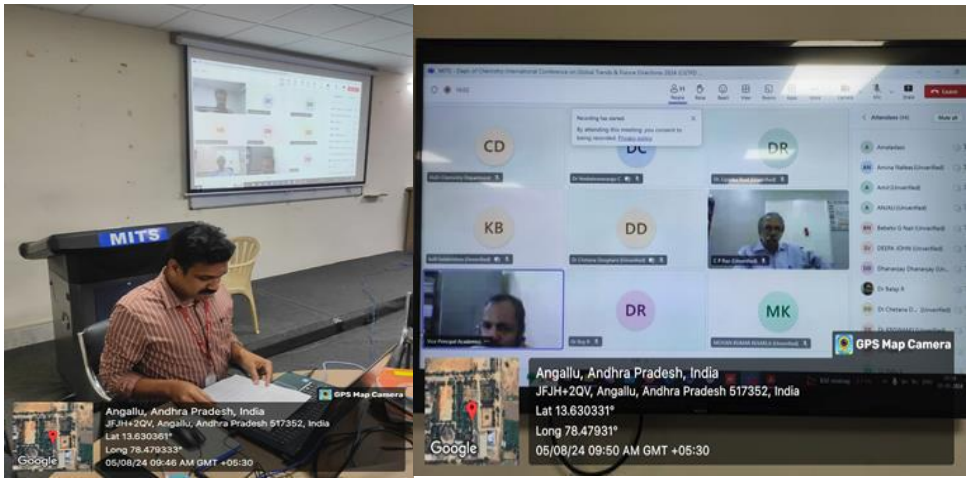
A Report on 3-Day Virtual International Conference on "Chemistry: Global Trends and Future Directions 2024 (CGTFD-2024)" Organized by Department of Chemistry From 05.08.2024 to 07.08.2024



Report Submitted by: Dr. Rashmi Roy, Assistant Professor, Department of Chemistry

Resource Persons Details: Prof. C. P. Rao, Professor, SRM University, AP; Dr. Mohan Kumar Kesarla (Investigador Titular A de TC, Universidad Nacional Autónoma de México; Dr. Arijit Kumar De, associate prof. IISER Mohali; Dr. Raj Sharma, Director, Europe Business Development, Aurigene Pharmaceutical Services; Dr. Nitee Rathi, Principal Investigator Postech in South Korea; Dr. Pavan K Kancharla, Associate Prof, IIT Guwahati; Dr. Chayan Dutta, Assistant Professor, Georgia State University, USA; Dr. Thomas Stegmann, a professor in the department of physics at Universidad Nacional Autónoma de México in Mexico; Prof. Dr. Anandhu Mohan of the Department of Nano Science and Technology Convergence, Gachon University, South Korea; Dr. Balaji Mohan, Assistant Professor, Department of Chemistry, MITS; Dr. Nadezda Prochukhan, a member of technical staff. Longitude Licensing Ltd. Dublin, Ireland; Dr. Sumanta Sahoo, Assistant Professor, School of Chemical Engineering, Yeungnam University, South Korea; Prof. Alexei Demchenko, Professor, Department of Chemistry, Saint Louis University, USA; Dr. Satyajit Saha, UGC Assistant Professor, Institute of Chemical Technology, Mumbai, Associate Editor of Organocatalysis (specialty section of Frontiers in Catalysis; Dr. Manav Saxena, Assistant professor of chemistry at CNMS, JAIN University, India; Dr. Priyabrata Ghana, Assistant Professor, IIT Gandhinagar; Dr. Christopher Jeyakumar, Department of Chemistry, The American College, Madurai, Tamil Nadu, India; Dr. Ugrabadi Sahoo, Assistant Professor, MITS

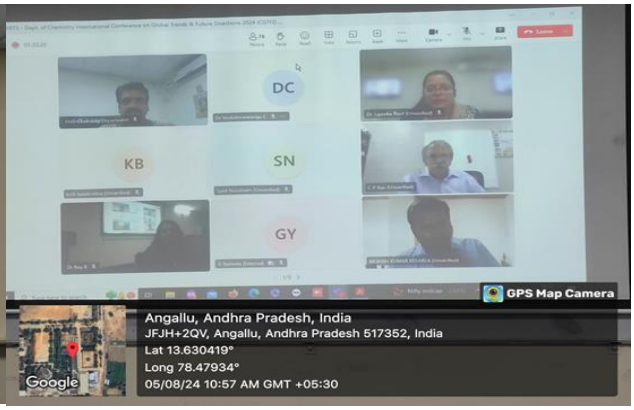
Mode of Conduct: Online

Report Received on 14.08.2024

Day-1 (05/08/2024)

The Department of Chemistry at Madanapalle Institute of Technology & Science, Madanapalle organized a Three Day Virtual International Conference entitled **"Chemistry: Global Trends and Future Directions, 2024" during 5th-7th August 2024**. The programme Inauguration was started at 9:30 AM by Dr. **Lipeeka Rout** (Asst. Prof. Dept. of Chemistry, MITS) who invited the convener **Dr. Rashmi Roy** to give welcome address to the respected dignitaries, distinguished delegates and all the participants. Then, **Dr. Renjith Bhaskaran** (HOD, Chemistry Dept.) gave Inaugural welcome address to all the dignitaries, delegates, and participants. In addition, **Dr. P. Ramanathan** (Vice Principal Academics- MITS, Madanapalle) also given the inaugural address to the gathering virtually.

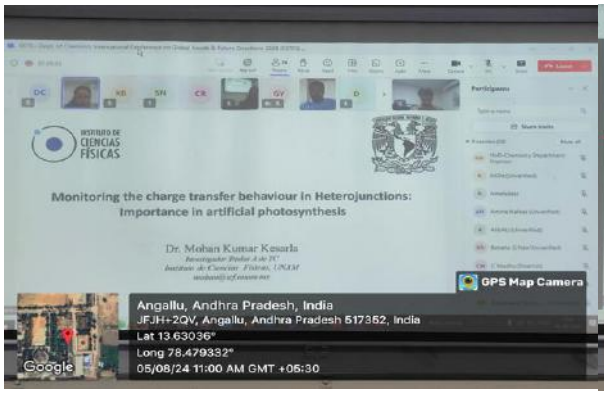
First session of Day-1 talk was started at 10.00 AM chaired by Dr. Lipika Rout (Asst. Prof., Dept. of Chemistry, MITS) who introduced the resource person of plenary lecture-I **Prof. C. P. Rao, Professor, SRM University, AP**, to the participants and thanked him for accepting the invitation. Further, the academic profile of Prof. C. P. Rao was being introduced to the gatherings by the chair through virtual mode.

