PSGR Krishnammal College for Women

Five -day online Faculty Development Programme
on
"Advancements in Materials Science Research"
July 29 - August 2, 2024
Organized by
PG & Research Department of Chemistry
in association with
Association of Chemistry Teachers, Mumbai

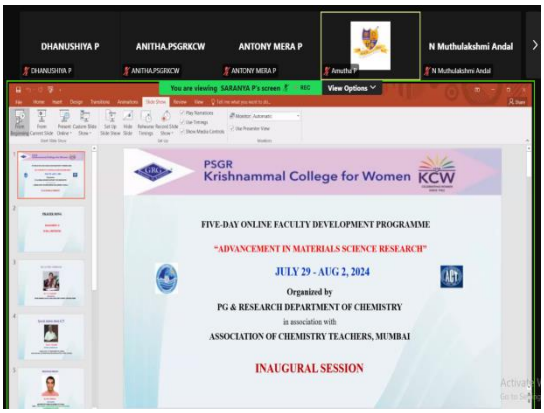
Faculty Deveopment Programme on "Advancements in Materials Science Research"

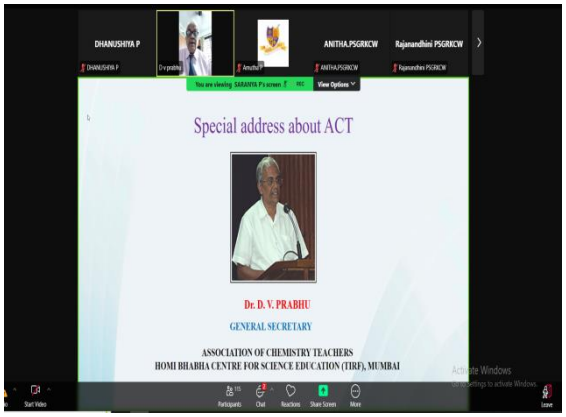
29.07.2024 to 02.08.2024

29.07.2024 – Report

Session – Forenoon

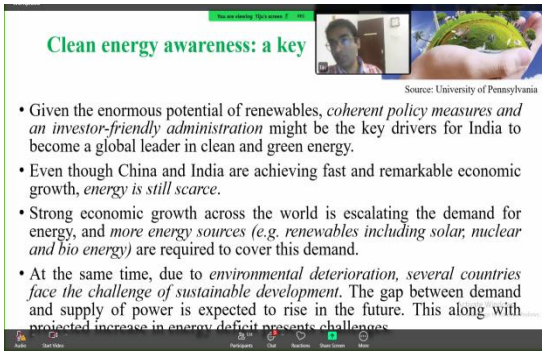
Dr.D.V.Prabhu, General Secretary,Association of Chemistry Teachers,Homi Bhabha Centre for Science Education(TIFR), Mumbai has delivered lecture entitled "Special address on Association of Chemistry Teachers"on 29.07.2024 Forenoon Session.He has enlighted to advance chemistry education by means of curriculum development and innovation in teaching evaluation methodologies and To organize workshops and conferences including an Annual National Convention of Chemistry Teachers (NCCT) in different regions. To collaborate with International Science Teachers organizations for exchange of ideas and joint programmes. ACT interacts with Government education departments and offers assistance in syllabi framing. ACT plays an important role in the organization of National Standard Examination in Chemistry (NSEC) which is the first stage examination leading to participation in International Chemistry Olympiad. Yearly about 35000 students participate in the examinations. ACT newsletters includes on chemistry themes and it is freely available to all educational and scientific institutions, government and other funding agencies.

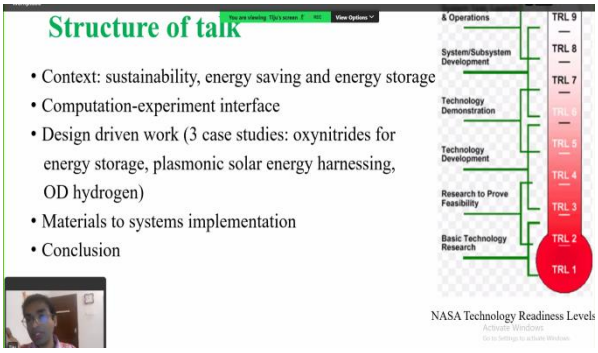


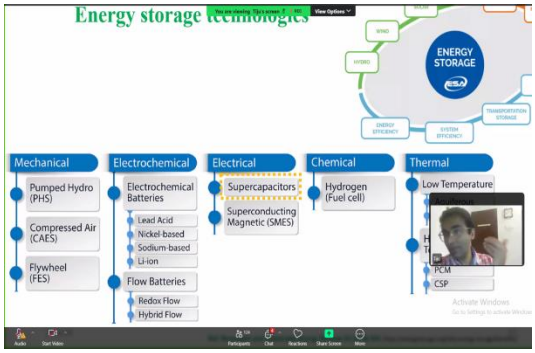


Session – Forenoon

Dr.Tiju Thomas, Professor, Department of Material Engineering, IIT Madras has delivered lecture entitled "Material Design and development for a sustainable future - A multidisciplinary journey" on 29.07.2024 Forenoon Session. He has enlighted to know more on sustainability,energy saving and storage devices , develop computation - experiment interface, design work (case studies: oxynitrides for energy storage, plasmonic solar harnessing, OD hydrogen, Materials to system implementation.Discussion about Clean energy awarness and sustainable development of resources,Regenerate and recycling of waste materials and usage of renewable storages in solar cells, wind, nuclear, natural gas, hydro, transportation and energy efficiencysystems. Benefits of supercapacitors and comparison with Lithium ion battery- Result: Supercapacitors are non -toxic in nature and ecofriendly and has long life time and has high specific power. Comparision of Batteries,Capacitore and Supercapacitors. He has explained about the applications on Prediction of suitable dopant-Experimental vaidation-Performace of a novel material-creation od database-pitstop and comparision- Instrumentation - Leakage current- capacitance measurement using constant current discharge method - Hydrogen production- solar energy harnessing-Applications in waste water treatment-Light energy trapping in thin films Si solar cells and plasmon-enfhanced solar heating.



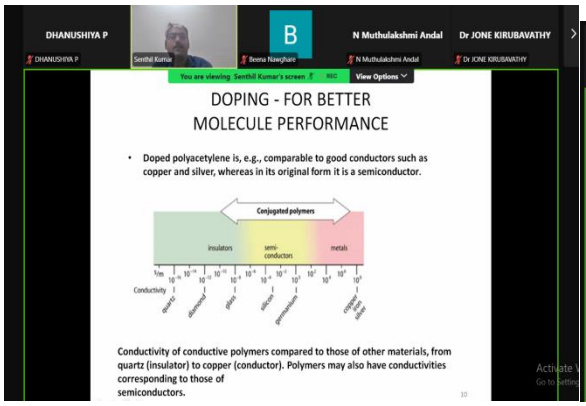


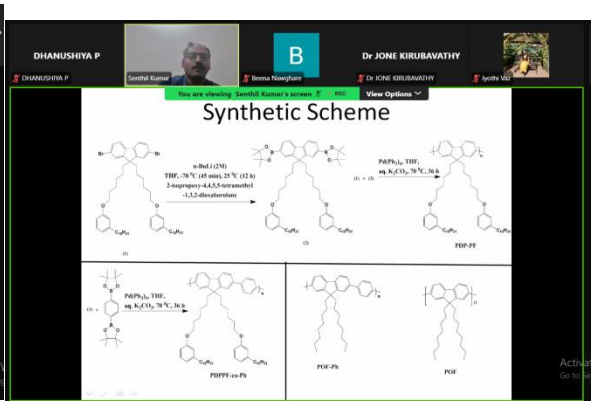


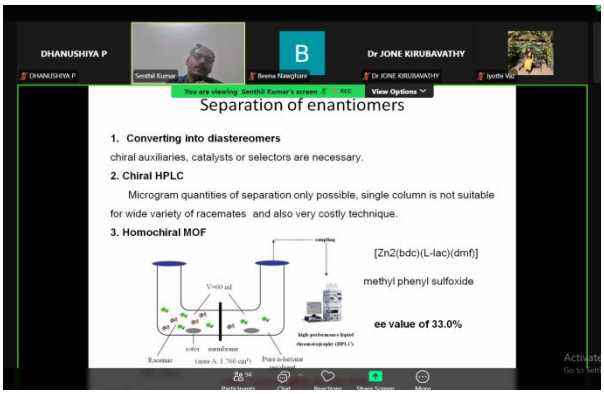
Session – Afternoon

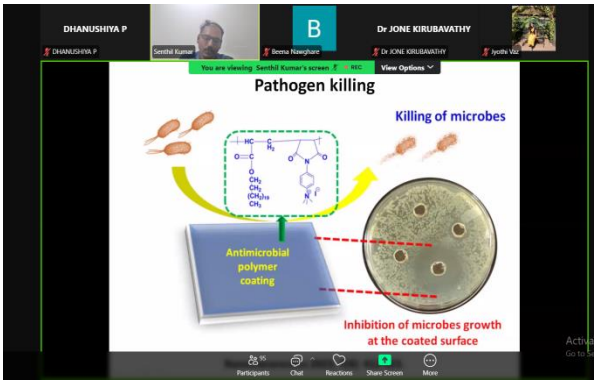
Dr.T.Senthil Kumar, Scientist, CSIR-Indian Institute of Petroleum, Dheradun has delivered lecture entitled "Design and synthesis of conjugated polymers for biological applications" on 29.07.2024 Afternoon Session. He has discussed about synthesis of conjugated polymers, Synthesis protocol methods mechanism of conduction, Doping of molecule for enhancing the performance of molecules, Fluorescence sensing & imaging of biomolecules and developing of amphiphilic polymers for drug delivery systems, Antimicrobisl polymers and self-assembly of polymers and 3D printings, Sensing of conjugated polymer based fluorescent sensors by molecular wire effect, Bilirubin and synthesis - detection methods using Diazo test -Fast and accurate detection method used in clinal diagnosis, Glycopolymers for visual sensing of free bilirubin in human serum, D-Gluconic acid appendage and visual sensing of bilirubin in water, Fluoresence lifetime studies and cholesterol detection and selectivity & sensitivity involves rapid sensing and imaging of labile Fe^{2+} in living cells, Toxicity of Iron (II) - Iron overloaded indicates accumulation of iron in the body from any cause and causes hereditary haemochromatosis(HHC), Seperation of enantiomers involves converting into diastereomers,chiral HPLC and homochiral MOFs, Drug delivery,pathogen killing,and culture tube tests. He has clearly explained about the applications of Conjugated polymers in Organic light emitting diodes(OLED),Organic field effect

transistors(OFET),Electrochromic devices,Biological applications,Chemical sensing,chemical sensors and organic photovoltaics (OPV) and biological applications like Biological detection,Bioelectronic devices,Biological therapy and biological imaging.







