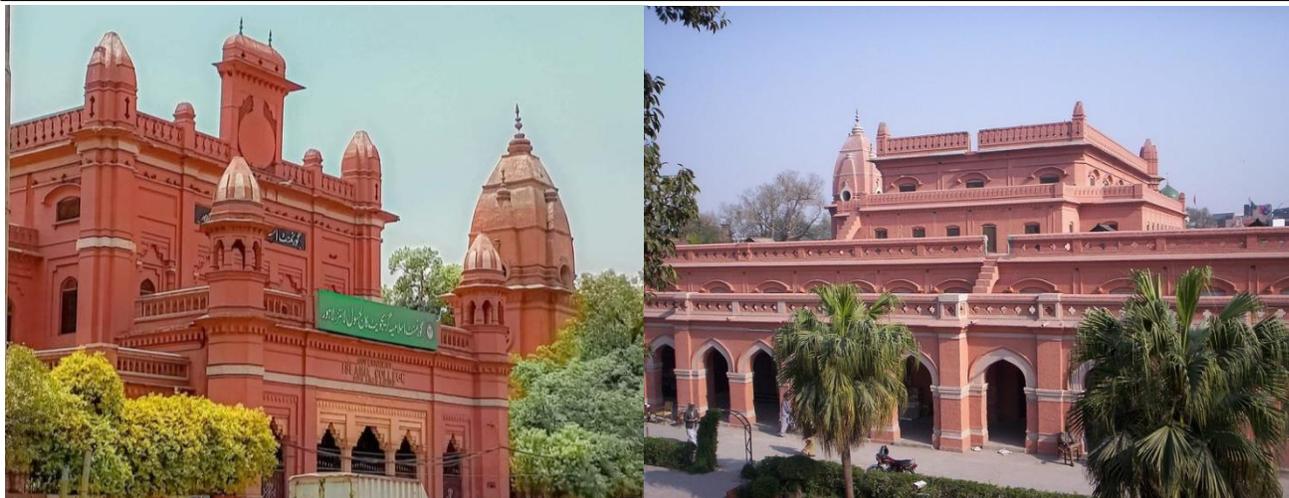


**Proceedings of 1st IGPC-2022-GIGCCL
International Graduate Physics Conference
August 23 and 24, 2022 Lahore, Pakistan**



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International Graduate Physics Conference

Department of Physics

Govt. Islamia Graduate College Civil Lines Lahore, Pakistan

IGPC-2022-GIGCCL

Proceedings of papers

Organized by: Department of Physics, GIGCCL Lahore, Pakistan

August 23 and 24, 2022

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About IGPC-2022-GIGCCL

IGPC-2022-GIGCCL is a 1st International Graduate Physics Conference on, August 23 and 24, 2022 at Govt. Islamia Graduate College Civil Lines Lahore, Pakistan. The ultimate ambition of this conference is to bridge the gap between Physics and Emerging Science aiming at technological opportunities for college students and researchers. Advanced technologies promise novel revolutionary products and methods in numerous areas of application. Renowned National and International researchers have been invited as keynote talks at this prestigious conference. Scientists working in research fields related to IGPC-2022-GIGCCL topics are to submit papers. All accepted papers (presented at the conference and following IEEE format) will be submitted and published in the Pakistan Journal of Emerging Science and Technologies (PJEST), Department of Physics, Govt. Islamia Graduate College Civil Lines Lahore, Pakistan.

Venue: Lahore, the eternal city, is one of the oldest cities in the world with a vivid and rich history and culture, records the great changes of the Pakistani nation just like a living history book. Lahore is the capital of the Pakistani province of Punjab and is the country's 2nd largest city after Karachi, as well as the 18th largest city proper in the world. Lahore is one of Pakistan's wealthiest cities with an estimated GDP of \$65.14 billion (PPP) as of 2017. Lahore is the largest city and historic cultural centre of the wider Punjab region and is one of Pakistan's most socially liberal, progressive, and cosmopolitan cities.

Govt. Islamia Graduate College Civil Lines Lahore, Pakistan

Our college is one of the first-ranked institutions in Punjab. Let us have a glance at the past history of the college. The college is providing sports apart from academic activities. This college is providing the students opportunities for acquiring skills in Hockey, Football, Volley Ball, Basket Ball, Squash, Badminton, Tennis, Bodybuilding, Rowing, Hiking, Kabaddi, and Weightlifting, Handball Boxing, Tug of War, Cricket, Taikvando and Athletics. Our trained players have always been bringing a good name and repute to the college and country in International Olympics and Asian Games. It is hoped that we will be successful in maintaining our former splendid records in the coming championships and competitions. Now, our college is going to arrange an international conference on emerging science and technologies; it will be held on 23 and 24 August 2022.

Message from Organizing Committee

It is our pleasure to have all of you engaged in the International Graduate Physics Conference (IGPC-2022-GIGCCL). This International Conference is held in Govt. Islamia Graduate College Civil Lines, Lahore, Pakistan on August 23 and 24, 2022. This one-day conference focuses on the current research in Emerging Science and related technologies. The conference aims to be a key international forum for the exchange and dissemination of technical information in every field of science.

The conference features technical presentations that cover topics of current interest in the area of Plasma Physics, Quantum Entanglement, Organic Framework Nanoparticles: Synthesis and Applications as Cancer biomarkers, trace determination of inorganic/organic analytes, Photocatalysis for Environmental application, simulation, modelling and energy saving. Renowned researchers will give keynote speeches at this prestigious conference.

Therefore, this conference can be considered as an ice breaker for the local and international logistics industry to understand Sri Lanka, South Asia and the Indian Ocean opportunities for more efficient technology-based skilled solutions to be discussed to re-position and invest pragmatically in an emerging region of the world. The world is moving into an emerging science revolution transforming with fifth-generation technologies. We believe staff and students of Govt. Islamia College Civil Lines Lahore will have a great opportunity to learn from the network of renowned researchers and scientists and discuss, and understand how the emerging Science will transform over the next few decades through the discussions and ideas presented at the IGPC-2022-GIGCCL. Therefore, it is very necessary that such conference must be carried on annually.