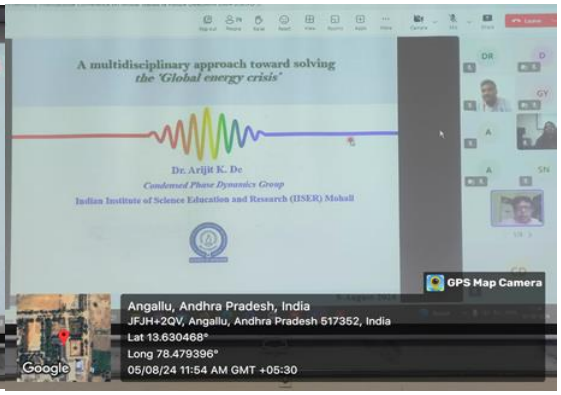


Prof. C. P. Rao has begun the lecture by sincerely thanking the audience, the organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle for providing him with the chance to share his expertise in chemical science research and related fields. His title of the talk was "Supramolecular Conjugates of Calixarenes: Multitude Application Domains". He discussed about how during the past one and half decades, his group entered into the arena where the conjugates of calixarenes are appropriately designed, synthesized and demonstrated for their cell targeting, anticancer activity, drug delivery, gene transfer, catalysis and in water purification. Finally, he answered to all the questions raised from the audience side.

The second talk of the session-I was began at 11.00 AM and the resource person was introduced by Dr. Lipika Rout who gave brief introduction about the resource person **Dr. Mohan Kumar Kesarla (Investigador Titular A de TC, Universidad Nacional Autónoma de México**. Dr. Kesarla's academic profile was being introduced to the participants by the session chair.

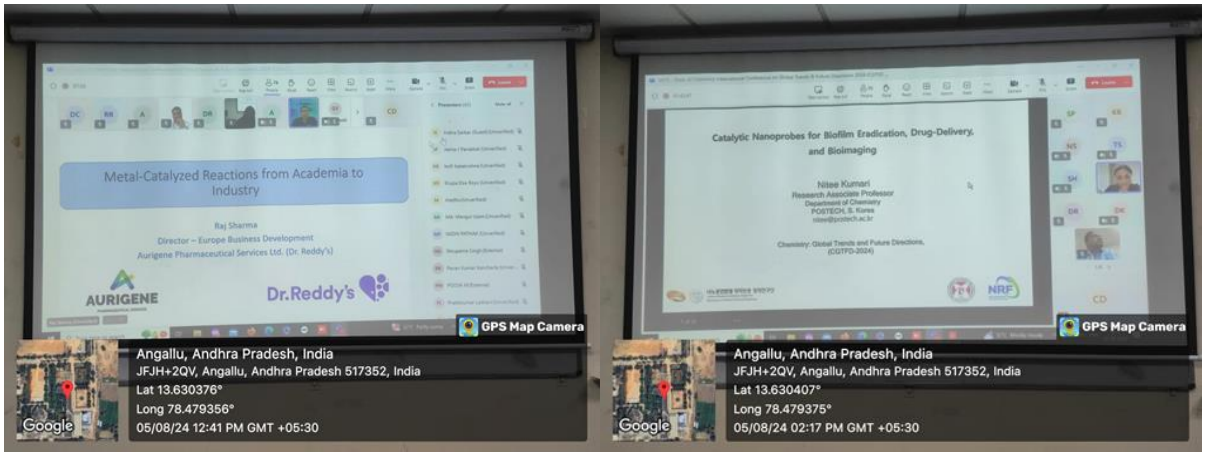
In his opening remarks, Prof. expressed his gratitude to the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle for giving him the opportunity to share his knowledge of chemical science research and associated subjects. His title of the talk was "Monitoring the charge transfer behavior in Heterojunctions: Importance in artificial photosynthesis". In the course of his talk, he spoke about the current study being done by his research team. This talk focuses on the importance of heterojunction photocatalysts and their charge transfer behavior. Some basic concepts that must be considered during its use in energy and environmental catalysis will be covered, which includes basics of water splitting with semiconductor-photocatalysts, the problems associated with single semiconductor photocatalysts and how heterojunctions can overcome these problems and finally designing the heterojunctions and their characterization using various techniques to understand the behavior of charge transfer. In addition, recent work on energy and environmental catalysis through heterojunctions that they developed in the materials science group was briefly presented.





Dr. Boobalan Ramadoss, Assistant professor of chemistry at MITS, presided over the first talk of the second session (Day-I). On Day-I, the first talk of the session-II was begun at 11.50 AM. He welcomed **Dr. Arijit Kumar De, associate prof. IISER Mohali** and thanked him for accepting the invitation. Additionally, Dr. Boobalan Ramadoss introduced Dr. Arijit Kumar De's academic background to the participants.

In his opening remarks, Dr. A. K. De expressed his gratitude to the audience, the lecture's planners, the HOD Chemistry, the Principal, the Vice Principal, and the Administration of MITS Madanapalle for giving her the opportunity to impart his knowledge in chemical science research and associated fields. His title of the talk was "A multidisciplinary approach toward solving the 'Global energy crisis". He discussed about how we can think about solving the challenge of the ever-increasing demand of energy of the world through a multifaceted approach combining the expertise of different disciplines of science and technology. Finally, he addressed the participant's questions.