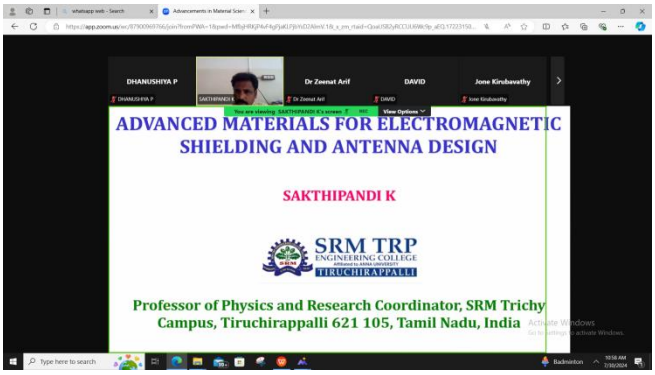


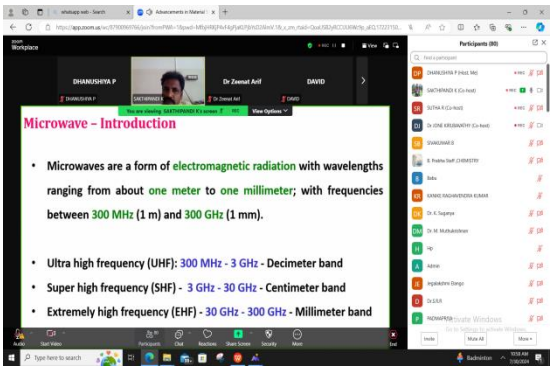
30.07.2024 – Report

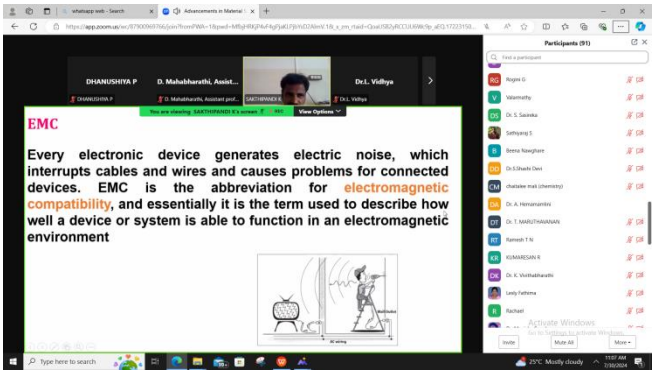
Session – Forenoon

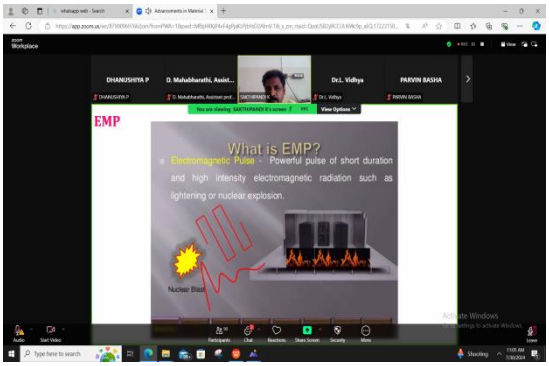
Dr.K.Sakthipandi, Professor, Department of Physics and Research Coordinator, SRM University, Trichy has delivered lecture entitled "Advanced Materials for electromagnetic sheilding and Antenna design" on 30.07.2024 Forenoon Session. He discussed on the Modern materials and their applications in the microwaves andsatellite dish receives satellite television. He has discussed on biological effects on microwaves. The EMI and electromagnetic pulse and electromagnetic compatibility are involved in Electromagnetic sheilding.Spinel Ferrites and the potential

applications in electronics, bioprocesing and electromagnetic resonance imaging enhancements are done in recent times. Among those Barium spinel ferrites are extensively used in microwave devices. The effect swift heavy - Barium hexaferrite nanoferrites and graphene coated Fe nanocomposites , Organic coatings in self cleaning and smart coatings are synthesised was well defined.



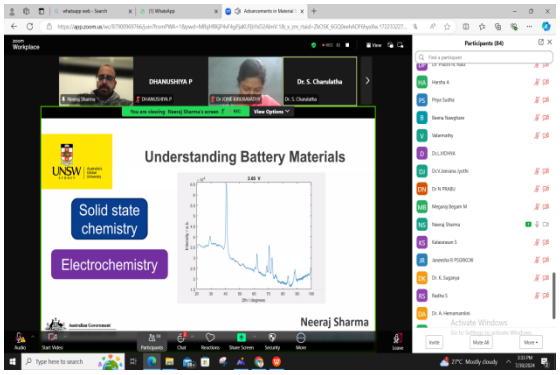


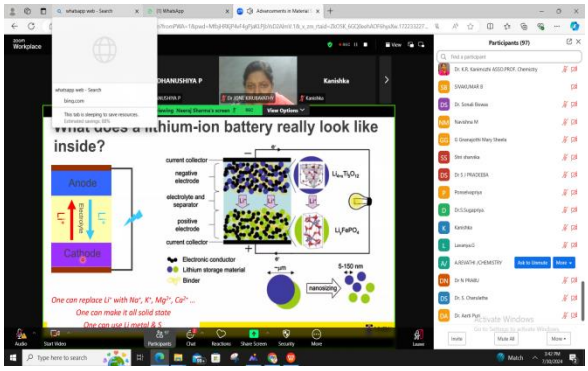


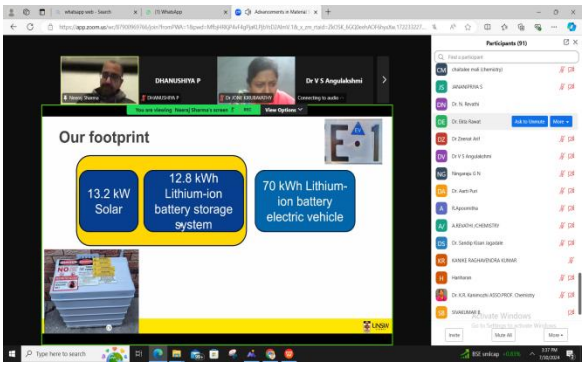


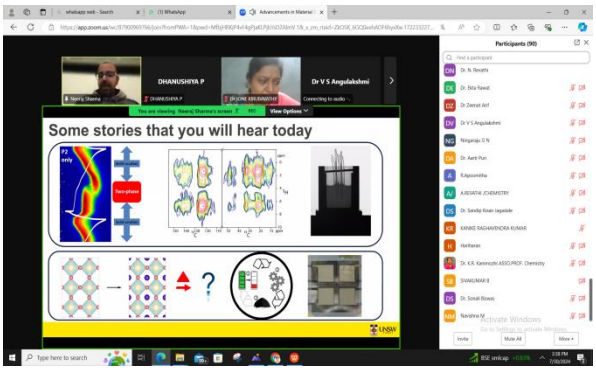
Session – Forenoon

Dr.Neeraj Sharma, Professor,University of New South Wales, Sydney, Australia has delivered lecture entitled “Understanding Battery materials in solid state chemistry and Electrochemistry” on 30.07.2024 Afternoon Session. He has enlighted on the footprints of solar ,lithium ion storage battery and lithium ion electric vehicles. He has discussed about the appearance and prototype of lithium ion battery,layered cathodes in Na-ion batteries and some recent battery materials,sustainability and recycling of sodium ion batteries and from carbon sources,Cool-anode materials are also developed . His speech was useful in understanding the mechanism and morphological characteristics of batteries.