We are pleased to announce that we are launching the Pakistan Journal of Emerging Science and Technologies (PJEST) and selected papers will be published in the Journal. We wish you all enjoy the conference and the wonderful city of Lahore. Please do not hesitate to ask our staff for any queries and assistance.

Conference chair

Conference Secretary

Organizing Committee

IGPC-2022-GIGCCL

IGPC-2022-GIGCCL Conference Committees

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Keynote Conference Talks

Title of the talk: **Role of Physics Graduates in Knowledge Based Economy**

Prof. Dr. Waheed Anwar

University of Engineering Technology Lahore

Title of the talk: **Nanostructured Materials for Energy Conversion Devices: Synthesis and Characterizations**

Prof. Dr. Ghazanfar Abbas

Department of Physics, COMSATS University Islamabad, Lahore Campus, Lahore, Pakistan

Abstract of Accepted Papers

Role of Physics Graduates in Knowledge Based Economy

Waheed Anwar

University of Engineering and Technology Lahore

Pakistan is the world 5th most populated country. Pakistan has a very important strategic location. Pakistan is the top ranked country in many aspects considering natural resources, biodiversity, production of many crops, different climates, rivers, coastline, Gwadar deep seaport and mountain peaks. Moreover Pakistan has more than 66% of the population of young people under the age < 30 years. Despite all these blessings mentioned above

Pakistan is far behind in technology, exports, world knowledge index and per capita income. A large population is living below the poverty line. What is the way forward now? The solution is to transform the Pakistan economy into knowledge base economy. The knowledge economy addresses conversion of human capital into intellectual capital. This component of the economy relies greatly on intellectual capabilities instead of natural resources or physical contributions. In the knowledge economy, products, and services that are based on intellectual expertise in advance technical and scientific fields, encouraging innovation in the economy as a whole. The role of research and innovation related to physics plays an important part in knowledge base economy. So the key stake holders are physics graduates in knowledge base economy.

Nanostructured Materials for Energy Conversion Devices: Synthesis and Characterizations

Ghazanfar Abbas*

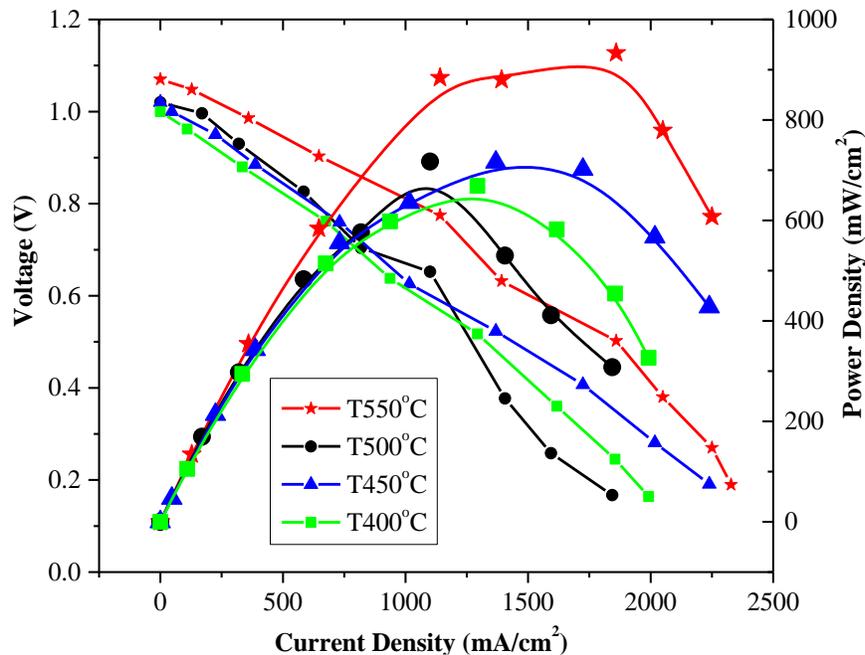
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Abstract: Our lifestyle is sustained by energy. The current scenario of energy conservation is adequately equal to zero due to high consumption rate of fossil fuel based energy resources. The present assets of conventional resources may be vanished in a century plus couple of decades. The current structure of conserved energy and consumed

energy leads to in darkness instead of brightness in view of advancement. Therefore, it is a wonderful as well as reflection on moment for change to make prosperity with alternative (renewable) energy conversion technologies. The energy gained by alternative renewable resources may prolong the present energy assets and this support can be considered energy conservation phenomenon because advanced energy conservation technologies have an ability to enhance the life time of energy conservation.

In this context, fuel cells can be considered one of the best energy conversion technologies in this millennium. Fuel cell technology is one of the most promising and environment friendly energy conversion technologies with high efficiency. Fuel cell is a device which converts chemical energy of fuel (hydrogen or hydrocarbon) into electrical energy. Conventional solid oxide fuel cell consists of Ni-YSZ electrodes having YSZ electrolyte, and hydrogen as a fuel have showed an excellent performance, which fetches a confidence to us to provide clean energy at high temperature. But the bulk particle size and high temperature are the main obstacles for commercialization. The investigation of new Ni free electrodes materials for solid oxide fuel cells is a great challenge for fuel cell community. For this purpose, nanocomposite electrode materials based on $\text{Ba}_{0.05}\text{Cu}_{0.25}\text{Fe}_x\text{Zn}_{0.7-x}$ where $x = 0.02, 0.04, 0.06, 0.08, 0.10$ and 0.12 and such anodes were successfully synthesized by dry method using different compositions. The XRD patterns show the structure is single phase having only ZnO element by shifting Fe and Cu peaks into Zn during the sintering process. Their crystallite sizes were evaluated and found to be in the range of 20-80nm. The maximum conductivity was found to be 25.85 S/cm at 600°C in hydrogen atmosphere. The BCFZ electrode was tested in fuel cell with ceria-alkali carbonates composite NKDC electrolytes while BSCF oxide conventional material was used as cathode. The fuel cell was fabricated by dry press technique with 13mm diameter. The maximum power density was achieved to be 933mW/cm² at 550°C.