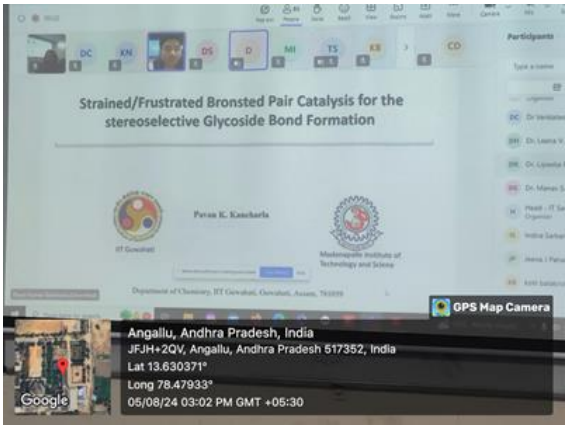


The second talk of Session II (Day-I) was begun at 12.40 AM and the resource person was introduced by the session chair who gave brief introduction about the resource person **Dr. Raj Sharma, Director, Europe Business Development, Aurigene Pharmaceutical Services.** Dr. Rahul Pal introduced Prof. S. Nagarajan academic background to the participants through virtually.

Dr. Raj Sharma thanked everyone for the opportunity to speak about chemical catalysis research and its industrial perspective, including the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His title of the talk was "Metal-catalyzed reactions from academia to industry". His topic of discussion covers the following concepts. In pharmaceutical space, transition metal catalysis has become foundational reaction for drug discovery, development, and manufacturing. Starting from numerous cross-coupling methodologies that facilitate simple construction of C−C and C−X bonds, to asymmetric hydrogenations that almost trivialize the construction of numerous primary and secondary stereocenters, transition metal catalyzed reactions has become widely utilized across the chemical community ranging from medicinal chemistry all the way to commercial manufacturing in pharmaceutical industry. Remarkably, the Suzuki−Miyaura and Buchwald−Hartwig reactions are now among the top five reactions performed by medicinal chemists today, which facilitates the design of modern pharmaceuticals. His discussion was focused on how various chemists utilize and envision transition-metal catalyzed reactions during various stages of drug discovery and development.

The opening presentation of the third session (Day-I) was led by Dr**. C. V. Raju** (Asst. Prof, Dept. of chemistry, **MITS**) at 2.00 PM. **Dr. Nitee Rathi, Principal Investigator Postech in South Korea** was requested to deliver her talk, and she was welcomed and thanks for accepting our invitation. The participants were also given an overview of Dr. Nitee Rathi's academic history by Dr. C. V. Raju.

Dr. Nitee Rathi thanked the audience, the organisers of the lecture, the head of the department of chemistry, the principal, the vice principal, and the administration of MITS Madanapalle for allowing him the chance to share his expertise in chemical science research and related fields. "Catalytic Nanoprobes for Biofilm Eradication, Drug-Delivery, and Bioimaging" was the title of her speech. Her group has been synthesized hydrophilic Si-nanoshells encapsulated with catalytic PdNCs in a rattle-like configuration. Due to small size and hydrophilicity, these nanoprobes were easily endocytosed inside mammalian cells, demonstrating high biocompatibility and photostable Si characteristic PL-based live cell imaging. Intracellular Si-nanoprobes demonstrated excellent catalysis to synthesize bioimaging molecules as the result of light-induced heterogeneous [Pd]-catalyzed C–C cross-coupling reaction. By the development of new nanoscale chemistries, highly functional nanomaterials can be designed and synthesized. She discussed the key synthetic strategies and their applications, which her group has recently introduced. She answered the participant's queries in the end.



The resource person of the second talk of Session III (Day-I) was introduced by Dr. C. V. Raju who gave brief introduction about the resource person **Dr. Pavan K Kancharla, Associate Prof, IIT Guwahati.** The session was begun at 2.45 PM. Dr. C. V. Raju introduced Dr. Pavan Kancharla's academic background to the participants through Microsoft Teams.

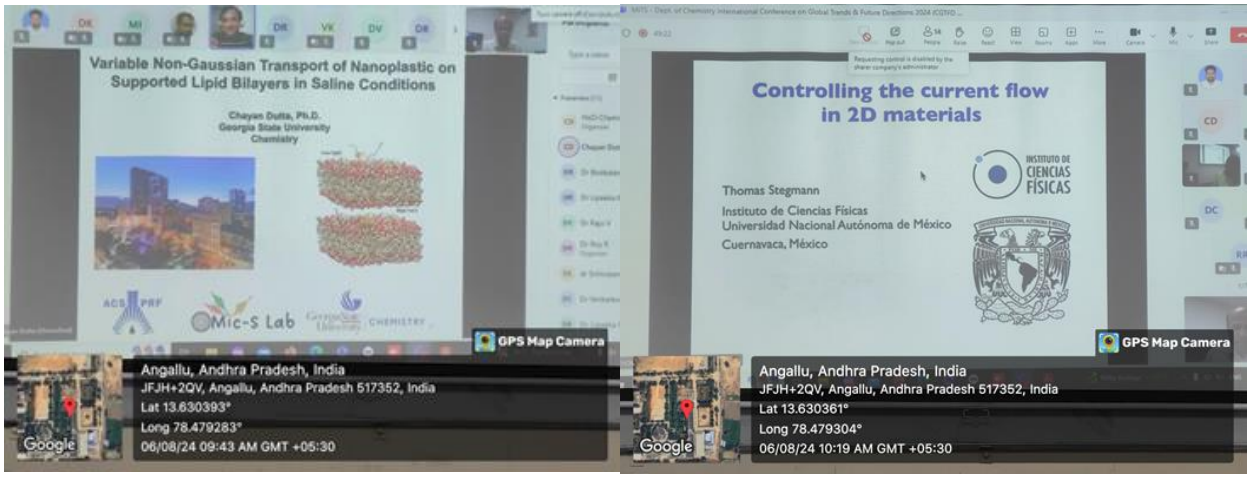
Dr. Pavan Kancharla thanked everyone for the opportunity to speak about chemical science research and related topics, including the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His title of the talk was "Frustrated Bronsted Pair Catalysis for Glycoside Bond Formation". He

discussed the current study being conducted by his research team during his presentation, which focused on the frustrated Bronsted pair catalyzed chemical glycosylations. He provided a thorough explanation of the many glycosylation methodologies and its significance towards oligosaccharides and glycoconjugate synthesis.

At the end of day-I, the virtual poster presentation was conducted which began at 3.30 PM. There were totally 4 participants presented their posters on Day-I. Each participant presented their poster around 20 mins duration and judges asked question around 5 mins to evaluate the posters. Poster presentation was completed around 4.50 PM. First day of the conference concluded at 5.10 PM with few announcements made by convener Dr. Rashmi Roy.