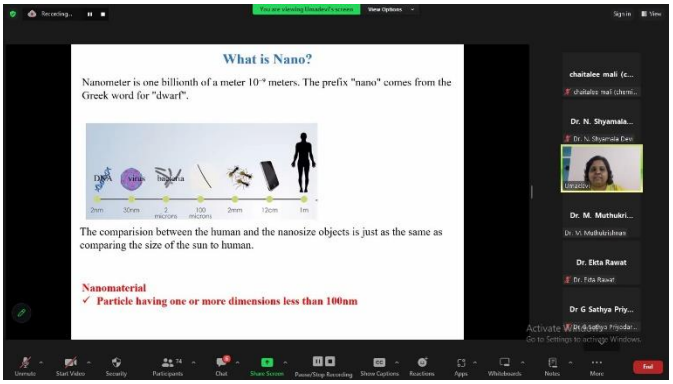


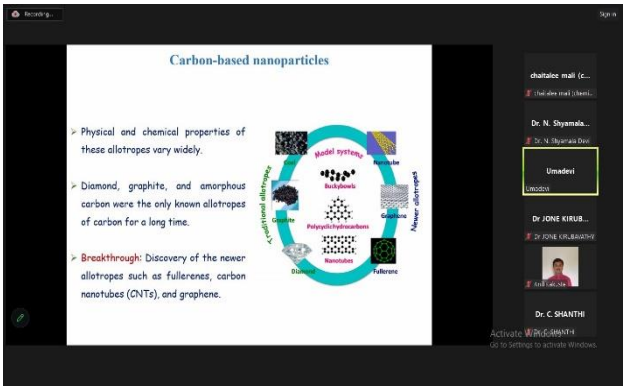


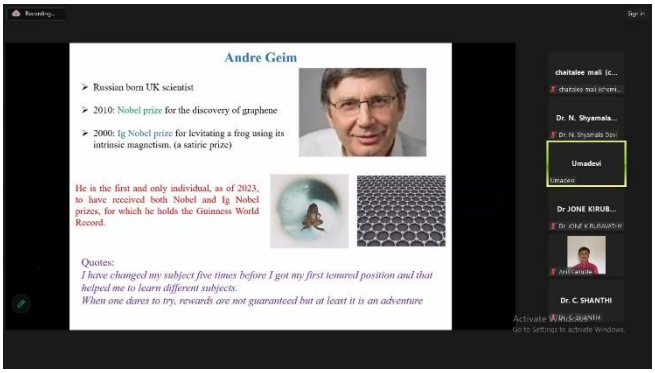
31.07.2024 – Report

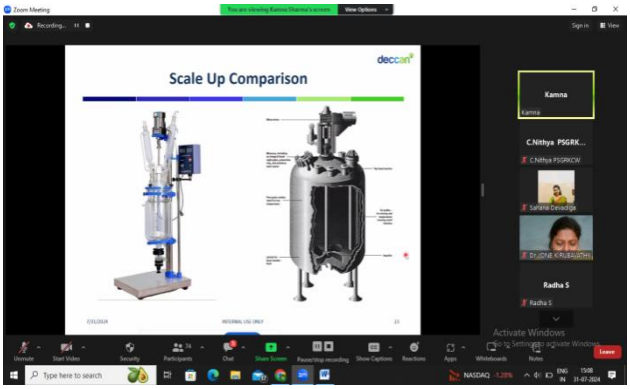
Session – Forenoon

Dr. Umadevi Deivasigamani, DST-Women Scientist, Department of Chemistry, IIT Palakkad has delivered lecture entitled "Two-Dimensional Nanomaterials for Environmental Applications: A DFT approach" on 31.07.2024 Forenoon Session. She has enlighted Two-dimensional (2D) nanomaterials, such as graphene and transition metal dichalcogenides which offer unique properties like high surface area and tunable electronic structures, making them ideal for environmental applications. Further she has highlighted Density Functional Theory (DFT) computational approach which is used to study the 2D materials at the atomic level, predicting their behavior and interactions with pollutants. DFT helps in understanding adsorption mechanisms, catalytic activity, and the electronic properties essential for designing efficient environmental remediation processes. These insights facilitate the development of innovative solutions for pollution control and sustainable environmental management.



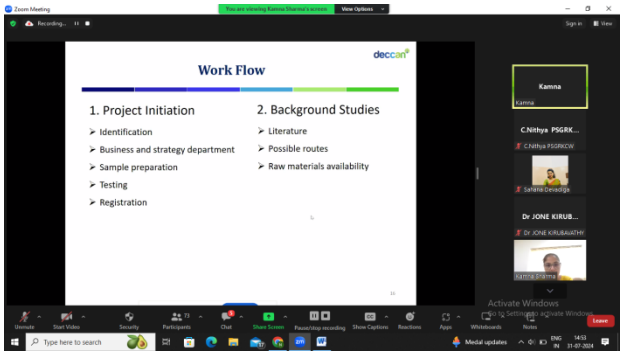


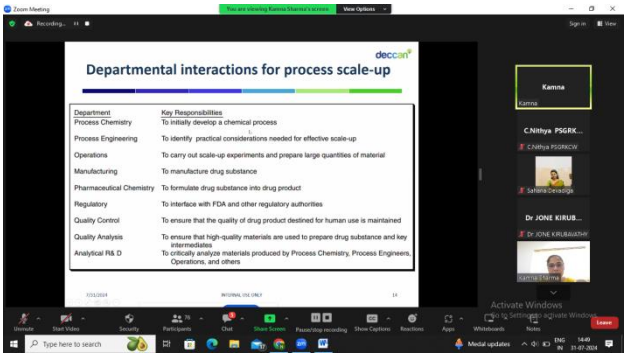


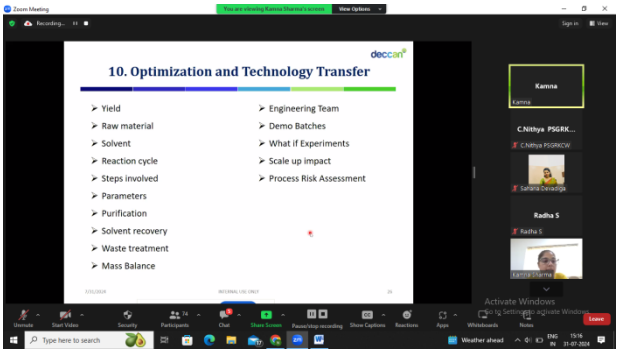


Session – Afternoon

Dr. Kamna Sharma, Team Lead Process Chemistry, Deccan Fine Chemicals, Mumbai , Maharastra has delivered lecture entitled "Insights of Process Development Chemistry in Industry" on 31.07.2024, Aftenoon Session. She has highlighted the various process what happened in industry. Process development chemistry at Deccan Fine Chemicals in Mumbai, Maharashtra, focuses on optimizing chemical processes for industrial-scale production. This involves route selection, cost analysis, and troubleshooting for waste reduction and purification. The team has successfully developed multistep processes for active ingredients and raw materials, enhancing efficiency and sustainability. Continuous innovation and rigorous testing ensure high-quality and cost-effective solutions for the chemical industry. Further, she has explained the diverse career opportunities in various sectors.



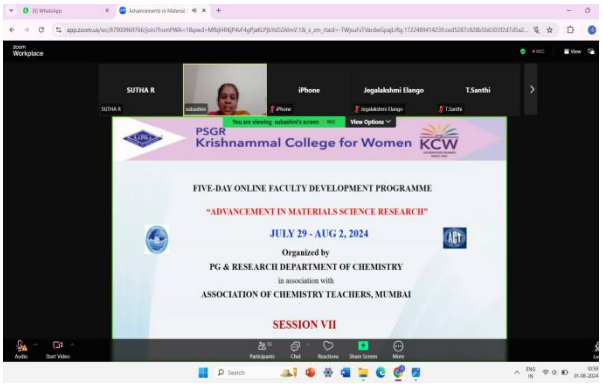


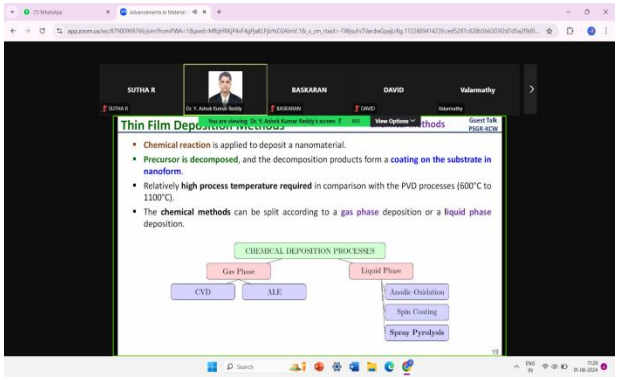


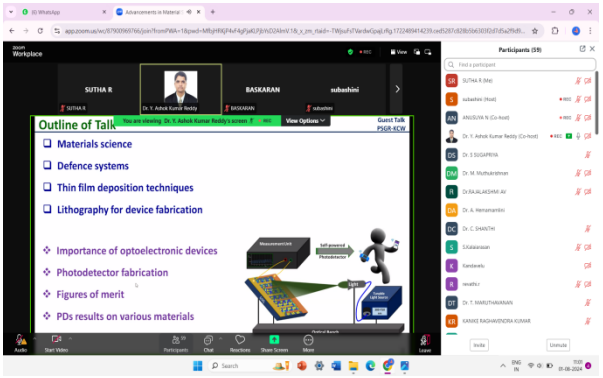
01.08.2024 – Report

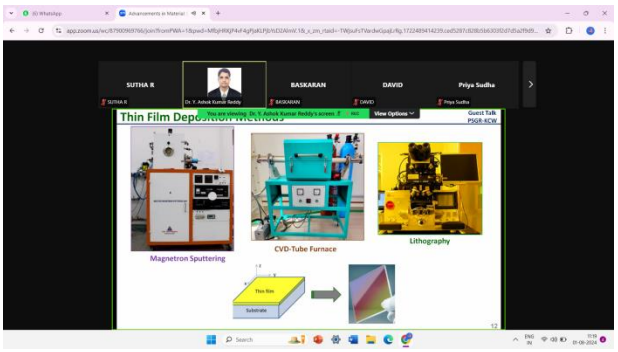
Session – Forenoon

Dr. Y.Ashok Kumar Reddy, Assistant Professor, Advanced Energy Materials and Sensors Laboratory, IITDM-Kancheepuram, Chennai has delivered lecture entitled "Role of Materials Science in Optoelectronic devices" on 01.08.2024, Forenoon Session.He has enlighted about the importance of optoelectronic devices, Photoelector fabrication, figures of merits.The talk helps to improve the knowledge on thin film deposition techniques and lithography for device fabrication. It also involves in Sputtering, Chemical vapour depositions, photolithography,surface coating,spin coating.The photodetectors usage in electronic devices are used as a main application in sensors for image sensing. The photodetectors are used in sun protections.The target area includes self powdered PDs which has low-power technology and in flexible PDs which has wearable devices.



