

Report on Faculty Development program hosted by department of Chemistry, Central University of Jharkhand (CUJ), Brambe, Ranchi (21st to 26th September)

Opening Day, 21st September:

At the onset, Program Convener Professor Arun Kumar Padhy, who is also Department Head of Chemistry welcomed all the participants.

The inaugural talk was delivered by Professor Ratan Kumar Dey, Honourable Vice chancellor (acting) and Chemistry Professor of CUJ, on the topic “Polymeric Materials in Medical Use”. The presentation started with synthesis and characterization of various classes of polymeric materials and then shifted focus on the application and future potential of polymeric biomaterials in diverse fields like drug delivery, prosthetic implants etc. The intellectually invigorating lecture, which also included cutting edge research done by Professor Dey’s research group set the tone for the week-long program with lectures from distinguished speakers from premier institutes and universities of the country.

The afternoon session lecture was delivered by Dr. Srivari Chandrasekhar, Director, CSIR-IICT, Hyderabad on the topic “Role of Science in covid mitigation: Chemists Perspective”. The contemporary lecture presented various practical synthetic routes of several drug molecules which are being used for the treatment of ongoing COVID pandemic. The lecture also discussed large scale manufacturing of several drug intermediates in the country under the governments “Make in India” initiative which is critical as several key drug intermediates are currently imported from abroad (mainly China). The highlight of the talk was on successful development of the COVID drug Favipiravir by CSIR-IICT scientists in collaboration with pharmaceutical company CIPLA.

Day 2, 22nd September:

Professor Akhil K Sahoo, Univ. of Hyderabad presented talk on the topic “Synthetic Domain to Thioarylated/Selenylated Pyrrole” in the morning session. Several novel methods developed by professor Sahoo’s research group for the synthesis of pyrroles were presented which is an important heterocyclic moiety present in various natural products and drugs. Also, mechanisms of these chemiselective and regioselective transformations which ranges from radical cyclization of ynamides, C-H insertion, gold catalysis were also presented through various experiments and theoretical calculations.

In the afternoon session, Dr. Raja Ram Bal, Indian Institute of Petroleum, Dehradun delivered lecture on the topic “Selective Oxidation Over Nanostructured Catalysts”. The initial part of the talk discussed the importance of eco-friendly and recyclable nanostructured catalyst in organic transformation in large scale. Then recently developed green oxidation of alcohols over silver nanoparticle catalysts supported on various metal oxides like Fe₂O₃, WO₃ etc were discussed. The talk included preparation, characterization of nanostructured catalysts and detail study on their catalytic role in the oxidation of alcohols using H₂O₂ as an oxidant. The talk concluded with the advantages of using newly developed nanostructured catalysts in the high yielding and green oxidation methods.

Day 3, 23rd September:

In the morning session professor Mukut Chakraborty of West Bengal State University presented his lecture on “Atomic Absorption Spectroscopy”. The lecture began with the basic description of atomic absorption spectroscopy before discussing quantum mechanical aspects. Later part of the talk presented application of atomic absorption spectroscopy in various physical, chemical and biological studies.

Professor Pradeepta K Panda of Univ. of Hyderabad presented his lecture on the topic “Chemistry of Porphyrinoids” in the afternoon session. The lecture began with colorful presentation describing role of porphyrin molecules in imparting colors in various biomolecules like hemoglobin, chlorophyll etc. Various electronic, steric and stereo chemical factors in relation to color and metal coordination properties of porphyrinoids were discussed. Then some recent syntheses of porphyrinoids in the Professor Panda’s research group were presented.

Day 4, 24th September:

In the morning session professor Suddhasatwa Basu, Director, CSIR-IMMT, Bhubaneswar presented talk on the topic “Nano Structured Materials for Energy Storage Devices”. The talk described the chemical and structural properties of nanostructures silicon and metal oxides like nickel oxide used in photovoltaic cell and various types of fuel cells.

Professor Bhisma Patel of IIT, Guwahati delivered talk on the topic “Emerging Facets of Nitrogen Centered Radicals” in the afternoon session. The initial part of talk described various types of nitrogen centered radicals, their stability and reactivity. Then some of the recent reaction methodologies based on these radicals including research done by professor patels group were discussed. Several important reactions like C-H activation, remote functionalization, oxidative insertion, heterocycle formation mediated through nitrogen centered radicals along their probable mechanisms were presented.

Day 5, 25th September:

In the morning session, Professor Partha S. Mallick of VIT, Vellore presented on the topic “Application of CNT materials as Interconnects”. The first part of the lecture introduced interconnects in their application in integrated circuits (IC) and integrated chips. Then physical, structural and electronic properties of carbon nanotubes (CNT) which enables them to carry very high currents with essentially no heating were discussed. At the end of the lecture advantages of CNTs over currently used copper interconnects followed by challenges and opportunities of CNTs as interconnects were presented.

In the afternoon session two lectures were presented by the faculty member of the host department. Dr. Partha Ghosh and Dr. Soumen Dey.

Dr. Partha Ghosh, assistant professor delivered the talk on the topic “Air Oxidation in Organic Chemistry”. The talk highlighted the inherent challenges of air oxidation even as having great potential in achieving green and cost effective oxidation. The presentation included discussion on electronic structure

of oxygen and various types of air oxidation reactions. Finally some recent novel air oxidation methods developed by Dr. Ghosh's research group were presented.

Dr. Soumen Dey, assistant professor presented his lecture on the topic "Self propagator combustive synthesis of metal oxide based magnetic nanomaterials for potential application in water treatment". The lecture described recently published research by Dr. Dey's research group on water purification by magnetic nickel oxide and cobalt oxide nanoparticles. Preparation of these metal nanomaterials by combustive method and their characterization were discussed. Then the removal malachite green dye by these magnetic nanomaterials was presented. The highlight of the presentation was a video demonstration of the magnetic properties of these dye removing metal nanomaterials.

Day 6 (Final day), 26th September:

In the morning session Professor Ashok K Mishra of IIT, Madras delivered talk on the topic "Fluorescence Spectroscopy: Origin, Development and Future Trends". The talk began with the discussion on origin and historical developments of Fluorescence Spectroscopy. Then various types of fluorescence phenomenon like confocal fluorescence, multiphoton fluorescence etc was presented. There after some recent developments of Fluorescence Spectroscopy like fluorescence imaging microscopy, white light excitation fluorescence etc and their application in diverse field like biosensors, medical imaging, environmental etc were presented. Finally a recent exciting research done at professor Mishra's research group was presented where dyes obtained from pomegranate fruit was used for the generation of white light upon excitation with ultraviolet light.

Dr. Raj Bahadur Singh, assistant professor of the host department presented a talk on the topic "Total synthesis of illudalane class of natural products". Dr. Singh discussed recently published total synthesis of illudalane natural products Coprinol, Onitin and (\pm)-4, 8, 14-trihydroxyilludala-2, 6, 8-triene. The talk included retro-synthetic analysis, synthetic route optimization and details synthetic step in the total synthesis of the natural products.

Then at 3.00 pm an exam based on lecture presented during the entire weeklong program was held in online mode moderated by Dr. Arvind Lal, Assistant professor and Mr. Simon Sangma, assistant professor from the host department. Thereafter, feedbacks from the participants were collected.

Finally, the Convenor, Professor Arun Kumar Padhy, HoD of Chemistry in his concluding remark thanked all the participants for their enthusiastic participation in the program.

The program ended with vote of thanks by Dr. Partha Ghosh, assistant professor, Department of Chemistry.