<u>Day-2 (06/08/2024)</u>

Convener Dr. Rashmi Roy began the programme on Day 2 at 9.30 AM by welcoming the participants with a few announcements about the CGTFD-2024 conference. The first session of the Day-II talk began at 9:40 AM, and Dr. Rahul Pal, an assistant professor of chemistry at MITS, presided. He welcomed the attendees and thanked **Dr. Chayan Dutta, Assistant Professor, Georgia State University, USA**. Dr. Rahul Pal also used virtual presentations to introduce the academic background of Dr. Chayan Dutta to the participants.



In his opening remarks. Dr. Chayan Dutta expressed his gratitude to the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle for giving him the opportunity to impart his knowledge in chemical science research and associated fields. He delivered talk on “Variable Non-Gaussian Transport of Nanoplastic on Supported Lipid Bilayers in Saline Conditions” where the importance of the saving the environment, Causes, and consequences of plastic nanoparticles have been discussed in a detailed way. In his lecture he has covered the following investigations done in his laboratory. They have investigated PNP transport on biomimetic membrane surfaces under different ionic strength conditions, using single particle tracking (SPT) analysis. Dr. Chayan Dutta’s group has employed a home-built total internal reflection fluorescence (TIRF) microscope to probe particle transport on model lipid surfaces. They compared the transport of fluorescently labeled carboxy-functionalized polystyrene (PS) particles on a supported lipid bilayer made of 1-palmitoyl-2-oleoyl-sn-glycerol-3-phosphocholine (POPC) under various conditions to identify the salt effects on the PS transport process. Their results show an ionic strength-dependent transport of PS nanoplastics and increased confinement at high salt environments. Additionally, Dr. Chayan Dutta’s group tested environmentally relevant PNP samples to understand the effects of particle heterogeneity.

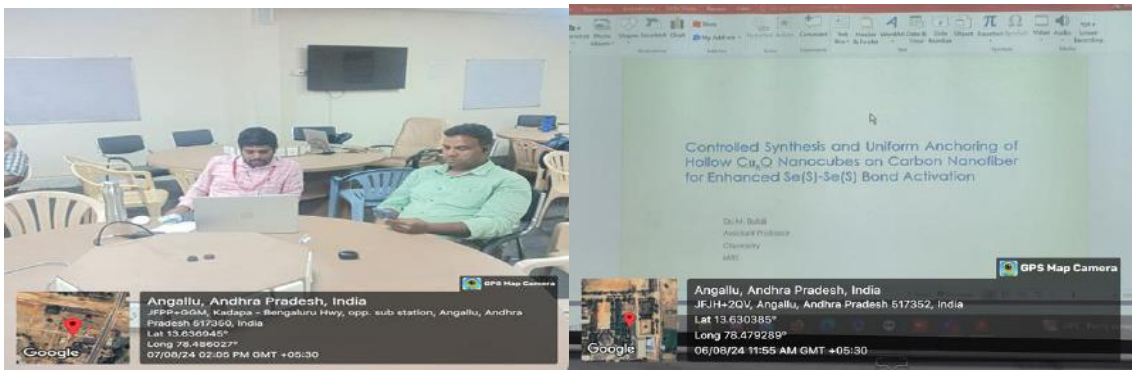
The second talk of session I started at 10.30 AM. **Dr. Thomas Stegmann, a professor in the department of physics at Universidad Nacional Autónoma de México in Mexico**, was introduced by Dr. Rahul Pal as the resource person. Dr. Rahul Pal used virtual reality to introduce Dr. Thomas Stegmann’s academic background to the participants.

For the opportunity to talk chemical science research and related topics, Dr. Thomas Stegmann thanked the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. The topic of the presentation was "Controlling the current flow in 2D materials". He delivered talk about some strategies to control

the current flow in 2D materials. In the first part of this talk, he demonstrated that the current flow in graphene can be guided on atomically thin current pathways by the engineering of Kekule-O distortions. A grain boundary in these distortions separates the system into topologically distinct regions and induces a ballistic domain-wall state. The state is independent of the orientation of the grain boundary with respect to the graphene sub lattice and permits guiding the current on arbitrary paths. As the state is gapped, the current flow can be switched by electrostatic gates. An atomic model supported by DFT calculations demonstrates that the system can be realized by decorating graphene with Ti atoms.

The opening lecture of the second session (Day-II) was presided over by Dr. Arunbabu Dhamodaran, an assistant professor of chemistry at MITS. The first talk of the second session of Day II began at 11.30 AM. **Prof. Dr. Anandhu Mohan of the Department of Nano Science and Technology Convergence, Gachon University, South Korea,** who had been invited to speak, was welcomed and thanked for accepting the invitation. Arunbabu Dhamodaran also gave the participants an overview of Dr. Anandhu Mohan's academic background.

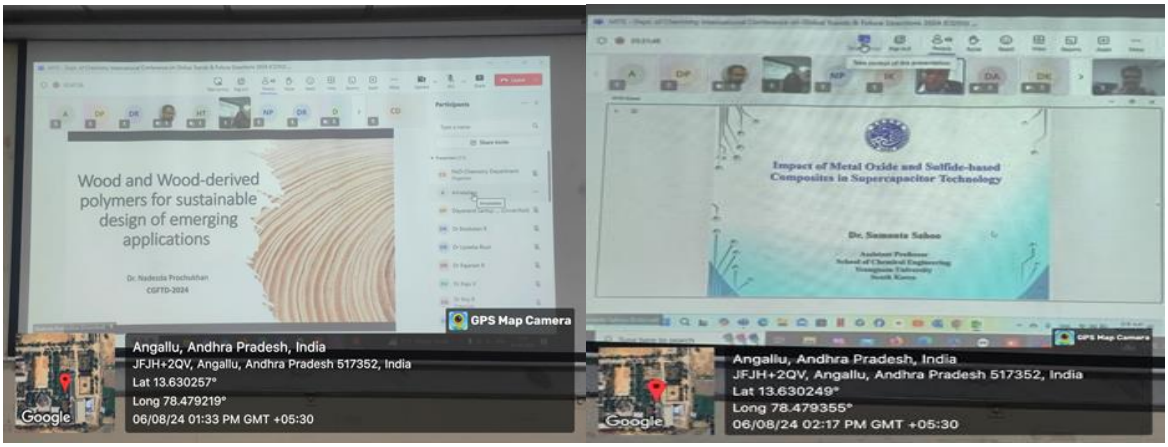
Dr. Anandhu Mohan thanked the MITS Madanapalle administration, the audience, the lecture's organizers, the HOD Chemistry, the Principal, and the Vice Principal for the opportunity to share his expertise in chemical science research and related fields. "Synthesis of Biomass-Derived Porous Carbon through Solid-State Activation for Reversible Iodine Capture" was the topic of his talk. His lecture was based on the following topic. The search for adsorbent materials capable of extracting and storing radioactive iodine derived from nuclear power plants has intensified owing to the growing nuclear waste concerns. Herein, they have introduced a novel method, which is simple and effective, to synthesize biomass-derived porous carbon from an easily available biomass, Opuntia humifusa, via simple solid-state activation with zinc chloride. The resulting porous carbon exhibits a large specific surface area, with up to 1869 m2/g of micropores. The textural properties of activated carbons can be easily modified by adjusting the amount of zinc chloride and activation temperature.