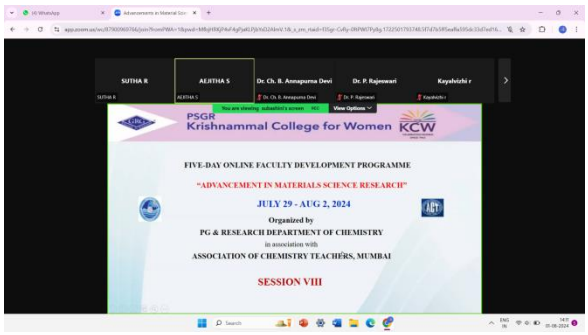


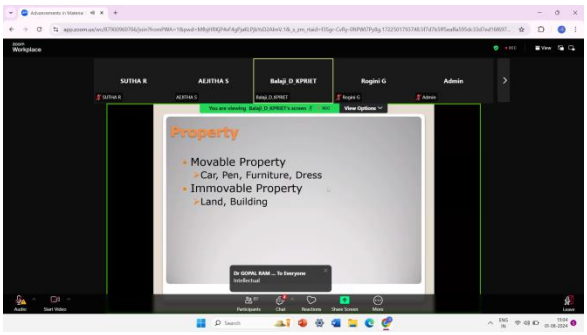


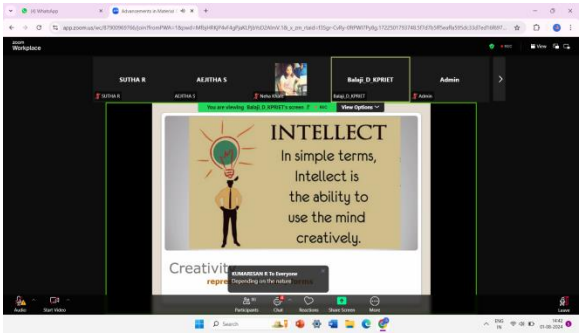


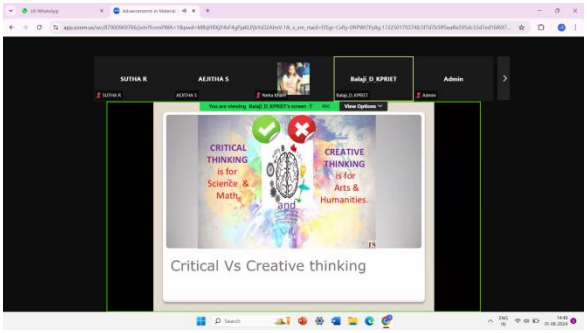
Session – Afternoon

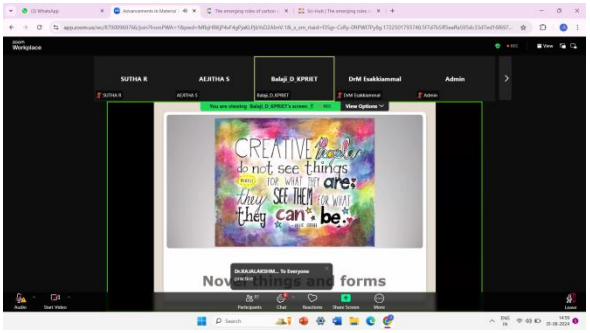
Dr.Balaji Devarajan, Head Centre for IPR, Assistant Professor, KPR Institute for Engineering and Technology, Coimbator**e** has delivered lecture entitled "Interaction on creative and critical thinking and Nature of IP" on 01.08.2024, Afternoon Session. He has discussed about an intellect which is the ability to use themind creatively. He discussed on critical and creative thinking of brain. The nature of Intangible property (IP) is an exclusive rights given by statues annd time-bound and it is territorial. He has clearly explianed on the cration of IP and the integration in increasing overall mental health and enhancing cognitive performance and better memory and intellectual functioning.









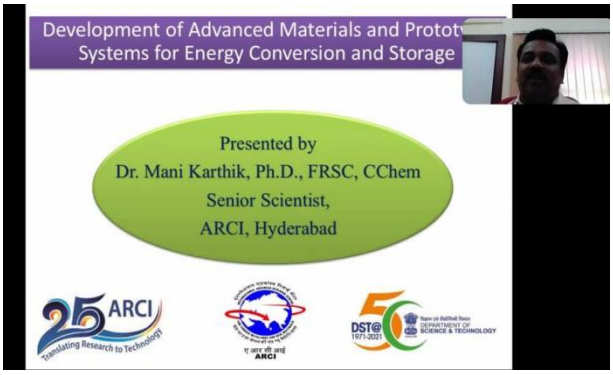


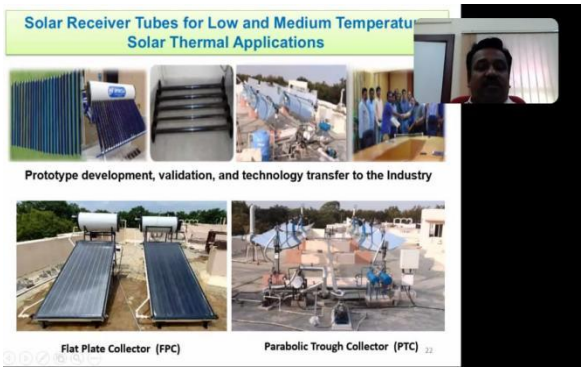
02.08.2024 – Report

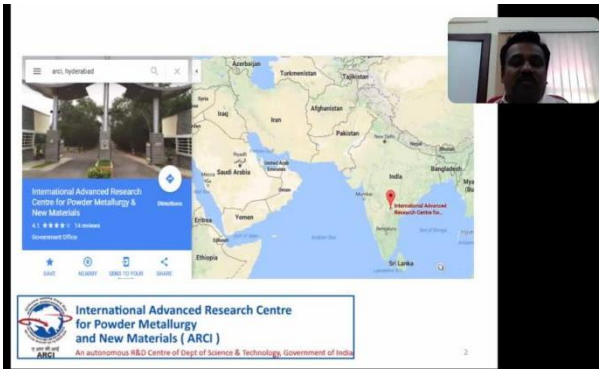
Session – Forenoon

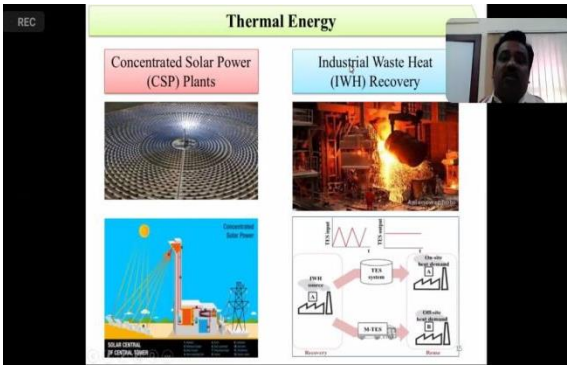
Dr. Mani Karthik, Senior Scientist, Centre for Solar Energy Materials, ACRI, Balapur, Hyderabad has delivered lecture entitled "Development of Avanced Materials and prototype systems for energy Conversion and Storage" on 02.08.2024, Forenoon Session.He has highlighted on the Thrust research areas of ACRI which includes Nanomaterials like nanocomposite coatings,Carbon materials, Nanostructured materials ans Automotive energy materials like ceramics and involves laser processing snd other alternative energy sources. He has discussed on the solar receiver tubes for low and medium temperature solar thermal applications in prototype development,validation and technology transfer to the industry. The thermal energy involves Concentrated solarpower (CSP) plants and Industrial Waste Heat (IWH) Recovery. His lcture helps

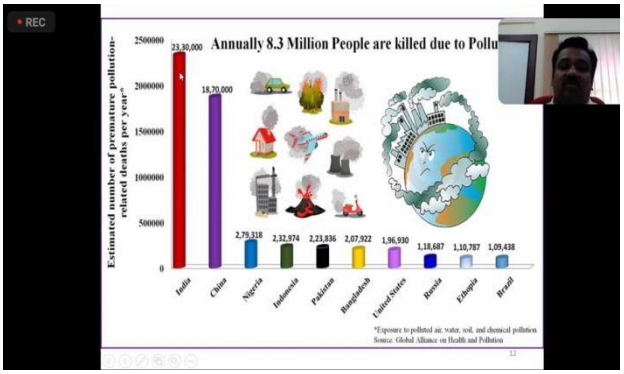
to know more about the Energy storage Technologies with respect to mechanical electro-chemical, chemical, thermal and electrical applictions and maturity of Technology transfer to the recent stage of development.







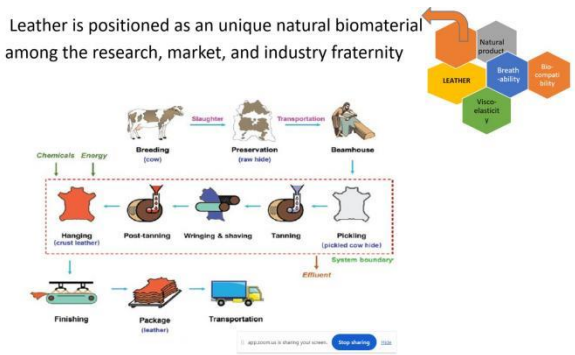


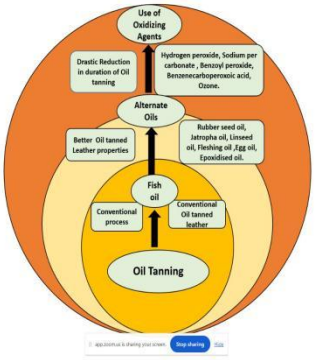


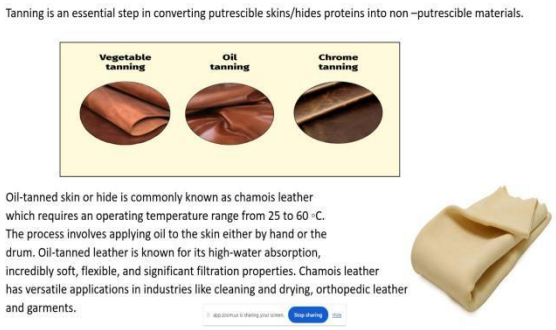
Session – Forenoon

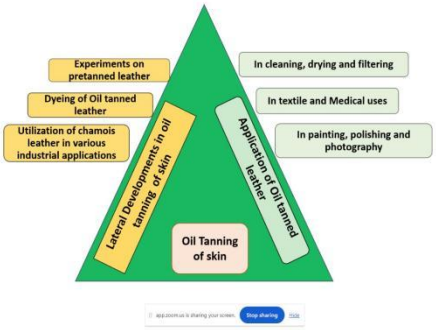
Dr. Bindia Sahu, Senior Scientist,Cenral Leather Research Institute, Chennai has delivered lecture entitled “Oil Tanning of Skin and Applications of oil tanned leathers” on 02.08.2024, Afternoon

Session. She has enlighted the tanning of leathers using oil tanning. The conventional oil tanned leathers has a versatile applications in cleaning and drying and orthopedic leather and garments. This session discuss about the uniqueness of leathers in research,market,and industries. The fish oil and alternate oils are used for drastic reduction in duration of oil tanning and used as oxidising agents.



