



ChemE Chronicles

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DEPARTMENTAL NEWSLETTER*

FROM HOD's DESK

PROF. ADITYA KUMAR

Dear friends and well-wishers,



We feel pleased to present the inaugural issue of our departmental newsletter - **ChemE Chronicles** ! This aims to be the mouthpiece of the Department of Chemical Engineering at IIT (ISM) Dhanbad. We aim to communicate with all our stakeholders - current students, alumni, prospective students, faculty colleagues within Chemical Engineering, colleagues from other departments within and outside the institute, and the society at large, for whom all our educational, research and developmental activities are ultimately meant.

Chemical engineering is a traditional, core engineering discipline, concerned with the science and art of large-scale production of materials, and is innately interdisciplinary in nature. Chemical engineering has a rich tradition in India - it was introduced as early as in 1921 at Jadavpur University, by Dr. H. L. Roy, who is widely regarded as the father of chemical engineering in India. That is truly something to be proud of, as then, chemical engineering was at its infancy, even in the Western world, be it Europe or USA. Since 1960, when Bird, Stewart, & Lightfoot

published their legendary book "Transport Phenomena", chemical engineering curriculum underwent a massive revision across the world, leading to what is known as "chemical engineering science" today.

Today, chemical engineering is perhaps one of the few branches of engineering that has significant overlap with all basic science disciplines (physics, chemistry, biology, mathematics). Not just that, modern chemical engineering is indispensable to solving the grand challenges faced by the world today - clean energy, climate change, clean air & water - the list goes on and on.

In the aforementioned context, **ChemE Chronicles** aims to play a seemingly small yet pivotal role - towards inspiring the future generation of chemical engineers. Each issue of this newsletter will apprise you with key chemical engineering news from around the world. More importantly, we will share news and views from our department, be it the achievements of our students, faculty colleagues, alumni, or the latest workshops and conferences that are being organised here. We hope to receive your wholehearted support!

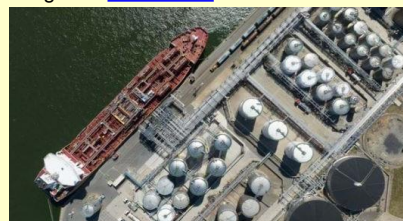
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Chemical Engineering News

Maersk investment group investing EUR 1.5B plant for producing fossil-free plastics from methanol

A new 3,00,000 tonnes/year plant is coming up in Belgium, that will convert methanol into polyethylene & polypropylene. The plant is expected to be operational from 2028 in Antwerp, Belgium. [Read more](#)



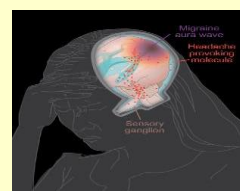
UK invests GBP 22B in CCS clusters and hydrogen projects

The massive investment of 21.7 B would span across 25 years. It has been planned for Teesside and Merseyside in northern England. [Read more](#)



Study reveals brain fluid dynamics as key to migraine mysteries

New research describes, for the first time, as to how a spreading wave of disruption and the flow of fluid in the brain triggers headaches. The study has appeared in a recent edition of *Science* journal. The study throws light on preventing and treating migraines, and strengthening existing therapies. [Read more](#)



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TEACHERS' DAY 2024

On 5th September 2024, i.e., on the occasion of National Teachers' Day, the students of the Department arranged for a celebration to pay tribute to the faculty members of the Department. The event was conceptualized, coordinated, and executed entirely by the students (spearheaded by the masters, doctoral, and postdoctoral scholars of the department). It was truly a cherishable evening - filled with anecdotes from the faculty members and cultural performances by the students. Here are some snapshots of the moments captured during the evening!



Funding

- The Department of Chemical Engineering, in association with the Department of Chemistry & Chemical Biology, has received an approval (with a sanctioned budget of INR 5.61 crores) from the Ministry of Chemicals & Fertilizers, Govt. of India, for setting up a Centre of Excellence in "Coal to Acetylene and Fine Chemicals". Congratulations to Prof. Parthasarathi Das (from Chemistry & Chemical Biology), Prof. Ejaz Ahmad, Prof. Siddhartha Sengupta, and Prof. Aditya Kumar for the same!
- Prof. Aditya Kumar has received funding (as PI) for "Investigation on helium extraction at Bakreswar hot spring, West Bengal; Funding Agency - Mangalswastik Imperial SSR Construction & Development Private Limited, Budget: INR 7.65 lakhs.

Alumni News

- Our alumni Rajan Singh (M.Tech, 2017) and Gaurav Chauhan (B. Tech, 2015) have joined as Assistant Professors in the Department of Chemical Engineering at IIT Indore since May 2024 and June 2024, respectively.