The second talk of Session II (Day-II) was begun at 12.20 AM and the resource person was introduced by Dr. Arunbabu Dhamodaran who gave brief introduction about the resource person **Dr. Balaji Mohan, Assistant Professor, Department of Chemistry, MITS**. Dr. Arunbabu Dhamodaran introduced Dr. Balaji Mohan's academic background to the participants through virtual reality.

For the chance to discuss chemical science research and related topics, Dr. Balaji Mohan expressed his gratitude to the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His talk was titled "Controlled Synthesis and Uniform Anchoring of Hollow CuxO Nanocubes on Carbon Nanofiber for Enhanced Se(S)-Se(S) Bond Activation." His talk was based on the following topic. In the present study, we have constructed hollow cubic CuxO nanoparticles (~23 nm) incorporated with CNF (HC-CuxO/CNF) through controlled thermal oxidation of solid cubic Cu2O nanoparticles (~21 nm) supported on carbon nanofibers (SC-Cu2O/CNF) under airflow, exploiting the nanoscale Kirkendall effect. These hollow CuxO nanocubes with increased surface areas exhibited outstanding catalytic activity for unsymmetrical chalcogenide synthesis under ligand-free conditions.

The opening presentation of the third session (Day-II) was led by Dr. Imran K, Asst. Prof, Dept. of chemistry, MITS at 2.00 PM. **Dr. Nadezda Prochukhan, a member of technical staff. Longitude Licensing Ltd. Dublin, Ireland** was requested to deliver her talk, and she was welcomed and thanks for accepting our invitation. The participants were also given an overview of Dr. Nadezda Prochukhan's academic history by Dr. Imran K.



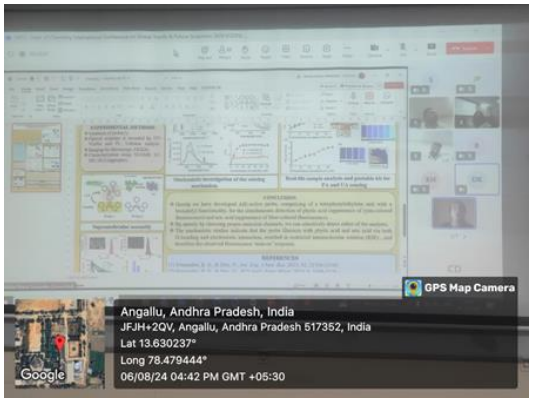
Dr. Nadezda Prochukhan expressed her gratitude to the audience, the lecture's organizers, the head of the chemistry department, the principal, the vice principal, and the MITS Madanapalle administration for giving her the opportunity to share his knowledge of chemical science research and associated subjects. Her talk was titled "Wood and wood-derived polymers for sustainable design of emerging applications" Her lecture was based on the following topic. Wood contains the two most abundant biopolymers namely cellulose and lignin. Cellulose is used in the paper making industry; however, lignin is often treated as a by-product. Only recently has it gained visibility as a material that can be used in energy storage or fuel applications. In her research lignin was used to produce membranes for the first time without additives and the resultant structure was template onto silicon to yield black silicon, a light absorber useful for solar cell technology. They have also demonstrated the generation of cellulose membranes by the same principle.

Thus, Dr. Nadezda Prochukhan demonstrated the use of wood as well as its constituent polymers (lignin and cellulose) for various environmentally important applications in a sustainable manner.

The resource person of the second talk of Session III (Day-II) was introduced by Dr. Imran K. who gave brief introduction about the resource person **Dr. Sumanta Sahoo, Assistant Professor, School of Chemical Engineering, Yeungnam University, South Korea.** The session was begun at 2.40 PM. Dr. Imran K. introduced Sumanta Sahoo's academic background to the participants through online mode.

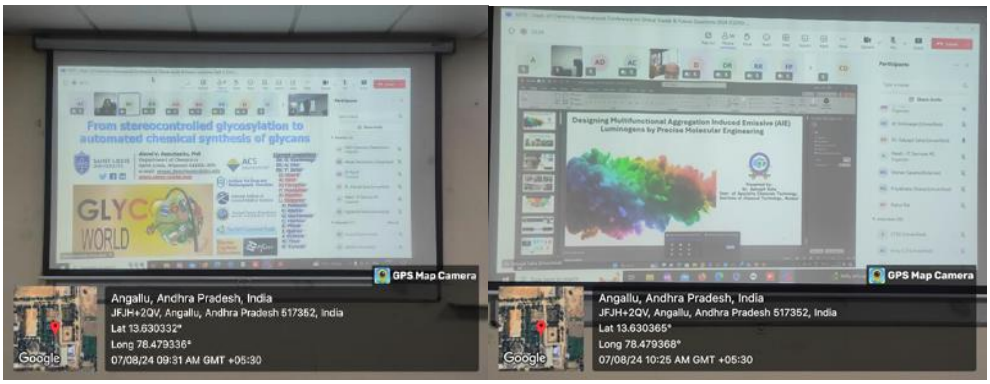
Dr. Sumanta Sahoo thanked everyone for the opportunity to speak about chemical science research and related topics, including the audience, the lecture's organizers, the HOD of Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His title of the talk was "Impact of Metal Oxide and Sulfide-based Composites in Super capacitor Technology". He discussed about the following investigations done in his research lab. Energy has become a vital component of the modern world. The crisis of such a crucial component has become a global issue today. To overcome this, modern science and technology have been significantly focused on exploring alternating energy resources. Super capacitor (SC) is one such electrochemical energy storage device that expressively advances the modern automobile industry. In this talk, the basics of SC technology will be discussed in detail. Special attention will be paid to exploring fruitful strategies for improving the electrochemical performance of SC electrodes based on the composites of metal oxide/mixed metal oxides and metal sulfides/mixed metal sulfides. Furthermore, the efficient ways of enhancing the device's performance had also been explored in his talk. Various synthetic strategies of the metal oxides and sulfides and their composites with advanced 2D materials like MXene, graphene, etc. were also was focused. Finally, he explained in detail for the quarries of the participants.