The present electrode material can be used as a key potential candidate for solid oxide fuel cell with high efficiency at comparatively low temperature to mature the fuel cell technology. The present research can be considered a backbone study in advanced energy conversion technologies.



STAT1 prevents lymphoma formation in spleen

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Abstract: STAT proteins are essential regulators of a variety of cellular processes, including immune responses, growth, and antiviral protection. The transcription factor STAT1 (Signal Transducer and Activator of Transcription 1) can facilitate the transcription of genes that constrain cell division and increase inflammation. In this project, I have studied a mouse model that expresses a functionally dormant deletion mutation of the amino-terminal domain of STAT1, which exhibits heightened sensitivity to microbial infection. This mouse line develops splenic tumors, although the molecular mechanisms triggering tumorigenesis are not fully understood. Furthermore, I examined that the expression of the truncated STAT1 mice repeatedly developed splenomegaly with clinical features of non-Hodgkin lymphoma at the age of 6 months. The histopathological assessment of the tumors showed a positive response for tyrosine phosphorylation for both STAT1 and STAT3. Western blot results demonstrated

hyperphosphorylation of STAT1 even before stimulation with different cytokines. Increased DNA-binding activity was confirmed through gel-shift assays in isolated tumor cells as compared to the wild-type protein. Furthermore, real-time PCR data from tumor tissue and cytokine-treated tumor cells showed significantly decreased STAT1-regulated target gene expression. Indirect immunofluorescence staining showed that the STAT1 mutant was incapable to enter the nucleus upon cytokine treatment. Thus, the absence of nuclear accumulation of STAT1 impairs the functional balance between STAT1 and STAT3 and, thereby, promotes tumorigenesis.

Analysis of photovoltaic performance of perovskite solar cell: Effect of electron transport layer and hole transport layer

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Abstract: As a potential absorber material for perovskite solar cells (PSCs), CsPbI₃-single halide has already attracted a lot of attention. CsPbI₃-halide based PSCs, however, have not yet reached the high performance of hybrid PSCs. We used the one-dimensional Solar Cell Capacitance Simulator (SCAPS-1D) program to recognize the performance of eight electron transport layers (ETLs) and twelve-hole transport layers (HTLs) with CsPbI₃ absorber and Au back contact. The best-optimized device structure, ITO/TiO₂/CsPbI₃/CBTS/Au, with a power conversion efficiency (PCE) of 17.90%, was found among 96 perovskite devices. Along with their current density-voltage and quantum efficiency characteristics, the effects of series resistance, shunt resistance, and operating temperature were also assessed for the six best devices. Widget Provided Analysis of Microelectronic and Photonic Structures (wxAMPS) solar cell modeling software was used to compare and validate the SCAPS-1D results.

Lead free double perovskite absorber based solar cell: A numerical study

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Abstract: Due to the environmental friendliness double perovskite-based absorber layer-based perovskite solar cell plays an important role in recent photovoltaic research. In this study $\text{Cs}_2\text{BiAgI}_6$, double perovskite-based solar cells study is conducted using a one-dimensional solar cell capacitance simulator (SCAPS-1D), where from ninety-six combination of solar cell best three structure is selected to optimize the absorber layer thickness and study of further parameters. As ETL, ZnO, TiO_2 , C_{60} , IGZO, SnO_2 , WS_2 , and CeO_2 are utilized. As HTL, Cu_2O , CuSCN, CuSbS_2 , NiO, P3HT, PEDOT: PSS, siproMeOTAD, CuI, CuO, V_2O_5 , CBTS, and CFTS are also used, along with Au as a back contact. From ninety-six combination of solar cell ITO/ZnO/ $\text{Cs}_2\text{BiAgI}_6$ /CBTS/Au, ITO/ TiO_2 / $\text{Cs}_2\text{BiAgI}_6$ /CBTS/Au and ITO/ SnO_2 / $\text{Cs}_2\text{BiAgI}_6$ /CBTS/Au structure selected for absorber layer thickness optimization purpose. Before optimization these structure shows PCE 21.59 %, 21.55% and 21.52 %. After absorber layer thickness optimization, it shows correspondingly PCE 21.67 %, 21.61 %, and 21.51 % Finally effect of series resistance, shunt resistance, temperature, JV characteristics of solar cells are observed and possible structures quantum efficiency also observed.

Numerical investigation of lead-free cesium-based halide perovskite solar cell

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Abstract: Perovskite materials have extraordinary electrical, electronic, mechanical, and optical properties. That's why it can be considered the backbone of the photovoltaic industry. In this work, a lead-free, non-toxic, and inorganic Cesium Tin Iodide (CsSnI_3) based solar is used to see the performance while PCBM, TiO_2 , ZnO , C_{60} , IGZO, SnO_2 , WS_2 , CeO_2 are used as Electron Transport Layer (ETL) and Cu_2O , CuSCN , CuSbS_2 , NiO , P_3HT , PEDOT:PSS, Spiro-MeOTAD, CuI , CuO , CBTS, CFTS, V_2O_5 are used as Hole Transport Layer (HTL) and Cu , Ag , Fe , C , Au , W , Ni , Pd , Pt , Se are used as back metal contact for the simulation one by one using SCAPS 1D simulation package. The thickness, shallow uniform acceptor density, donor density, total defect density, the interface defect density of absorber layer (CsSnI_3), ETL (PCBM), and HTLs have been varied to carry out the best-optimized structure. After the investigation of all possible configurations, it is known that Glass/FTO/PCBM/ CsSnI_3 /CFTS/Se shows maximum power conversion efficiency (PCE) of 24.73%, an open circuit voltage (V_{oc}) of 0.8718 V, a short circuit current density (J_{sc}) of 33.98772 mA/cm^2 and Fill Factor of 83.46%. The second highest PCE of 18.41% is achieved for the structure Glass/FTO/PCBM/ CsSnI_3 / CuSCN /Se. After the thermal inspection, it is clear that 300K is the best temperature for the configurations.