Feature Article

The Impact of AI & ML in Chemical Engineering

- From streamlining industrial processes to unlocking new materials, AI & ML are reshaping how engineers approach challenges and innovate solutions.
- Imagine a chemical plant where every process, from reaction conditions to energy use, is optimized in real-time. AI-driven models analyse vast amounts of data, identifying inefficiencies that would take weeks or months to uncover in general. This means less energy consumption, reduced waste, and faster production cycles—all while lowering operational costs.
- In the realm of materials discovery, AI is accelerating breakthroughs by predicting the properties of catalysts and polymers. This is opening doors to innovations in sustainable energy, biodegradable plastics, and more efficient batteries, all driven by AI's ability to process complex datasets.
- More importantly, the true power lies in blending advanced AI techniques with a rigorous understanding of chemical engineering principles, ensuring that the technologies complement rather than outpace the core knowledge that is essential for the field. This fusion of advanced technology with chemical engineering is paving the way for a smarter, more sustainable future.

PROF. PRIYANKA D. PANTULA



SHORT-TERM PROGRAMME

A six-day short-term programme on "High-efficiency, low-emissions clean coal and carbon capture, utilization, and storage technologies" was organised by the Department of Chemical Engineering & the Department of Mechanical Engineering, IIT (ISM) Dhanbad, under the aegis of Malaviya Mission Teacher Training Programme (MMTTP), UGC, Govt. of India. It was held during 23-28 September 2024 at the OCEP Conference Hall, i2H Building, IIT (ISM) Dhanbad.

The primary objective of this programme was to disseminate among the participants about the recent developments in the areas of high-efficiency, low-emissions (HELE) clean coal and Carbon Capture, Utilization and Storage (CCUS) Technologies, which are absolutely crucial to combat the biggest challenge of our time, i.e. global warming.

The resource persons for this short-term course were experts from both academia and industry. The sessions had experts from Tata Steel, DVC, Maithon Power Limited, IIT Bombay, IIT Kharagpur, Jadavpur University, CMERI Durgapur, etc. The course witnessed participation from both academia and industries.

Prof. A Samanta from the Department of Chemical Engineering was the Course Coordinator for this short-term programme, while Prof. Tanmay Dutta (Dept. of Mechanical Engg.) and Prof. Soumyajit Sen Gupta (Dept. of Chemical Engg.) were the Course Co-coordinators.



ChemE Trivia

- Prof. Frances Arnold, one of the winners of Nobel Prize in Chemistry in the year 2018, is a Professor of Chemical Engg., Bioengineering, and Biochemistry at the California Institute of Technology (Caltech), USA. She obtained her undergraduate degree in mechanical and aerospace engg. from Princeton University, USA.

Upcoming conferences/workshops

- The third edition of the National Conference on "Net-Zero Emission Technologies for Sustainable Development: Challenges and Opportunities" (NOET-2024) is going to be organised during 6-7 December 2024. Convenor: Prof. Aditya Kumar; Co-convenor: Prof. Ejaz Ahmad & Prof. Suresh Kumar Yatirajula
- A three-day workshop on "Concepts of Interfacial Phenomena in Microscale Flows: Theory and Applications" (IPMF-2024) will be organised from 10-12 December 2024. Convenor: Prof. Soubhik Kumar Bhaumik; Co-convenor: Prof. Aritra Santra & Prof. Bidhan Chandra