The virtual poster presentation, started at 3.30 PM, which was held at the end of day II. On Day II, eight contestants in all displayed their posters. Each competitor gave a presentation of their poster for around 10 minutes, and then the judges took questions for 3 mins to determine best posters. Around 5.30 PM, the poster presentation was finished. At 5.30 PM, the conference second day came to an end with a few announcements from organizer, **Dr. Rashmi Roy.**



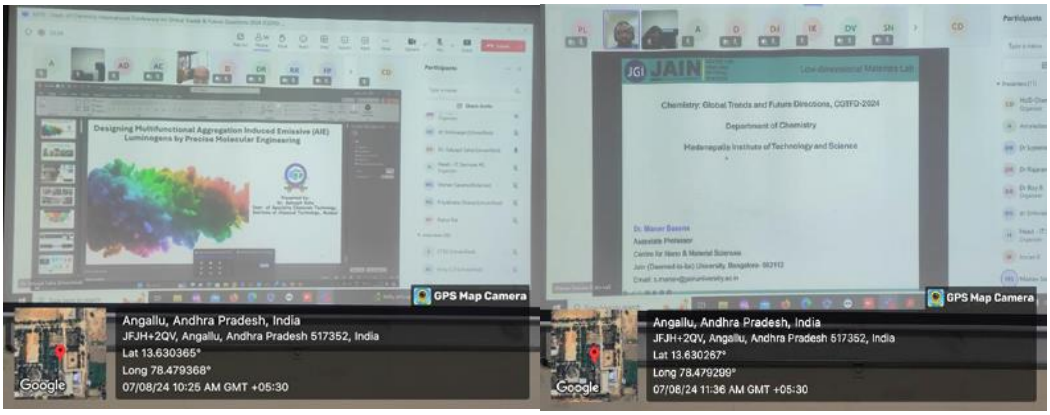
Day-3 (07/08/2024)

On Day 3, at 9.30 AM, Convener Dr. Rashmi Roy welcomed the participants and made a few announcements regarding the CGTFD-2024 conference. At 9.40 AM in the morning, Dr. K. Raghavendran, an assistant professor of chemistry at MITS, presided over the opening session of the Day-III discussion. He greeted the audience and expressed gratitude to **Prof. Alexei Demchenko, Professor, Department of Chemistry, Saint Louis University, USA,** who was the plenary speaker-II for the conference CGTFD-2024. Dr. K. Raghavendran also provided the audience with an overview of Dr. Alexei Demchenko's academic background through virtual presentations.



In his opening remarks, Prof. Dr. Alexei Demchenko expressed his gratitude to the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle for giving him the opportunity to impart his knowledge in chemical science research and associated fields. He delivered a talk on “From Stereocontrolled Glycosylation to Automated Chemical Synthesis of Glycans” where the strategies for sterocontrolled chemical glycosylation methodologies had been discussed in a detailed way. The lecture was based on the following topic.

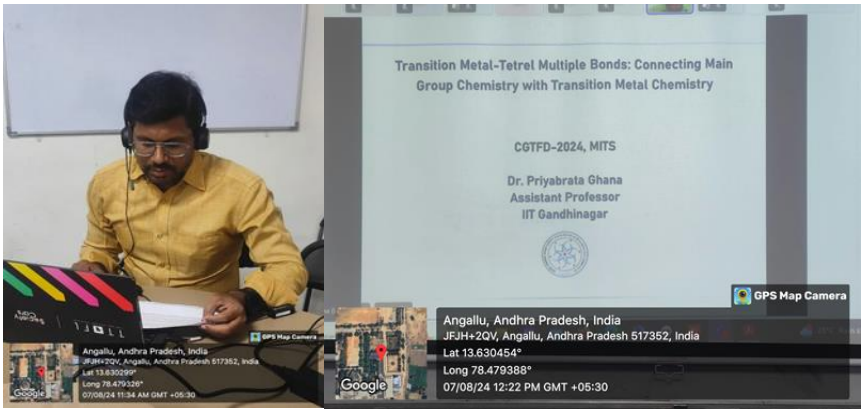
The core of his presentation is the development of new methods, strategies, and technologies for the chemical synthesis of glycans. Chemical glycosylation tools were discussed in light of recent results related to the development of new glycosylation reactions, methods for controlling stereoselectivity, and HPLC-based automated synthesis. The effectiveness of the methods developed were illustrated by the synthesis of glycopharmaceuticals. His work has been generously supported by the National Institutes of Health and the National Science Foundation. Finally, he addressed the participant’s queries.