Design and simulation of cadmium telluride (CdTe) absorber based solar cell

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Abstract: Due to its abundance, low cost, and simplicity of availability, cadmium telluride (CdTe) is a promising component for next-generation solar cells. In₂S₃ is used as the window layer in this study and is provided as a novel alternative method for enhancing all photovoltaic performance characteristics. The proposed structure (Cu/FTO/In₂S₃/CdTe/FeSi₂/Ni) is carefully studied and assessed using simulation on SCAPS-1D. To optimize this design and boost photovoltaic performance, the absorber layer thickness, and interface defect density was all carefully simulated. According to the current study, 0.5 μm is the ideal thickness for the CdTe absorber layer to maximize efficiency. Efficiency is attained with CdTe alone at 13.26%. However, efficiency is improved and the obtained value is 27.35% when CdTe and FeSi₂ are used. The values for FF, V_{OC}, and J_{SC} are increased along with the other parameters, yielding values of 83.68%, 0.6566V, and 49.78 mA/cm², respectively. The proposed model also functions well at 300 K operating temperature. The findings of this investigation offer a promising approach to producing high-performance and reasonably priced CdTe-based solar cells.

Thermal Analysis of Heat sink for smart cell phone

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Abstract: This paper is about the thermal analysis of heat sink in smart phones. Now a day's heat producing in smart phones is the biggest issue people are facing. Hence to solve this issue, heat sinks are using in mobile to reduce the heat. Aluminum alloy is the most used for heat sink material. This is because aluminum is less expensive than copper. In this paper we have studied that what factors affect the heat produced in smart phone.

For the simulation of fuzzy logic, we have used MATLAB software. Systems normally are rule-based or knowledge and considerate systems. A knowledge base made up of fuzzy IF-THEN rules is at the main part of a fuzzy system. To make logic two inputs and two outputs are taken. First, we have used 1 to 1 relation, means 1 input is related to 1 output. Then 2 to 1 relation is used means 2 inputs are depending upon 1 output. 1st input taken is length and 2nd input taken is temperature. 1st output taken is discharging rate and second output taken is efficiency. 1st input taken is length and 2nd input taken is temperature. 1st output taken is discharging rate and second output taken is efficiency. The errors found for output discharging rate was 0.32% and efficiency was 0.4%.

Fuzzy Based Control System for Surgical Robot

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Abstract: Surgical robots are getting enormous attention in the last few decades due to automation in the medical field. The surgical robot is programmed by computers as an autonomous subject in order to provide assistance during the medical procedures. They are very important in the field of medical nowadays as it performs different tasks including complicated surgeries. The surgeries which used to take couple of days and hard work by surgeons, they are now done quickly and safely. The surgical robots have camera, robotic arm and console, which helps surgeon in different surgeries. For simulation, fuzzy logic is used in MATLAB software. There are two inputs and their corresponding two outputs. The first input is weight and its corresponding output is force. It means that how much force is required to lift the load according to weight. Similarly, the second input is joystick movement and its corresponding output is distance. It means that how much distance is covered by movement of joystick. Then error is calculated by comparing of simulated and theoretical values. More the weight, more the force is required in order to move the surgical device from the joystick to the surgical area. Similarly, the joystick movement is directly dependent on the distance in order to move the robot. This work provides a suitable way in order to predict the time and force required in order to move the robot for the surgical work.

Fuzzy based Approach to Analyzed the Parameters of Advanced Generation Solar Cell

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Abstract: The purpose of the work is to, Optimize and predict the effect of solar light intensity and irradiation on the current (short circuit current) and overall power conversion efficiency of the solar cell using fuzzy rule-based systems, and analyze the effect of the size of the current (short circuit current) and overall power conversion efficiency of the solar cell using fuzzy rule-based systems. For the simulation of fuzzy logic, we have used MATLAB software. Systems normally are rule-based or knowledge and considerate systems. A knowledge base made up of fuzzy IF-THEN rules is at the main part of a fuzzy system. To make logic we have used two parameters as input. One is the intensity of light and other is the size of panel of cell. And two are the outputs, one is output current and other is the output efficiency. First, we have used 1 to 1 relation, means 1 input is related to 1 output. Then 2 to 1 relation is used means 2 inputs are depending upon 1 output.

Study of Quantum Effects and Porosity of the Perovskite Materials for Energy and Photocatalysis Applications

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Abstract: Energy conversion devices are widely being used to convert chemical into electrical. Fuel cell is the most prominent candidate among all the energy conversion devices. The operating temperature of conventional fuel cell is very high because of high electrolyte resistance. Develop better energy storage and conversion devices is the main goal of the scientists and engineers because of increasing global temperature due to consumption of fossil fuels. Fuel cell has potential and capability to give maximum energy without deteriorating environment. Electrode is the most important component of fuel cell because reaction takes place on it. Lanthanum and ferrite-based perovskite material are investigated quantum mechanically to

find out the impact factor on working of SOFCs. Among the prepared samples the material with high concentration shows better crystal structure, photocatalytic activity and improved conductivity. Samples have been investigated by various techniques showing considerable porosity, stability and presence of reactive metal cations like La^{+2} , Sr^{+1} , Cu^{+1} , Fe^{+2} and Fe^{+3} reveal the improved functionality of perovskites as they assist in conductivity, oxidation, reduction and catalytic process. Crystalline structure of the material is determined by XRD, energy band gap can be found by UV-Vis, vibrational characteristics and phase shift of the synthesized material can be found by Raman spectroscopy, materials used in synthesis can be confirmed by FTIR. Among various types of perovskites, the LSF perovskites are best performing material for photocatalytic applications while study of quantum effects reveals that LSCF second to them LCF are best optimized material for energy applications.