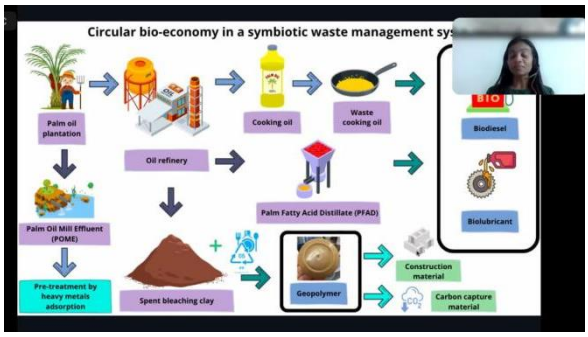






Session – Afternoon

Dr. Shangeetha Ganesan, Senior Lecturer, School of Chemical Sciences, Universiti Sains Malaysia, Penang, Malaysia has delivered lecture entitled “Circular bio-economy in a symbiotic waste management systems” on 02.08.2024, Forenoon Session. She has adsorption on the usage of palm oil plntation and palm oil effluent and their pre-treatment by heavy metals and used as biodiesel, biolubricant, construction materials and carbon capture materials. She has briefed on the synthesis of biodiesel by esterification reaction and also its cost, stability, high catalytic activity. The lecture helps to understand on tht biodiesel and biolubricants in environmental pollutions.


Circular bio-economy in a symbiotic waste management sys
Palm oil plantation
Oil refinery
Cooking oil
Waste cooking oil
Biodiesel
Palm Oil Mill Effluent (POME)
Palm Fatty Acid Distillate (PFAD)
Biolubricant
Pre-treatment by heavy metals adsorption
Spent bleaching clay
Geopolymer
Construction material
Carbon capture material

Centre for Advanced Materials & Sustainable Technologies (CAMAST)

Departments of Physics & Chemistry

अनुसंधान नेशनल रसच' फाउंडेशन

Anusandhan National Research Foundation (ANRF)

INTERNATIONAL CONFERENCE

On

ADVANCED MATERIALS FOR SUSTAINABLE TECHNOLOGIES

23 & 24 January 2025

Hybrid mode

GUEST SPEAKER:

Dr. PRADEEP KUMAR SOW, Associate Professor, Department of Chemical engineering, Bits Pilani, KK Birla, Goa campus.

OBJECTIVES:

The International Conference on Advances in Sustainable Technologies brought together experts from around the world to share knowledge, innovations, and best practices in sustainable technologies. The conference aimed to foster collaboration, inspire new ideas, and accelerate the development of sustainable solutions for a better future.

- Share recent advances, research, and innovations in sustainable technologies among experts, researchers, and students.
- Foster collaboration among experts from diverse fields, including science, technology, engineering.
- Showcase innovative sustainable technologies, products, and services that can contribute to a more sustainable future.
- Inform policy and decision-making processes with the latest research and innovations in sustainable technologies.
- Accelerate the development and idea of sustainable technologies among younger generations.

REPORT OF THE EVENT:

Departments of Chemistry & Physics of PSGR Krishnammal College for Women Organised International Conference on “Advanced materials for Sustainable technologies” funded by Anusandhan National Research Foundation (ANRF), in association with Centre for Advanced materials and Sustainable Technologies (CAMAST). The Respected Principal, Dr. PB Harathi Madam, the distinguished guests of the day Dr Pradeep Kumar Sow Sir, Associate Professor, Dr Mani Karthik Sir, Senior scientist, Dr NK Renuka Madam, Professor, Dr Palaniselvam Thangavelu Sir, Assistant Professor, Dr R Arun Kumar Sir, Assistant Professor, Deans of various capacities from various institutions were invited. Our esteemed Principal Madam Dr PB Harathi extended her heartfelt welcome to the gathering and invited the esteemed guest of honour Dr Pradeep kumar Sow Sir, Associate Professor, Department of Chemical engineering, Bits Pilani, KK Birla, Goa campus to share his thoughts on the topic of “Interdependence of wettability on Electrochemistry for Material in Electrochemical Systems”. The session began with a detailed discussion on Electrochemical systems, such as batteries, fuel cells, and electrolysers, rely on the interaction between materials and electrolytes to facilitate chemical reactions. He also discussed about the wettability which plays a crucial role in these systems, as it affects the electrochemical performance and overall efficiency. The interdependence of wettability and electrochemistry can be understood by some factors such as Electrode-Electrolyte Interface, Surface Roughness, Electrolyte Properties, etc,. Experimental methods were also discussed in the session.

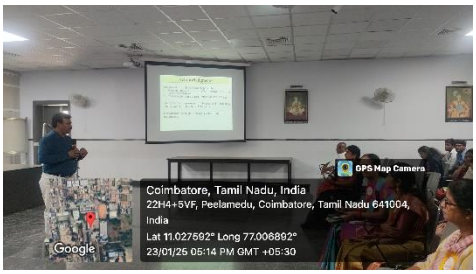
SESSION 2

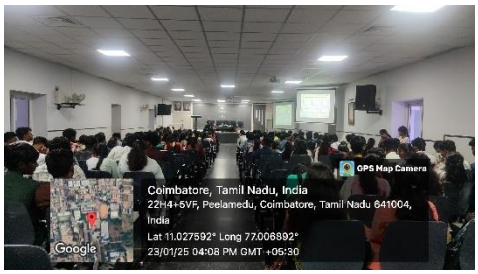
GUEST SPEAKER:

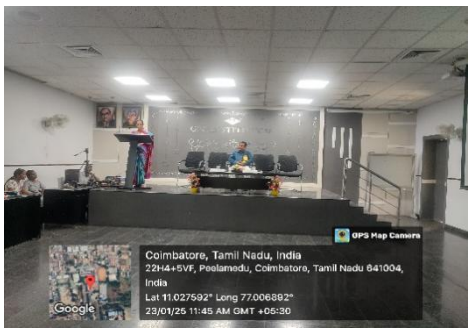
Dr MANI KARTHIK, Senior scientist, Centre for solar energy materials, International advanced research centre for powder metallurgy and new materials (ARCI), Hyderabad.

REPORT OF THE EVENT:

Departments of Chemistry & Physics of PSGR Krishnammal College for Women Organised International Conference on "Advanced materials for Sustainable technologies" funded by Anusandhan National Research Foundation (ANRF), in association with Centre for Advanced materials and Sustainable Technologies (CAMAST). Dr. E Kayalvizhi, Associate Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr Mani Karthik, Senior Scientist, Centre for solar energy materials, international advanced research Centre for powder metallurgy and new materials (ARCI), Hyderabad to share his insights on the topic of "Advanced materials for energy storage devices and technologies". The session began with a detailed discussion on Advanced Lithium-Ion Batteries. This session covered the latest advancements in lithium-ion battery materials and technologies, including new cathode and anode materials, electrolytes, and battery management systems. He also discussed about the Supercapacitors. This covered the latest advancements in supercapacitor materials and technologies, including new electrode materials, electrolytes, and device architectures. He also gave the detailed discussion on Fuel Cells it covered the latest advancements in fuel cell materials and technologies, including new electrode materials, electrolytes, and system designs.







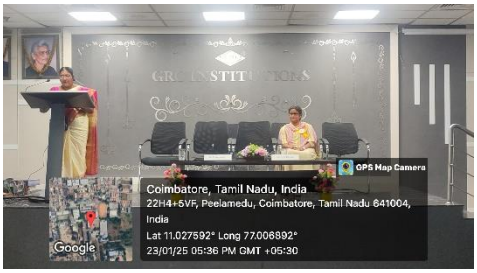
SESSION 3

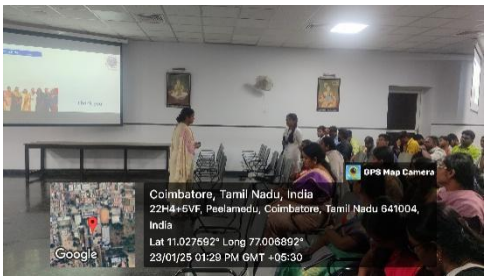
GUEST SPEAKER:

Dr N K Renuka, Professor, University of Calicut.

REPORT OF THE EVENT:

Department of Chemistry & Physics of PSGR Krishnammal College for Women Organised International Conference on "Advanced materials for Sustainable technologies" funded by Anusandhan National Research Foundation (ANRF), in association with Centre for Advanced materials and Sustainable Technologies (CAMAST). Dr. E Kayalvizhi, Associate Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr N K Renuka, Professor, University of Calicut to share her insights on the topic of "luminescent carbon for sensing and energy applications". The session began with a detailed discussion on luminescent carbon and its applications. Luminescent carbon materials have gained significant attention in recent years due to their unique optical and electrical properties, making them suitable for a wide range of applications, including sensing and energy storage. She also discussed about the energy applications and sensing applications. This covered the latest advancements in luminescent carbon and properties, including potential application and future development.





SESSION 4

GUEST SPEAKER:

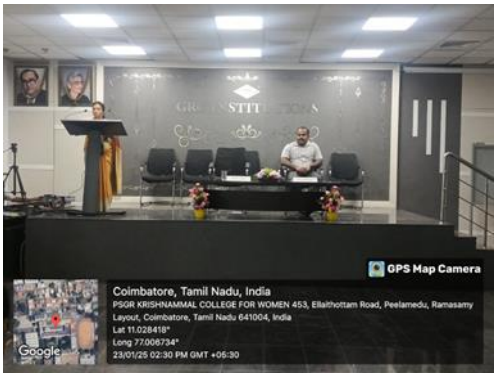
Dr. Palaniselvam Thangavelu, Assistant Professor, Department of Chemistry, IIT Madras.