The second talk of session I started at 10.40 AM. Dr. **K. Raghabendran** introduced the invited speaker **Dr. Satyajit Saha, UGC Assistant Professor, Institute of Chemical Technology, Mumbai, Associate Editor of Organocatalysis (specialty section of Frontiers in Catalysis** & gave a brief account of his academic accomplishments to the participants.
For the opportunity to talk chemical science research and related topics, Dr. Satyajit Saha thanked the audience, the lecture's organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. The topic of the presentation was "Designing Multifunctional Aggregation Induced Emissive Luminogen by Precise Molecular Engineering" He delivered talk about the following topic. Despite the abundance of several types of fluorescent materials like organic dyes, organic-metal complexes, and quantum dots, there is a continuous pursuit of developing fluorescent materials that do not suffer from emission quenching at higher concentrations. The deleterious emission quenching phenomenon known as aggregation-caused quenching (ACQ) greatly restricted the widespread use of fluorophores in concentrated form. Often the diluted fluorophores or dispersed fluorophores at low concentrations result in severe photo bleaching leading to a low target-to-background ratio (TBR), with drastically diminished sensitivity, thereby restricting their applicability. The ground-breaking discovery of the AIE phenomenon by Tang and co-workers in 2001 mitigated the ACQ problem and amplified the global research on small molecule AIEgens for diverse applications like metal sensing, bio imaging, organic light-emitting diodes, nanomaterials, etc. Although challenging, it is of great significance, to regulate the molecular properties of AIEgens precisely by rational molecular designing. Dr. Satyajit Saha discussed how in their research group they have taken up the molecular engineering concept to rationally design multi-functional aggregation induced emissive luminogens.

The opening lecture of the second session (Day-III) was presided over by Dr. V. Raju, Assistant professor, MITS. The session began at 11.40 AM by **Dr. Manav Saxena, Assistant professor of chemistry at CNMS, JAIN University, India,** the invited speaker who was being welcomed and thanked for accepting the invitation by the session chair. The chair also gave the academic background of the speaker to the participants.

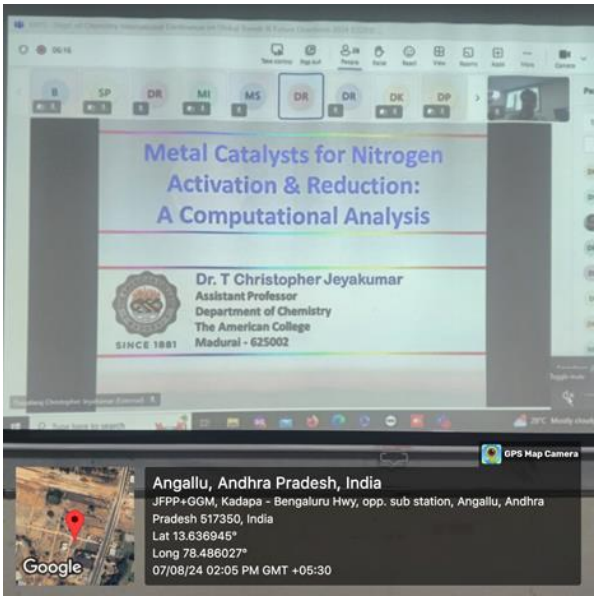
Dr. Manav Saxena expressed his gratitude to the MITS Madanapalle administration, the attendees, the lecture’s organizers, the HOD Chemistry, the Principal, and the Vice Principal for the chance to present his knowledge in chemical science research and associated fields. His session was titled "Fabrication of Large area Ultrathin Co/Ni(OH)2 Flexible Nanosheets: Electrode Material for the Charge Storage and Water Splitting." He discussed about the following topic. Bifunctional electrode materials are highly desirable for meeting increasing global energy demands and mitigating environmental impact. However, improving the atom-efficiency, scalability, and cost-effectiveness of storage systems, as well as optimizing conversion processes to enhance overall energy utilization and sustainability, remains a significant challenge for their application. Herein, we devised an optimized, facile, economic, and scalable synthesis of large area (cm2), ultrathin (<5 nm) electroactive nanosheet of Co(OH)2 and *b*-Ni(OH)2, which acted as bifunctional electrode material for charge storage and oxygen evolution reaction (OER). These electrodes show better activity as compared to their bulk counterpart. Further the rapid miniaturization of portable and wearable electronics and next-generation electronics rely on miniaturized energy storage devices such as “micro-supercapacitor” (MSC) that provide flexibility and portability. Volumetric capacitance is the most significant metric for miniaturized capacitive energy storage units due to the limitations in device volume and active surface area. Herein, we have used a flat 3.5 nm 2D ultrathin Co(OH)2 nanosheet as an electrode material for the flexible, solid-state micro-supercapacitor on micropatterned laser-scribed graphene (LSG) and PVA/KOH gel electrolyte. The present research work opens a new avenue for the simple and scalable manufacture of ultrathin film-based electrode material research.



The second talk of Session II (Day-III) was begun at 12.20 AM and the resource person was introduced by Dr. V. Raju who gave brief introduction about the resource person **Dr. Priyabrata Ghana, Assistant Professor, IIT Gandhinagar**. Dr. V. Raju introduced Dr. Priyabrata Ghana's academic background to the participants through virtual mode.

For the chance to discuss chemical science research and related topics, Dr. Priyabrata Ghana expressed his gratitude to the audience, the lecture organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His talk was titled "Transition Metal-Tetrel Multiple Bonds: Connecting Main Group Chemistry with Transition Metal Chemistry." He discussed about the following topic. The chemistry of compounds featuring triple bonds of the heavier Group-14 elements Si–Pb with transition metals is a very challenging research area, which combines modern molecular main-group elements with transition-metal chemistry and is of fundamental importance for the understanding of chemical bonding. During the last 30 years, the research in this area has witnessed considerable progress in isolating a series of closed-shell heavier tetrylidyne complexes. However, despite numerous attempts, open-shell tetrylidyne complexes with tetrel center unpaired electron and heavier group 14 element congeners of metallacarbynes complexes remained inaccessible. In the first part of this talk, the story of the first open-shell heavier tetrylidyne complexes featuring a tetrel-center unpaired electron (I), and the unprecedented metallasilylidynes (II) containing a multiply bonded, linear-coordinated silicon atom embedded between two metal centers will be presented.

The opening presentation of the third session (Day-II) was led by Dr. Rajaram R. (Asst. Prof, Dept. of chemistry, MITS) at 2.00 PM. **Dr. Christopher Jeyakumar, Department of Chemistry, The American College, Madurai, Tamil Nadu, India** was requested to deliver his talk, and he was welcomed and thanks for accepting our invitation. The participants were also given an overview of Dr. Jeyakumar's academic history by Dr. Rajaram R.