Study the catalytic converter through (ANSYS Fluent)

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Abstract: A catalytic converter is a device that converts dangerous smoke into less dangerous gases, cleaning the air of dangerous gases. The catalytic converter is primarily used in vehicles. These toxic gases include carbon monoxide, carbonized hydrocarbons, and nitrogen oxides, damaging humans and the environment. This pollution was caused mainly by the chemicals generated by motor vehicles, including low-level ozone and photochemical smog. This project aims to use ANSYS (Fluent) to simulate the catalytic converter. The dependence of the catalytic converter on the inlet velocity, outlet pressure, density, and length of the catalytic converter is observed using simulation software. The catalytic converter has a length of 1 m and works at a temperature of 278.6 k. The pressure and velocity contours in the results are also generated by ANSYS (Fluent) for the same input values. Three planes, each containing two oxidation and reduction blocks, respectively improve the results compared with simulations of other catalytic converters. Unlike other catalytic converter models, which only convert two hazardous gases, this catalytic converter simulation converts three harmful gases into less dangerous gases. As a result, it operates more effectively than other converters.

ANSYS simulation of Temperature of Cooling System in Li-ion Battery

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Abstract: This work used ANSYS/Fluent to build a lithium-ion battery model for a rectangular cell and evaluate its performance using the cooling system on the battery cell. The availability of power and the battery pack's durability are two things that are impacted by temperature. The heat created in the flow direction was absorbed by fluid throughout the cooling process, which decreased the cooling capacity. The temperature downstream is therefore always higher than the temperature upstream. The battery pack's lifespan will be shortened by an inconsistent cooling effect's excessive variance in temperature variation. The active body cell has a surface area of $7211.8 \times 103 \text{m}^2$, a depth of 5mm, dimensions of 80mm, a volume of $15087 \times 103 \text{m}^2$, six faces, twelve edges, and eight vertices. There are 39830 elements and 50040 nodes. The process results in a temperature that varies from 288 k to 292 k. The study's key conclusions and recommendations center on the air-cooling of battery thermal management systems (BTMS) and the numerical analysis of the impacts of air-flow configurations to arrive at the best design. This has the potential to significantly increase airflow and non-uniformity in temperature distribution. Although the temperature differential between the passages is less influenced, the input temperature has a direct impact on the maximum temperature in the coolant passages.

Analysis of an Airfoil through ANSYS Fluent

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Abstract: To achieve better results from ANSYS' real-time simulation of an airfoil's shape, the chord length variable is taken to 1 m. To determine the values of the coefficients of lift and drag forces, velocity, and pressure around the area of an airfoil and all of its domains, this study will simulate the coefficients of lift and drag forces for an airframe

using ANSYS Fluent. The coefficients of lift and drag forces around the surface of an airfoil in this simulation were found to be 0.44 and 0.51, respectively. All the zones of an airfoil are subject to the air pressure of 2.12×10^3 Pa and a velocity of 80.5354 ms^{-1} .

Study the total deformation of steel beam through ANSYS static structural

Naeem ul Rehman, Usama Ashraf, Hammad Tariq and Muhammad Javaid Afzal

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Abstract: In this work we present an optimization procedure for the total deformation of steel beam. Beam is used in structures to enhance their bending as well as shear strength. They are also used when appropriate hot rolled section is not satisfying the design criteria. The analytical investigation has been carried using ANSYS software. Straight and curved beams are both recognized to transfer loads more effectively than one another. Also they are strong enough of handling heavy loads. The accuracy and simplicity of the proposed model make it suitable to predict experimental investigations.

STUDY THE HEAT TRANSFER ANALYSIS OF HEAT EXCHANGER THROUGH ANSYS (FLUENT)

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Abstract: This project's goal is to use ANSYS fluid flow fluent to mimic how a heat exchanger operates. The dependence of the heat exchanger on temperature difference, thickness, and length is observed using simulation software. With a sharp 288.6 K difference in temperature, the material is 22 mm thick and 45 mm long. ANSYS produces findings with a percent inaccuracy of 1.59 percent when compared to the typical heat exchanger formulation. These simulations showed that the heat exchanger has a direct relationship with both temperature differential and material length and an inverse relationship with thickness. A device designed to efficiently transfer heat from one substance to another is a heat exchanger. The fluid that conducts heat may be moving air or a liquid such as water or oil.

Heat Transfer Analysis of Al₂O₃ Nanoparticles

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Abstract: The capability of temperature variation is essential for cooling industrial operations. Different methods and fluids are used in the cooling process in industrial systems. In this study, convective heat transport is examined. The basic fluids are based on temperature, thermal stability, and effectiveness of heat transmission. Thermal characteristics improve when nanoparticles are added to the basic fluid. Nanofluid is among the most amazing effects of this evolution. This research paper study about the heat transfer and variation in the temperature using Al₂O₃ nanofluid at the entrance side and outlet side of the micro-channel pipe have a 3.5 mm diameter and 100 mm length. There are 48861 nodes and 48000 elements for composing the geometry. This study describes a well-defined method for utilizing Al₂O₃ nanofluids through ANSYS Fluent to investigate the impact of various performance optimization factors (temperature, heat transfer rate pressure, heat transfer coefficient, and pressure). Previous researchers and engineers investigated the enhancement of the heat transfer coefficient, variation in temperature, heat transfer rate, and pressure drop through Al₂O₃ nanofluids. The temperature of the nanofluids at the inlet and outlet is found 300 K and 313.7 K respectively in this study. It has been discovered that raising the temperature, heat coefficient, thermal conductivity, and viscosity of the nanofluid but the pressure are drop. Reynolds number and Prandtl number increase with temperature.