REPORT OF THE EVENT:

Dr M Lavanya , Associate Professor, Department of Physics, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. Palaniselvam Thangavelu, Assistant Professor, Department of Chemistry, IIT Madras. He took over the session and elaborated on the topic "Role of Ether Electrolyte for Sodium Ions Storage in Tin Alloy Electrodes." The session provided valuable insights into the critical role of ether-based electrolytes in advancing sodium-ion battery (SIB) technology, particularly when paired with tin alloy electrodes. The lecture was attended by a diverse audience comprising students, researchers, and professionals from the field of energy storage and electrochemical systems. The speaker began by emphasizing the growing importance of sodium-ion batteries as a sustainable and cost-effective alternative to lithium-ion batteries, especially in light of lithium's limited availability and rising costs. Tin-based alloys were highlighted as promising anode materials for SIBs due to their high theoretical capacity and abundance. However, their practical application faces significant challenges, including severe volume expansion and structural instability during the sodiation and desodiation processes. Addressing these issues requires careful optimization of electrolyte systems, and the lecture focused on the advantages of ether-based electrolytes in this context.

The speaker elaborated on the unique properties of ether-based electrolytes, including their high chemical stability, low viscosity, and wide electrochemical stability window. These characteristics make them ideal for forming a robust and stable solid-electrolyte interphase (SEI) on tin alloy

electrodes, which is crucial for minimizing irreversible capacity loss and enhancing the cycling performance of the battery. It was also noted that ether electrolytes effectively suppress side reactions between the electrolyte and electrode, resulting in improved Coulombic efficiency. Additionally, the lecture highlighted how the reduced viscosity of ether-based solvents facilitates uniform sodium-ion diffusion, which helps to mitigate the mechanical stress caused by the significant volume changes of tin alloy electrodes during operation. This not only improves the structural integrity of the electrodes but also enhances their rate capability and overall performance. Several case studies and experimental findings were presented to support these claims. The speaker shared data illustrating the superior cycling stability and capacity retention of tin alloy electrodes in ether-based electrolytes compared to conventional carbonate-based systems. The audience also learned about ongoing research efforts to address challenges such as the compatibility of ether electrolytes with high-voltage cathodes and their long-term stability.



SESSION 5

GUEST SPEAKER:

Dr. R Arunkumar, Assistant Professor, School of sciences, National institute of technology, Andhra Pradesh.

REPORT OF THE EVENT:

Dr P Kanchana, Associate Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. R Arunkumar, Assistant Professor, School of sciences, National institute of technology, Andhra Pradesh. He took over the session to enrich on the topic "new generation lighting systems". The speaker began by discussing the evolution of lighting technologies, starting from traditional incandescent bulbs to compact fluorescent lamps (CFLs) and the current dominance of light-emitting diodes (LEDs). LEDs were highlighted as the cornerstone of new-generation lighting due to their low energy consumption, long lifespan, and versatility. The transition to LED lighting has significantly reduced energy demand and greenhouse gas emissions, aligning with global sustainability goals. A major focus of the lecture was on smart lighting systems, which integrate Internet of Things (IoT) technology. These systems enable remote control, automation, and customization of lighting using mobile apps or voice commands. Features such as adaptive brightness, color temperature adjustment, and motion sensing were discussed as tools to enhance energy efficiency and user comfort. The role of smart lighting in creating "smart cities" was also emphasized, with examples of street lighting systems that adjust based on pedestrian or vehicular activity to conserve energy.

Another key area covered was the use of human-centric lighting, which mimics natural daylight to support human health and productivity. The speaker explained how adjustable lighting systems can influence circadian rhythms, improve focus, and even aid in sleep patterns. Such systems have found applications in workplaces, hospitals, and educational institutions. The environmental benefits of new-generation lighting systems were also highlighted. The speaker explained how advancements in materials and design have minimized waste, while the use of solar-powered lighting systems has contributed to renewable energy adoption. Furthermore, the lecture addressed challenges, such as e-waste from discarded lighting systems and the need for proper recycling methods to ensure sustainability. The session concluded with a Q&A segment, where participants raised questions about the cost-effectiveness, accessibility, and future trends of lighting

technologies. The speaker also discussed emerging innovations, such as OLED lighting and Li-Fi (light-based data transmission), which are expected to revolutionize the lighting industry.

SESSION 6

GUEST SPEAKER:

Dr. B. Senthil Kumar, Associate Research Scientist, Department of Chemistry, Texas A&M University, College Station, Texas, United States.

REPORT OF THE EVENT:

Dr N Priyadharshini, Associate Professor, Department of Physics, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. B. Senthil Kumar, Associate Research Scientist, Department of Chemistry, Texas A&M University, College Station, Texas, United States. He took over the session to enrich on the topic "Leveraging the Structural Diversity of Sugars: A Sustainable Approach to Next Generation polymers". He started the session by discussing about the escalating global demand for plastics and the environmental concerns associated with petroleum-based polymers have driven the search for sustainable alternatives. Sugars, abundant and renewable biomolecules, offer a compelling platform for the development of next-generation polymers. Sugars can be converted into a wide range of polymers with unique properties, making them an attractive alternative to traditional fossil fuel-based polymers. He also discussed about the structural diversity of sugars and its key factor in their potential as a feedstock for next-generation polymers and sugars can be converted into a variety of polymers.

He discussed about the use of sugars as a feedstock for next-generation polymers offers a sustainable approach to polymer production. Sugars are, Sugars are abundant and can be replenished naturally, making them a renewable resource.Sugars are biodegradable, which means

that they can be easily broken down by microorganisms, reducing the environmental impact of polymer production. Sugars are non-toxic, making them a safe alternative to traditional fossil fuel-based polymers. Sugars are carbon neutral, meaning that they do not contribute to greenhouse gas emissions.

SESSION 7

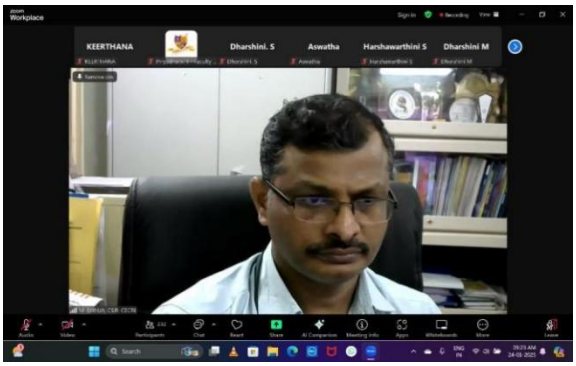
GUEST SPEAKER

Dr. M. Sathish, Principal Scientist, Electrochemical Power Sources Division, (CSIR) - Central Electrochemical Research Institute, Karaikudi, Tamilnadu, India

REPORT OF THE EVENT:

Dr G Selvi, Associate Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. M. Sathish, Principal Scientist, Electrochemical Power Sources Division, (CSIR) - Central Electrochemical Research Institute, Karaikudi, Tamilnadu, India. He took over the session to enrich on the topic "Nanostrutured carbon materials for Electro chemical Energy Storage and Conversion devices". He started the session by discussing about Nanostructured carbon materials have emerged as a critical component due to their unique properties, including high electrical conductivity, large surface area, chemical inertness, and structural versatility and he also discussed about the various types of nanostructured carbon materials, their applications in electrochemical energy storage and conversion, and the recent advancements in this field. Nanostructured carbon materials also play a crucial role in

electrochemical energy conversion devices, Fuel cells are Carbon materials are used as catalyst supports in fuel cells to enhance the electrocatalytic activity of the catalysts. They also serve as gas diffusion layers to facilitate the transport of reactants and products. He also mentioned Electrolysers are Carbon materials are used as electrodes in electrolysers for hydrogen production. They can also be used as catalyst supports for more efficient water splitting. Various applications about Nanostructured carbon materials.



SESSION-8

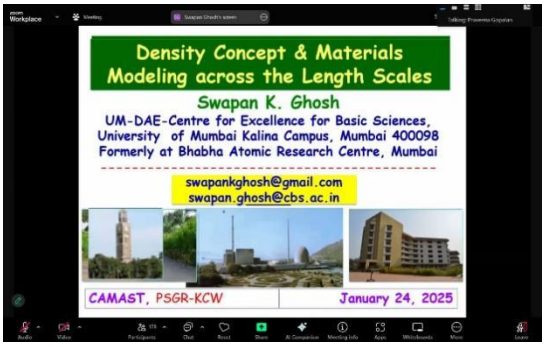
GUEST SPEAKER:

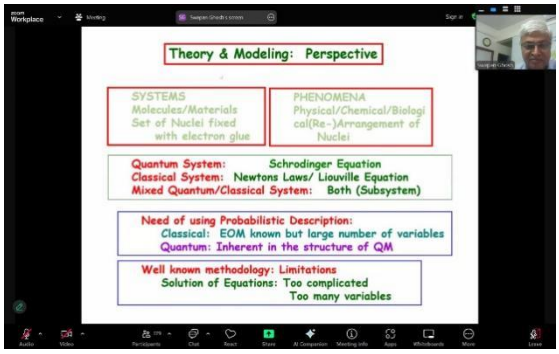
Prof. Swapan Kumar Ghosh, Distinguished Professor and Dean, UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai, Mumbai, India

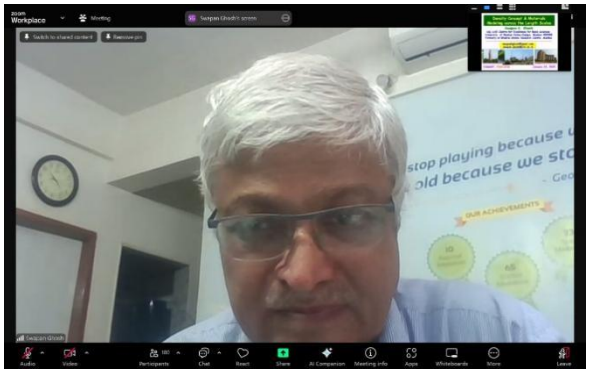
REPORT OF THE EVENT:

Dr G Praveena, Assistant Professor, Department of Physics, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Prof. Swapan Kumar Ghosh, Distinguished Professor and Dean, UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai, Mumbai, India. He took over the session to enrich on the topic Materials modelling. He started the session by discussing about the Electrochemical devices, such as batteries, supercapacitors, and fuel cells, hold great promise for addressing these challenges. He also discussed about the various Materials modelling, Materials Design are Modelling can be used to predict the properties of new materials before they are synthesized, accelerating the discovery of materials with desired characteristics. He also discussed about Failure Analysis are Modelling can be used to understand the causes of material failure and prevent future failures. He also mentioned that the Drug

Discovery are Modelling can simulate the interaction of drugs with biological molecules to aid in the development of new drugs.