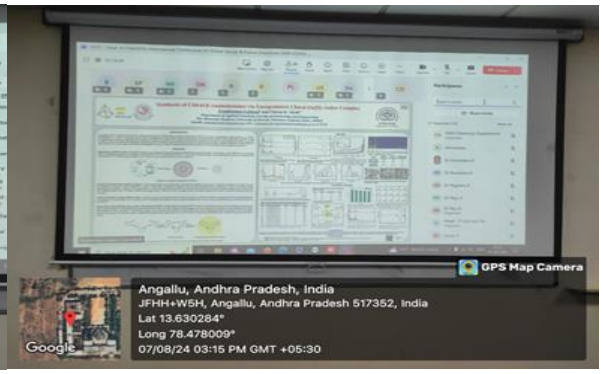


Dr. Christopher Jeyakumar thanked everyone for the opportunity to speak about chemical science research and related topics, including the audience, the lecture organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His title of the talk was "Metal Catalysts for Nitrogen Activation & Reduction." His talk covers the following topic. Ammonia is one of the most highly produced inorganic chemicals in the world, because of its utility as fertilizer, pharma industry, manufacture of nitric acid, nylon, polyamides, dyes, explosives and fuel etc. Therefore, ammonia synthesis becomes more important, the most successful commercialized process for the synthesis of ammonia is the Haber–Bosch process, where the dinitrogen is reduced by dihydrogen in the gas phase under highly drastic reaction conditions using heterogeneous catalysts. Nevertheless, the nitrogenase enzyme converts atmospheric dinitrogen into ammonia at ambient reaction conditions. Several attempts have been made to discover a homogeneous catalyst for the nitrogen reduction into NH3. We have investigated the possibility of conversion of the coordinated dinitrogen into to NH3 and N2H4 using H2 in the presence of Ru-triamidoamine and FLP (Frustrated Lewis pair) under mild experimental conditions. We also attempted to demonstrate the functionalization of coordinated nitride (tpyOs(VI)-nitride) to ammonia using H2 in the presence of

phosphine (Lewis base). We have studied metal borazine's reactivity towards dinitrogen molecules' activation by DFT calculations. We have used the same method to determine the mechanism of ammonia and hydrazine synthesis using a molybdenum bound nitrogen doped graphene as a catalyst.

The resource person of the second talk of Session III (Day-III) was introduced by Dr. Rajaram R. who gave brief introduction about the resource person **Dr. Ugrabadi Sahoo, Assistant Professor, MITS**. The session was begun at 2.40 PM. Dr. Rajaram R. introduced Dr. Ugrabadi Sahoo's academic background to the participants through online.

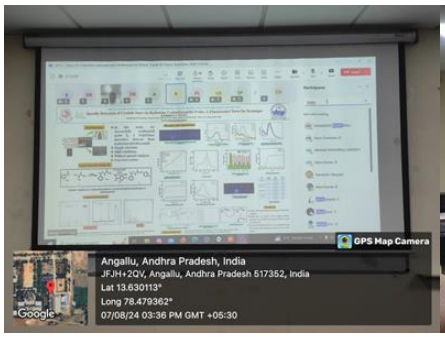
Dr. Ugrabadi Sahoo thanked everyone for the opportunity to speak about chemical science research and related topics, including the audience, the lecture organizers, the HOD Chemistry, the Principal, the Vice Principal, and the Management of MITS Madanapalle. His title of the talk was "Fe based Metal organic frameworks for photocatalytic energy and environmental applications." He discussed about the following topic. His work reports the fabrication of heterojunction between defect induced CeO2 and iron based metal organic framework (MIL-53). A simple chemical redox etching methodology was adopted to narrow the band gap of pristine CeO2 through oxygen vacancy engineering. The photocatalytic efficacy of defect induced CeO2/MIL-53 (MCO-X) heterojunction was studied in Bisphenol A (BPA) breakdown and photocatalytic hydrogen generation from water splitting. The significantly improved photocatalytic application of MCO-X heterojunction could be attributed to the switching of charge dynamics mechanism from Type-1 to Type-II due to defect formation in the pristine CeO2. The optimal photocatalyst (MCO-30) displayed the highest photocatalytic BPA degradation with rate constant (0.045 min−1) and H2 evolution (3286.2 μmol.h−1. g−1) respectively. This study provides a comprehensive analysis on how defect in pristine CeO2 in MCO-X heterojunction can switch the charge transfer mechanism from Type-1 to Type-II to achieve remarkable visible light harnessing capacity and photocatalytic activity. Dr. Ugrabadi Sahoo finally addressed the questions of the audience successfully.

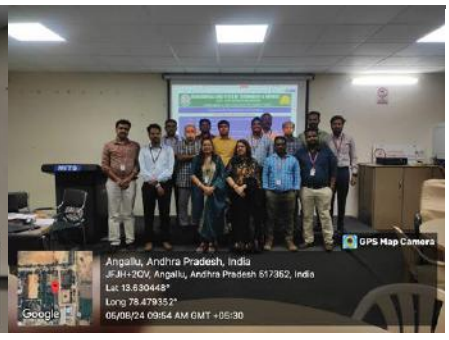


The virtual poster session on Day III began at 3.30 PM. Nine contestants in all displayed their posters. Each competitor gave a presentation of their poster for around 10 minutes, and then the judges took questions for 3 mins to determine which posters were the best. Around 4.30 PM, the poster presentation was finished. At end of the session, Judges finalized the **5 best posters**.

At 4.40 PM, we began the farewell celebration. The HOD Dr. Renjith Bhaskaran gave a few conference-related announcements. Our beloved principal Dr. **C. Yuvaraj** was invited by Dr. **Rashmi Roy** to say a few words and declare the best poster winners of the virtual poster presentation sessions.

In his brief remarks, the principal expressed his gratitude to all the faculty members, participants, and invited speakers. Among the 21 posters displayed in the poster section throughout India and internationally, he declared the best poster winners.





Then, our convener Dr. Rashmi Roy gave a brief vote of thanks to every invited speaker, dignitaries, supporting staffs of MITS, all the attendees and all the faculty members of Dept. of Chemistry. Finally, Convener Dr. Rashmi Roy formally declared the conference closed at 5:30 PM.