Study the thermoelectric generator by current generation and total current density through ANSYS thermal electric

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Abstract: Currently, people must deal with difficult issues like rising energy prices, environmental pollution, and global warming. Scientists are focusing on enhancing energy-harvesting power generators to lessen their effects. Through the Seebeck effect, thermoelectric generators (TEGs) have proven they are capable of converting thermal energy directly into electrical power. Thermoelectric generators are ideal for integrated systems as they can be used anywhere. This study is taken into account when creating a thermoelectric generator, it was discovered that growing temperature differences caused a gradual change in the electric current and electric current density. As, in the range of 35–6000C, with the highest power being 50.619A at $\Delta T = 5650C$ and the current density is obtained $7.0906e+005A/m^2$. The thermoelectric generator's maximum power was expressed as a function of either the maximum electric current, electric current density or temperature difference.

Study the Heat Flux of heat sink (copper) through ANSYS Steady-State Thermal

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Abstract: A heat sink is a type of electronic component that's usually attached to a device. It cools the components by dispersing the excess heat. It can also prevent overheating and early failure. A heat sink is an electronic device used to dissipate extra heat. High-powered integrated circuits have been created to address the demand for faster, more adaptable computers. An inventive cooling device [heat sink] is required to address this issue because it is preceded that these high-speed circuits will produce heat fluxes that are higher than the device's

permitted operating temperature. Early in the 1980s, heat sinks have occurred to cool integrated circuits. Since then, numerous investigations on these heat sinks had carried out. This article goal is to give a literature overview on the development of research into heat sinks and the removal of heat using heat sinks. This literature will highlight the most recent findings. This project aims to use ANSYS (steady state-thermal) to simulate the heat sink.

Fluidic simulation of a Nano Channel

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Abstract: Fluidic simulation Through a Nano Channel In this research, a fuzzy estimate of fluid parameters is presented. To cure any disease drug is injected into the patient. When the liquid drug is delivered through a Nano channel it creates pressure on the walls of the Nano channel. A channel having a diameter in the range of 100 nm is referred to as a Nano channel. The effect of drug delivery becomes significant through a Nano channel. To assess the medication flow rate and speed, a fuzzy simulation-based inquiry is conducted. The simulation was based on current fluid parameter conditions. The findings are well in line with earlier studies. There is only a slight discrepancy between simulated and computed outcomes 1 μ l/min for drug flow rate and 0.01 milliliter/sec for drug speed. All these results are taken from fuzzy simulation. Keywords Fluid, drug delivery, flow rate, Nano channel.

Study and Observation of structural and optical properties of Tin Oxide

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Abstract: In this study we investigate the structural and optical properties of Tin Oxide using experimental and theoretical data. Tin Oxide with different doping is very beneficial w.r.t its optical band gap as well as structure. Tin oxide when doped with fluorine, cobalt and indium give best result with fluorine and cobalt. Fluorine doped tin oxide is used

in applications that include touch panel contacts, gas sensors and electrodes in thin film solar cells, transparent light emitting diodes, smart windows, thin film transistors and catalyst, and flat panel displays and optoelectronic devices. FTO are used in space craft such Cubesats for heat management. In its pure form it is n type semiconductor. UV-Vis spectra of Tin Oxide with some dopant (Scandium, Indium, Aluminium and Fluorine) shows that it is best used as transparent conducting oxide TCO. It is because its suitable band gap with these dopants which make it transparent in visible light. For a long time, scientist have been in the shadow of tin doped indium tin oxide ITO. However, SnO₂ has better thermal resistance than ITO, its films are relatively hard and they have good abrasion and scratch resistance. The expanding use of TCO materials, especially for the production of transparent electrodes for optoelectronic device applications, is endangered by the scarcity and high price of In. This drives the search for alternative TCO materials to replace ITO. The properties of SnO₂, and its relative low cost, make it preferable in some applications requiring a conducting layer on glass. So if we use SnO₂ as host material and In as dopant so its cost become suitable to some extent. UV-Vis Spectra of Scandium doped Tin Oxide also shows good transparency but Sc is also very costly. PL Spectra of ITO and FTO shows that FTO is more useful in case of long lifetime of LEDs as compared to ITO.

Metal Doping Effects on the Electrochemical Performance of Metal Organic Frameworks

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Abstract: Rapid increases in energy demand and excessive use of fossil fuels, which result in dangerous gases emissions, have resulted in major energy shortages and pollution. Scientific community is moving toward energy storage device and sensors because of its novel abilities e.g., high power densities and long-life cycle. Tremendous class of electrode materials have been introduced but their potential is very limited because of low power density. One of the key neurotransmitters in our body is dopamine. Changes in normal concentration can lead to a variety of diseases and disorders. Electrochemical investigations of dopamine using a bare electrode are not feasible because of a number of problems, including electrochemical fouling, interfering species with the same oxidation potential, and lower quantities of dopamine in

biological samples. The alteration of the working electrode is required for the detection of dopamine to be rapid, precise, selective, and sensitive. Metal Organic Frameworks offer electrochemical active sites that can be a viable choice because of large surface area, tunable pore dimensions, evenly distributed metal atoms, and open metal sites. A study has been designed to synthesize Metal doped Ni-MOFs by hydrothermal route. For the synthesis of Ni-MOF Cost effective Hydrothermal method was used. In this method, the precursors are diluted in water or another suitable solvent and put into a steel vessel or another suitable metal that can withstand high temperature and pressures. Using the synthesized nanocomposite, the glassy carbon electrode (GCE) surface will be modified. To enhance the electrochemical response, the electrode will be decorated with the metal doped NiMOF nanocomposite. We will aim, through this study, to report a high charge retention, a more efficient supercapacitor and a quicker and accurate sensor for electrochemical dopamine detection utilizing metal doped Ni-MOFs nanocomposite. The metal doped Ni-MOFs nanocomposite will be used as an anode material and MOF-derived nonporous carbon (NPC) material will be used as cathode material. Fourier transform infrared spectroscopy (FTIR) explain bands of prepared material while Raman spectra show the composition of sample. The use of electrochemical techniques like cyclic voltammetry (CV) and electrochemical impedance spectroscopy, the performance and stability of the electrode were further examined (EIS). Specific capacitance, Energy Density and power density of Zn doped Ni-MOF are 380 F/g, 30.4 W h k/g and 0.2 W k/g and Fe doped Ni-MOF are 255 F/g,20.4 W h k/g,0.2Wk/g calculated from GCD graph.