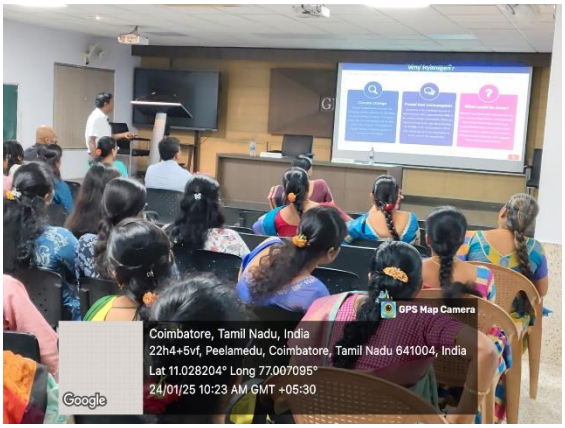
SESSION-9

GUEST SPEAKER:

Dr. N. Ponpandian , Professor and Head, Department of Nanoscience and Technology, Bharathiar University, Coimbatore, Tamilnadu, India.

REPORT OF THE EVENT:

Dr N Muthulakshmi Andal, Associate Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. N. Ponpandian , Professor and Head, Department of Nanoscience and Technology, Bharathiar University, Coimbatore, Tamilnadu, India. He took over the session to enrich on 2D Nanomaterials: Pioneering the future of green energy technologies. He started the session by discussing about the increasing global energy demand coupled with the detrimental effects of fossil fuels necessitates the development of sustainable energy solutions. 2D nanomaterials, characterized by their atomic or molecular thickness and large lateral dimensions, present a unique opportunity due to their exceptional properties. He delves into the applications of these materials in various energy domains like Graphene is a single layer of carbon atoms arranged in a honeycomb lattice, graphene is renowned for its exceptional electrical conductivity, mechanical strength, and thermal conductivity. He also discussed about them Solar cells are Enhancing the efficiency of light absorption and charge transport and the Energy storage are Improving the performance of batteries and supercapacitors. He mentioned about the Catalysis are Acting as a support for catalysts in fuel cells and other energy conversion devices.



SESSION-10

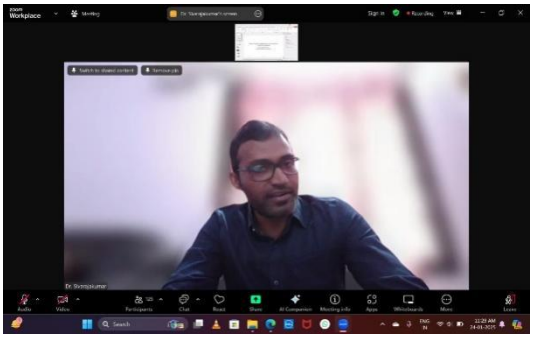
GUEST SPEAKER:

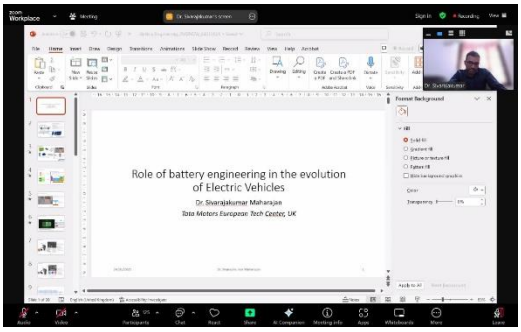
Dr. Shivakumar Maharajan University, Lead Engineer, HV Battery Development Division Tata Motors, European Tech Center, Coventry, United Kingdom.

REPORT OF THE EVENT:

Mrs. S. Subanya, Assistant Professor, Department of Physics, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. Shivakumar Maharajan University, Lead Engineer, HV Battery Development Division Tata Motors, European Tech Center, Coventry, United Kingdom.He took over the session to enrich on Role of Electric Vehicles and EV Batteries towards Sustainability. He started the session by discussing about the increasing urgency to combat climate change and improve air quality has placed a strong emphasis on decarbonizing the transportation sector. Electric vehicles, powered by batteries, have emerged as a key technology in this transition. EVs offer the potential to significantly reduce greenhouse gas emissions, improve urban air quality, and enhance energy security. He delves about the multifaceted role of EVs and their batteries in driving sustainability. Reduced Greenhouse Gas Emissions are EVs produce zero tailpipe emissions, significantly lowering greenhouse gas emissions compared to conventional internal combustion engine vehicles (ICEVs) and the extent of emission reduction depends on the electricity source used to charge the EV. He gave a key note about a grid powered by renewable energy sources maximizes the environmental benefits. He also mentioned that the Improved Air Quality are EVs contribute to cleaner air, particularly in urban areas, by eliminating pollutants like

nitrogen oxides (NOx), particulate matter, and hydrocarbons, which are detrimental to human beings.





SESSION-11

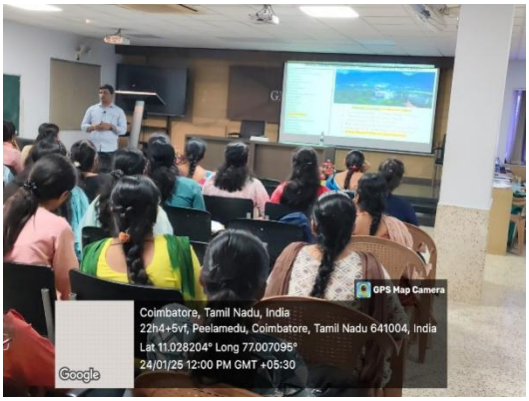
GUEST SPEAKER:

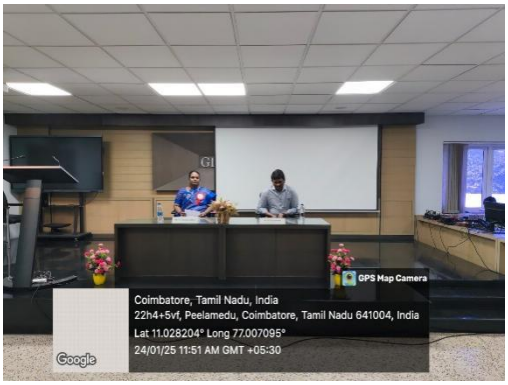
Dr. M. Ulaganathan, Associate Professor, Department of Physics School of Physical Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, Tamilnadu , India.

REPORT OF THE EVENT:

Dr N Shyamala Devi, Associate Professor, Department ofChemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr. M. Ulaganathan, Associate Professor, Department of Physics School of Physical Sciences, Amrita Vishwa Vidyapeetham, Coimbatore, Tamil Nadu, India. He took over the session to enrich on Nanomaterials for Hybrid capacitor Applications. He started the session by discussing about the demand for efficient and reliable energy storage solutions continues to grow, hybrid capacitors have emerged as a compelling technology and these devices combine the electrostatic charge storage mechanism of electrochemical double-layer capacitors (EDLCs) with the faradaic charge transfer of pseudo capacitors or batteries. He also shares about the unique combination which allows hybrid capacitors to deliver both high power and high energy density. Nanomaterials play a pivotal role in realizing the full potential of hybrid capacitors by providing enhanced surface area, improved

conductivity, and tailored electrochemical properties. He mentioned about the Hybrid capacitors which can be broadly classified based on the type, Asymmetric Hybrid Capacitors are capacitors utilize two different electrode materials, one typically a high surface area material for EDLC behaviour (e.g., activated carbon) and the other a pseudocapacitive material (e.g., metal oxides or conducting polymers). Battery-Type Hybrid Capacitors are devices incorporate a battery-type electrode (e.g., intercalation compounds) along with a capacitive electrode, offering even higher





SESSION 12

GUEST SPEAKER: Dr. Arulraj Arul Kashmir, Scientist, Centre for Materials for Electronics Technology, Thrissur, Kerala, India.

REPORT OF THE EVENT:

Dr S. Jone Kirubavathy, Assistant Professor, Department of Chemistry, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr Arulraj Arul Kashmir, Scientist, Centre for Materials for Electronics Technology, Thrissur, Kerala, India. He enriches on the topic of "Tailored Polymers: A Game Changer for Affordable Medical Technologies". He started the session with the development of tailored polymers has the potential to revolutionize the field of medical technologies, making them more affordable, accessible, and effective. Tailored polymers are designed to have specific properties and functionalities, allowing them to be used in a wide range of medical applications, from implantable devices to diagnostic tools. His session also includes current state of tailored polymers in medical technologies, their potential benefits, and the challenges. He gave a brief introduction about medical technologies and it have

transformed and delivered, enabling the diagnosis, treatment, and management of a wide range of medical conditions. However, the high cost of medical technologies is a significant barrier to access, particularly in low- and middle-income countries. He also mentioned about the development of tailored polymers has the potential to address this challenge, enabling the creation of affordable, effective, and sustainable medical technologies.

He discussed about the various types of tailored polymers and he shares a few challenges and limitations that are listed below,

1. Regulatory frameworks: Regulatory frameworks need to be developed to ensure the safety and efficacy of tailored polymers in medical applications.

2. Scalability: The scalability of tailored polymers needs to be improved to enable their widespread adoption in medical technologies.

3. Standardization: Standardization of tailored polymers is needed to ensure their consistency and quality.

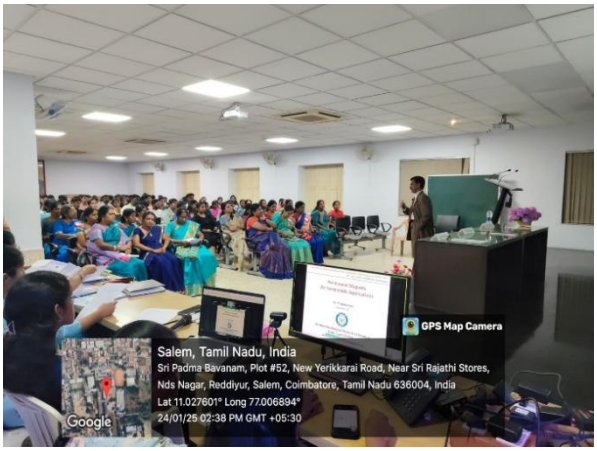
4. Public awareness: Public awareness of the benefits and risks of tailored polymers needs to be improved to ensure their adoption and acceptance.

