure. Author(s) : houda BENABIDA	
	22	Macromolecule-Based Formulation for wound Healing and Environmental Protection. Author : Asma Chetouani	
	73	Innovative Approaches to Biomaterials and Waste Valorization for Development of a Biofortified Product Based on Dates and Sweet Potatoes. Author(s): Moussaoui Chaima	
	06	Study of temperature effects on the electrical characteristics of Au/GaN/GaAs diodes. Author:	
	191	Structural, Electronic, Elastic and Optical Properties of the Doped Metal Halide Perovskite CsGeCl3, a DFT Investigation. Authors :Rebiha Slimani, Abdennour Benmakhlouf, Abdelouahab Bentabet	

Monday May 12th, 2025 Session 1 (Poster presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
Topic 4: Green Intelligent Systems			16:00 – 17:00
	103	Design and Optimization of UWB Pulses Using SSGW Waveforms and the Firefly Algorithm. Author(s): maaref Abdelaziz, Sidi Ahmed Elahmar Fateh Ghazali	
	129	Advanced Fast Terminal Integral Sliding Mode for Torque Control of Wind Turbine. Author(s): Chehaidia Seif Eddine, Cherif Hakima, Benbouaziz Oussama, Djeffal Selman, Haithem Boumediri , Chihaoui Salim, Djennane Mohamed, Mossad M.I.	
	141	IoT-Based EcoIntelligent Garbage Bin Management The Solution for Smart and Green Cities. Author(s): mehdi khitas , moncef khitas, Nada Boudour	
	150	Green Energy for Enhancing the Internet of Everything Applications in Rural Areas. Author(s): maza abdelouahab, sabri lyazid	
	172	A Novel Topology of Variable Speed Wind Turbine Based on Multilevel Converter System . Author(s): DAHBI Abdeldjalil, Khelfaoui Abderrahmane , Benmedjahed Miloud , Bouraiou Ahmed, Hamouda Messaoud , Djaafri Omar , Harrag Abdelghani	
	180	Adaptive Finite-Time Synergetic for Battery Discharging Based on a Boost Observer. Author(s): Saadi Salah Eddine, Merzougui Brahim	
	214	Performance Comparison Between SMC-MPPT and Synergetic-MPPT Methods in Grid-Connected Photovoltaic Systems. Author(s): bouguerra khoukha, Latreche Samia , Khemliche Mabrouk	
	215	Remote sensing, GIS and advanced methods for the creation of decision support tools in natural risk management. Author(s): SEDDIKI Ahmed, Mekki Lakhdar, Dehimi Salim, Amriou Abderrachid	
	216	Effect of GaAs thin film thickness on the performance of a (a-Si)-based heterojunction solar cell by simulation. Author(s): Moussaoui Nafissa, bakhti fatimazohra, Benkherbache Souad	
	232	Energy management of the water pumping system powered by a photovoltaic system using the metharustic algorithm. Author(s): RAHLI CHOUAIB	
	42	Power improvement using grid-side MPPT control for variable speed wind turbine Authors: saci taraft,djamila rekioua, djamal aouzellag	
	67	Advanced Fault Location in High Voltage Transmission Systems Using Traveling Waves and Wavelet Transform for Green Engineering Applications. Author(s): talbi asma, Abdelhafid Bayadi	

Tuesday May 13th, 2025 Session 2 (Poster presentations) Session Chair:			
Topic	**Paper ID**	**Conference Title**	**Time**
	112	Calculation of L1to L2-subshell Coster-Kronig transition for some atomic elements.. Author(s): meddah samia	**8:30 – 9:30**
	133	Empirical Determination of L X-Ray Fluorescence Cross-Sections for Dysprosium Excited by Photons at Different Energies. Author(s): BOUKCHID AMINA	
	99	Empirical formulae for L shell cross section for atomic elements . Author(s): bendjedi ahlam	
	125	Green synthesis of zinc oxide nanoparticles . Author(s): rouabah mounir, grine madani	
	126	THE IMPACT OF ALFA FIBRE ON MODERN INDUSTRIES AND THEIR DIVERSE APPLICATION. Author(s): farhet grine, rouabah mounir	
	127	Adsorption of reactive yellow 135 onto activated carbon prepared from the peel of a pomegranate. Author(s): Behloul Hamza	
	146	Structural and electronic properties of AInS2 (A: K, Rb) layered structures from first principles calculation. Author(s): Ghania BELGOUMRI, Nadjet BENMEKIDECHE, Layachi DJEDOUI, Abdelouahab BENTABET	
	233	Modeling of position deviations caused by thermal effects in the prismatic axis of a CNC machine tool. Author(s): Mechta Ahlem	
	235	Rotary friction welding of two dissimilar steels. Author(s): Helal Yazid , zakaria boumerzoug, elhadj raouache.	
	210	Towards Sustainable Skincare: The Use of Beeswax and Essential Oils in Natural Vaseline Formulations. Author(s) : Maria Mouhoub, Amina Hachaichi, Djahida Lerari	
	217	Study the Effect of Nanoclays on the Dynamical Properties of Polypropylene/Polyamide66 Nanocomoposites. Authors: Benalia Kouini, Amina Hachaichi, Asma Nour Elhouda Sid, Hossem Belhamdi	
	239	The durability of roller-compacted concrete made with recycled aggregates treated with glass powder. Author : Lyacia Sadoudi	
	196	Nonlinear Behavior Analysis of a Barrette foundation Under Lateral Loading. Author(s): Behloul Djamila, Moussai Belkacem	

	97	Comparing the Performances of a New Fractionalized Order PID Controller to a Classical PID Controller. Authors: Zemmit Abderrahim,khaled belhouchet, abdelghafour herizi,rouabhi Riyadh,bensafiay Yacine, idir abdelhakim	