Tailoring of optical and structural properties of metal doped Zinc Sulphide Nanoparticles

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Abstract: Various methodologies were used to investigate the structural and optical characteristics of ZnS. . XRD revealed cubic structure of ZnS. The mean size of the nanoparticles were range between (4.0-6.2 nm). The structural studies using transmission electron microscopy (TEM) reveal that all the sample are nearly spherical in shape.

Both undoped and doped samples were optically characterized by spectroscopy of ultraviolet–visible (UV–Vis) and photoluminescence (PL). In all of the absorption spectra the samples were blue shifted in comparison to the bulk ZnS within the range between (4.10-6.11 nm) having excitation wavelength range (298-320 nm) . An optimal transition metal doping amount for optical research reveal improved PL characteristics for Ni, Mn and Cu. PL emission spectra of transition metal doped ZnS were red shifted range between (365-583 nm) with the band gap energy range between (3.88-4.16 nm). Among different transition metal doped ZnS the most prominent peak was shown by 1% Ni and it is a desirable.

SOAP Documentation Tool

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Abstract: Simple Object Access Protocol (SOAP) is a message protocol used to interconnect the distributed elements of an application. SOAP is carried over a variety of lower-level protocols that includes web-related Hypertext Transfer Protocol. In this paper, we proposed a SOAP based documentation tool that defines a header structure to identify an action that various SOAP nodes are expected to take on the message in addition to a payload structure for carrying information. It further used an XML data format to declare its request and response messages relying on XML Schema and other technologies i.e., Application Programming Interface (API) and User Interface (UI) to enforce the structure of its payloads. In SOAP documentation tool, three panels are designed with distinct access and control attributes namely, Admin, Subscribed user and Guest. The Admin is assigned all authorities regarding the website such as addition and removal of data and users. The Subscribed user has given limited access i.e., generate query and feedback subject to the Admin approval. The Guest is allowed to read the available data with no write access. A payment method is also set up to manage the subscription process for the Subscribed user and Guest. Furthermore, SOAP documentation tool is an integral part of the Service-Oriented Architecture (SOA) and the Web services specifications associated

with SOA. It allowed the sender to create a message route based on the logical services that are applied to the message on the way to its destination. The proposed tool showed improved services in terms of secure and compliant connections, controlling access, reliable delivery, failure recovery, and supporting dynamic service discovery. It is appraised valuable by IT and e-commerce industries for business-to-business communication, application integration, general distributed computing, wireless applications, and web content creation.

Upper Limb Remote Physiotherapy

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Abstract: The aim of this project is to develop a smart sleeve with dual purpose. The purpose is to make a computer application for ensuring post injury upper limb rehabilitation through remote physiotherapy. This will enable the patients to regain complete motor control through online system, without even visiting the physiotherapist. The arm's movement associated data will be collected by the flex sensors. This data will be sent to a computer via Bluetooth for further processing and generation of progress reports for remote physiotherapy. For computer application we are using MATLAB, which is having three different exercises; fingers, elbow and of wrist. After completion of exercise patient logs in the account and uploads the progress there (on website), after that, doctor can review that progress at any time, as well as patient can also review his/her progress.

Implementation of Smart Traffic Management System

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Abstract: The traditional traffic management system is an out dated and full of hassle system. When it comes to managing traffic, smart management system is capable of managing road traffic in an efficient manner. In smart traffic management system, traffic flow has been controlled to avoid road congestion. This system has three parts that are density-based traffic lights, an

emergency vehicle response and e-challan generation. However, traffic signals are controlled through density of vehicles. When the density of vehicles reaches to a limit, time duration of traffic signal will be increased. Second key feature of traffic management system is emergency vehicle response. Whenever, an emergency vehicle comes across the traffic signal, it will use Radio Frequency (RF) receiver to turn traffic signal green. E-challan generation is another key feature of smart traffic management system. In which, Radio Frequency Identification (RFID) has been used. When someone will violate the traffic rules e-challan will be issued and sent to that particular through email. By using this smart traffic management system, traffic can be controlled in an easy and efficient way without any hassle.

Development of Highway Zombie Escape Game

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Abstract: Game development has become an important part of everyday life in short period of time. Continuous advancement and invention of new technologies have created opportunities for developers all around the world. This has caused gaming industry to grow as the time progresses. Our project (Highway Zombie Escape) demonstrates a 3D shooting and survival game created using Unity engine for android devices based on incremental development approach. Zombies are the main agents of this project. We have given a first person shooting combined with driving experience to user using Realistic First Person Shooter (RFPS) and Realistic Car Controller (RCC) controllers for player and Non-Playable Characters (NPCs). These controllers helped us to cover the implementation details of physics engines. For game flow, game effects, game audio, and game video, we have created custom scripts. We have also created an Android application package (APK) file that will be installed on android devices. This project will be helpful to improve the game development process.