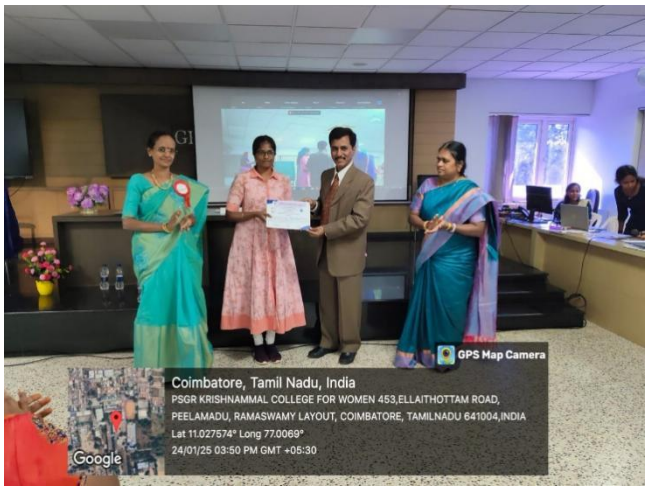
SESSION 13

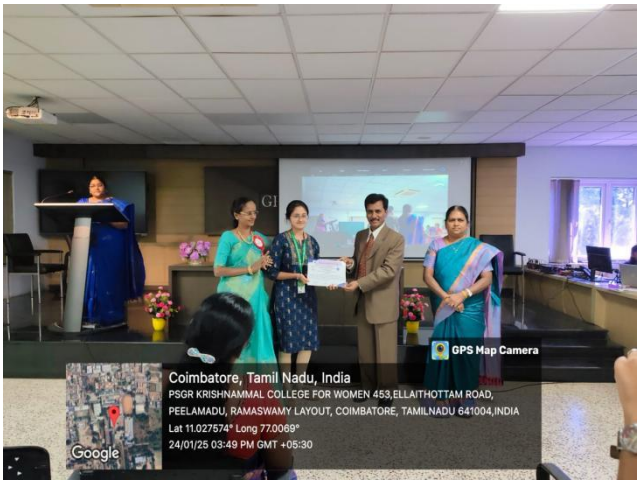
GUEST SPEAKER: Dr P Saravanan, Scientist 'G', Advanced Magnetics Group, Defence Metallurgical Research Laboratory (DRDO - DMRL), Hyderabad, India.

REPORT OF THE EVENT:

Dr J. Bala vijayalakshmi, Associate professor & Head Department of Physics, PSGR Krishnammal college for women, welcomed and introduced the guest of honor Dr P Saravanan, Scientist 'G', Advanced Magnetics Group, Defence Metallurgical Research Laboratory (DRDO - DMRL), Hyderabad, India to the valedictory session of the international conference 2025. He enriches on the topic of "Permanent Magnets for Sustainable Energy Applications". He started his discussion about general magnets and how it works. Later, he also discussed about the permanent magnets and its applications. Permanent magnets are a crucial component in various sustainable energy applications, including wind turbines, hydroelectric power plants, and electric vehicles. The demand for permanent magnets is increasing rapidly due to the growing need for renewable energy sources and energy-efficient technologies. He also discussed an overview of the current state of permanent magnets for sustainable energy applications, their benefits, and the challenges associated with their production and use. Permanent magnets are materials that retain their magnetic properties even after the removal of an external magnetic field. They are widely used in various applications, including energy generation, conversion, and storage. The increasing demand for sustainable energy sources has led to a significant growth in the demand for permanent magnets, particularly in the wind and hydroelectric power sectors. He also shared an experience about the laboratories. He also discussed about the applications of Permanent magnets such as Wind turbines, Hydroelectric power plants, Electric vehicles, Solar power systems. He also shares his valuable research experience with new generation.







At the end end of the session best presentation award was presented to the participants.

The vote of thanks was proposed by Dr D Nalini, Associate Professor & Head, Department of Chemistry and the conference was ended with National anthem.

Industrial Visit Report

Title: BITS Pilani, Goa Campus

Date of Visit: 21.08.2024 - 26.08.2024

Participants: III B.Sc.Chemistry, II M.Sc.Chemistry

Location: BITS Pilani, K.K. Birla Goa Campus, Zuarinagar, Goa

Introduction:

33 students of III B.Sc. & 22 Students of II M.Sc., Chemistry visited to BITS Pilani, K.K. Birla Goa Campus. The purpose of this visit was to explore the advanced research facilities and laboratories available at the campus, interact with faculty members, and understand the ongoing research and academic activities.

Objective of the Visit:

To gain knowledge into the research and development activities carried out at BITS Pilani, Goa.To explore the state-of-the-art lab facilities and understand their applications and handle the instruments. To interact with the faculty and research scholars to discuss potential collaborations and knowledge-sharing opportunities. To gain a lot knowledge and to have hands -on training on those instruments.

Details of the Visit:

1. Arrival and Welcome: The visit began with a warm welcome by the host team at BITS Pilani, Goa. After the initial introductions, an overview of the campus and its key research areas was introduced.

2. Visited two Instrumentation labs and 10 general labs.

3. Interaction with Faculty and Research Scholars.

Observations and Key Learnings:

The labs at BITS Pilani, Goa are equipped with cutting-edge technology and equipment, providing students and researchers with the tools needed for high-quality research. The faculty members are highly knowledgeable and actively engaged in a wide range of interdisciplinary research projects. The campus provides a conducive environment for research, fostering innovation and collaboration among students and faculty alike.


BITS PILANI K K BIRLA GOA CAMPUS
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Centre for Advanced Materials & Sustainable Technologies (CAMAST)

Departments of Chemistry & Physics

Oranizes

One day Seminar

on

Material Science and its Applications

27 December 2024

GUEST SPEAKERS:

1. Prof. (Dr). B.V.R. TATA, Raja Ramanna Fellow, GITAM University, Andhrapradesh
2. Dr. S. BEENA, Associate Professor, Department of Chemistry, Amrita School of Physical Sciences

OBJECTIVES:

The objective of the seminar is to provide participants with a comprehensive understanding of the latest advancements, innovations, and applications in material sciences. The seminar aims to:

- Enhance Knowledge: Introduce participants to the fundamental concepts and recent trends in material sciences.
- Showcase Applications: Highlight real-world applications in industries like electronics, healthcare, construction, energy, and more.
- Promote Research: Encourage interdisciplinary research by showcasing emerging technologies and innovative materials.
- Industry Collaboration: Foster collaborations between academia and industry for practical solutions and advancements.
- Skill Development: Equip attendees with insights into new techniques and tools for material analysis and design.

- Networking: Provide a platform for professionals, researchers, and students to exchange ideas and establish professional networks.
- Address Challenges: Discuss challenges in material synthesis, sustainability, and environmental impact while proposing future solutions.
- This seminar seeks to inspire participants to explore the vast potential of material sciences and contribute to its growth and application in diverse fields.

REPORT OF THE EVENT:

Department of Chemistry and Physics of PSGR Krishnammal College for Women Organised a one day Seminar by Dr. S. BEENA, Associate Professor, Department of Chemistry, Amrita School of Physical Sciences and Prof (Dr.) B.V.R TATA, Raja Ramanna Fellow, GITAM University on 27th December from 09.00 am to 1.00 pm titled "Material Science and its Applications". It was well received by the students and Faculty of Chemistry and Physics Department. Dr. N. MUTHULAKSHMI ANDAL, Associate Professor, Department of Chemistry started the session with a warm welcome to all the students and introduced the Guest Speaker. The session was then taken over by the Guest Speaker Dr. S. BEENA. The speaker began by explaining the principles of electrochemical sensing and its ability to detect biological molecules such as glucose, oxygen, and biomarkers. Practical applications, including glucose monitoring for diabetes, cardiovascular disease diagnosis, and wearable devices for real-time health tracking, were discussed.

The lecture also explored recent advancements, such as miniaturized and IoT-enabled sensors, which are paving the way for personalized healthcare solutions. Additionally, the challenges associated with sensor stability, calibration, and integration with advanced technologies like artificial intelligence were highlighted. The session was interactive, with participants actively engaging during the Question and answer segment, where the speaker addressed queries about future trends and innovations in the field.

The event concluded with a vote of thanks to the speaker for sharing their expertise and to the attendees for their enthusiastic participation. This informative session enriched the knowledge of participants, inspiring them to explore opportunities in the field of electrochemical sensing and health monitoring.

The next session was held offline from 11.00 am to 12.40 p.m. Dr. J. Bala Vijayalakshmi, Associate Professor & Head, Department of Physics started the session with a warm welcome to all the students and introduced the Guest Speaker. The session was then taken over by the Guest Speaker Dr. B.V.R. TATA. The speaker began by explaining the concept of structural colours, emphasizing how these colours are produced not by pigments but through the interaction of light with micro- and nanostructures. Examples from nature, such as the iridescent colours of butterfly wings and peacock feathers, were used to illustrate the principle. The discussion then shifted to photonic crystals, materials with periodic optical nanostructures that influence the motion of photons.

The lecture highlighted the diverse applications of photonic crystals, Including optical communication, sensors, energy-efficient displays, and anti-counterfeiting measures. Special emphasis was placed on their potential in developing sustainable and eco-friendly technologies. Challenges in fabricating and scaling photonic crystals for industrial applications were also discussed.

The session concluded with an engaging Question and answers, where students and faculty posed questions about the practical challenges and future prospects of this innovative technology. A vote of thanks was extended to the guest speaker for their enlightening talk and to the audience for their enthusiastic participation. The lecture provided valuable insights into the cutting-edge research and applications of structural colours and photonic crystals, inspiring attendees to explore this interdisciplinary field further.