Metal Ion concentration effect on lanthanum based perovskite material for energy devices

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Abstract: The world is currently encountering an energy crisis as a result of rising energy needs and the multiple environmental impacts imposed by excessive energy use. The need for renewable energy sources (such as fuel cells, solar cells, supercapacitors, and lithium-ion batteries) have recently developed greatly. These devices are of essential importance because of their special properties, which include high capacitance, energy density, power density, high cyclic stability, cyclic reversibility, high conductivity, low resistivity, best current density, power density, and low maintenance costs. Due to various application areas, developing such electrode and electrolyte materials with high porosity and broad surface area is necessary. To develop the Lanthanum-based perovskite materials for better performance of energy devices. Such lanthanum-based materials are used as electrodes in energy storage and energy conversation. Double perovskite $\text{La}_{1-x}\text{Sr}_x\text{Co}_{0.5}\text{Fe}_{0.5}\text{O}_{3-\delta}$ ($X=0, 0.2, 0.4, 0.6, \text{ and } 0.8$) (LSCF) were successfully synthesized by combustion method to improve the conductivity, porosity, and crystallinity. A material's crystalline structure is determined using XRD, its energy band gap is estimated using Tauc plot, its vibrational modes are studied using Raman spectroscopy. To determine the conductivity by using electrochemical impedance spectroscopy (EIS), investigate the surface morphology by scanning electron microscopy (SEM), and determine the chemical composition by energy dispersive X-ray (EDX). This research work analysis the prepared material by Raman spectroscopy, Fourier Transform infrared (FTIR) spectroscopy, UV-Vis spectroscopy, scanning electron microscopy (SEM), and electrochemical impedance spectroscopy (EIS). The Raman spectroscopy results shows that the vibrational modes and Raman Shift of LCF55, LSCF8255, LSCF6455, LSCF4655, and LSCF2855, FTIR results shows the functional groups and chemical bonding in samples, UV-Vis spectroscopy result shows the direct energy band gap of LCF55, LSCF8255, LSCF6455, LSCF4655, and LSCF2855 are 1.73eV, 1.72eV, 1.71eV, 1.70eV, and 1.73eV respectively. UV-Vis spectroscopy also shows the result of indirect

band gap of LCF55, LSCF8255, LSCF6455, LSCF4655, and LSCF2855 are 1.69eV, 1.68eV, 1.67eV, 1.66eV, and 1.68eV respectively. The result of SEM show the morphology of all samples, it shows that the perfect nanoparticles produce in LCF55 when added the strontium in LCF then the particles are collapse and the particle size become small but when the concentration of strontium increase at 80% then it show the reverse behavior particle size again become large, and the result of EIS spectra shows the perfect semicircles which determine the low resistivity and better conductivity.

Carbon Textile Decorated Zinc Sulfide Nanoparticles for Energy Applications

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Abstract: Here we report the synthesis of zinc sulphide(ZnS) nanoparticles grown on carbon cloth(CC) substrate via simple hydrothermal method. The precursors used are zinc nitrate($Zn(NO_3)_2$), sodium sulphide(Na_2S) and de-ionized water (DIW). Zinc nitrate dissolved in DIW under stirrer and Na_2S is also dissolved in DIW under stirrer separately. Then both the solutions are mixed under stirrer. The final solution is transferred to teflon lined stainless steel autoclave along with CC and placed in oven. After completion of reaction time ZnS@CC nanoparticles are formed. We have synthesized three samples of ZnS assembled CC nanoparticles by varying the metal precursors. The precursors used as Zn source are zinc nitrate ($Zn(NO_3)_2$), zinc acetate($Zn(CH_3COO)_2$), and zinc chloride($ZnCl_2$). The optical properties of bare carbon cloth and ZnS deposited carbon cloth are studied by Raman spectroscopy, in spectral region 130–500 cm^{-1} , by excitation source of 457 nm ($E = 2.71$ eV), which is in off resonant regime. Dominant spectral structures, of comparable intensity, are registered in spectral region 130–180 cm^{-1} , around 218 cm^{-1} and around 244 cm^{-1} . The optical absorption properties of bare carbon cloth and ZnS deposited carbon cloth were studied by diffuse reflectance spectroscopy. The absorption edge is red shifted in all ZnS@CC samples and is maximum for samples T2-ZnS@CC and T3-ZnS@CC (480nm). The optical band gap for all ZnS@CC samples is measured using tauc equation. The broad and asymmetric emission peaks ranging between 500-900nm were observed by photoluminescence spectra. The emission peak is centered at 647nm and 708nm for

T1 and T3 and is red shifted due to some extrinsic defects. The broad emission peak for T2 is centered at 581nm and is blue shifted as compared to T1, the blue shift indicates lesser defects in the sample. ZnS nanoparticles with large specific surface area combined with flexible carbon cloth substrate offer to be a promising material in energy devices with high energy.

Fuzzy Logic based Approach to Remove the Dust Particles from Solar Panels for improvement of Efficiency

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Abstract: The prevailing energy crisis across the global require efficient and sustainable solar energy generation system. Since solar light is one of the most available sources of energy, the need to utilize it in proper way is required. Silicon solar panel across the globe are being used with an efficiency of 15-20% to convert solar energy to electric energy. However, the dust cause due to wind and storm reduces the solar cell efficiency. In this work, sensor-based system is use to monitor the dust accumulated on the solar panel and remove the dust by watering and cleaning the surface of the solar panel. Fuzzy logic system is used which take in account the output conversion efficiency and sensor data and predict the cleaning of the solar panel by watering the panel from the watering tank. The simulated and calculations were compared with shows the accuracy of the work.

Implementation of E-Learning Platform

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Abstract: This project aims to fulfill the thirst for information and offers online content that can be conveyed to learners of any age at any place and anytime. It also gives fast access to particular information and knowledge. It is an online educational website just

like Coursera and Udemy but these websites are providing paid courses that everyone cannot afford. In this work, free courses have been provided so everyone can have access to knowledge.

Three different panels have been created such as admin, teacher, and student. Admin has all the authorities. Admin can add the teachers, courses and can also manage them. Teacher can request a specific course that he wants to publish. Admin will approve that course. After approval, that specific course will appear in the featured courses section. Once the course is verified, teacher will be provided with a username and password so that he/she can manage his/her courses. Teachers can upload the course content on regular basis. Assignments can also be uploaded by the teachers. Teachers can also send messages to the students and admin if they want to share something.

Students can enroll themselves in different courses. After enrolling in a specific course, students can get counseling from teachers on zoom. Counseling class will be conducted by using the zoom app and the teacher will explain briefly about the course guidelines. Once a student has selected the course, course content will be provided accordingly. Students can also post questions and answers below the content which are uploaded by the course teacher. After completing the course, the student will be provided with a course certificate. This certificate can be used to apply for jobs.