Publications

1. Srishti, A Kumar. Exploring the viability of anti-microbial, Superhydrophobic jute bags as an approach to sustainable food packaging system. *Food Chemistry* 460 (2024): 140595.
2. P Kumari, K Kumar, A Kumar. In-situ oil-spill remediation by an electrodeposited superhydrophobic copper mesh. *Marine Pollution Bulletin* 204 (2024): 116513.
3. Srishti, Paras, A Kumar. ANSYS Fluent-CFD analysis of a continuous single-slope single-basin type solar still. *Green Technologies and Sustainability* 2 (2024): 100105.
4. H Singhal, SK Pandit, P Kumari, A Kumar. In-situ assessment of the performance of oil-water separation by superhydrophobic coated cotton under extreme conditions. *Marine Pollution Bulletin* 200 (2024): 116062.
5. R Gururani, S K Pandit, P Kumari, A Kumar. Towards the development of one-step scalable self-cleaning and stain-resistant coating on cellulose wood. *Fibers and Polymers* 25 (2024): 1779-1788.
6. M Hazarika, Manoj, DNVV Konda Lutukurthi, V. K. Rai. Photocatalytic activity of Ho³⁺-Yb³⁺ activated BiVO₄ upconverting phosphors. *Journal of Alloys and Compounds* 1002 (2024): 175453.
7. C Nayak, Sudhir, S Sengupta, G Deo. Effect of Contact Time on Carbon Deposition and Catalytic Activity of Nickel Alumina Catalysts for Dry Reforming of Methane. *ChemistrySelect* 9, 27 (2024): e202304841.
8. M. Vanaparthi VSS, S Sengupta. Ni-based Catalyst Development for the Catalytic Conversion of CO₂ to Substitute Natural Gas—Effect of Preparation Method. *Catalysis Letters* (2024): 1-14.
9. PP Singh, P. Athira, S. Kamaliny, K. Ray, S. Sengupta. The pivotal role of oxygen vacancy and surface hydroxyl in the adsorption and activation of CO₂ on ceria-zirconia mixed oxide, *Molecular Catalysis* 555 (2024): 113855.
10. S. Tiwary, S. Saha, G. Sahu, P.D. Chavan, and S. K. Bhaumik. Infusion of Fly Ash/MgO in CaO-based sorbent for high-temperature CO₂ capture: Precursor selection and its effect on uptake kinetics, *Materials Today Sustainability* 27 (2024): 100933.
11. D Ratnam, S K Bhaumik. Functionalized borosilicate-silica-epoxy nanocomposite superhydrophobic coating for corrosion inhibition under harsh environment. *Progress in Organic Coatings* 188 (2024): 108264.
12. S Singh, S K Bhaumik, P K Singh. Experimental investigation of thickness profile in an extended meniscus of thin film evaporation using reflectometry. *Experimental Thermal and Fluid Science* 151 (2024): 111069.
13. S Singh, M Chavhan, P K Singh, S K Bhaumik. Thickness Profile Measurement of a Nanofluid Thin Film Meniscus using Reflectometry. In *Proceedings of the 27th National and 5th International ISHMT-ASTFE Heat and Mass Transfer Conference December 14-17, 2023, IIT Patna, Patna-801106, Bihar, India. Begel House Inc., 2024.*
14. S. Singh, P. K. Singh, S. K. Bhaumik. Magnetic-field induced flattening of evaporating ferro-nanofluid meniscus for enhanced cooling. *International Journal of Heat and Mass Transfer* 218 (2024): 124785.
15. A Oraon, A K Prajapati, M Ram, V K Saxena, S Dutta, A K Gupta. Synthesis, characterization, and application of microporous biochar prepared from *Pterospermum acerifolium* plant fruit shell waste for methylene blue dye adsorption: the role of surface modification by SDS surfactant. *Biomass Conversion and Biorefinery* 14, no. 1 (2024): 931-953.
16. R Kumar, G Swain, S Dutta. Synthesis of visible light-sensitive photocatalysts for hydrogen production. *Fuel* 360 (2024): 130555.
17. R Kumar, R Singh, S Dutta. Review and outlook of hydrogen production through catalytic processes. *Energy & Fuels* 38, no. 4 (2024): 2601-2629.
18. S Prasad, A Kumar, S Dutta, E Ahmad. Chemocatalytic oxidation of 5-hydroxymethylfurfural into 2, 5-furandicarboxylic acid over nickel cobalt oxide. *ChemCatChem*, 2024.
19. A Rajpoot, A A Khan, I Mohan, S Sengupta, E Ahmad. Stoichiometric-Ratio-Controlled Fe and Ni Non-noble Metal Catalysts Supported on γ -Al₂O₃ for Turquoise Hydrogen and Carbon Nanotubes Production. *ChemPhysChem*, 2024.

20. P Kashyap, S F Elahi, M K. Al Mesfer, K. D. P Nigam, E Ahmad. A Comprehensive Review of Physicochemical Properties of Biomass-Derived Oxygenates and Reformulated Gasoline. ChemistrySelect, 2024.
21. G Shrivastav, E Ahmad, T S. Khan, M. A Haider. Customizing reformulated gasoline using biofuel-additives to replace aromatics. Journal of Molecular Liquids, 398 (2024): 124251.
22. A Negi, J Mago, Sunali, A K Kumar, E Ahmad, M A Haider, S Fatima. Effect of pretreatment on the sound absorption performance of cellulosic materials. Waste and Biomass Valorization, 2024.
23. A Negi, Md A Jawed, Md I Alam, M A Haider, S Fatima, E Ahmad. "Techno-economic evaluation and life cycle assessment of biorenewable route to produce high-value aromatics" Book Chapter, in Green Chemistry: Research and Connections to Climate Change, 2024, 10, 13–31.
24. A Rafey, K Pal, K K Pant, E Ahmad, S Upadhyayula. "Introduction to Various Types of Wastes" Book Chapter, in Springer Nature, From Waste to Wealth, 2024, 1-18.
25. A Roy, S Sen Gupta, A Samanta, PVS S Likhith, S K Das. Prospects of energy-efficient power generation system with ammonia as hydrogen carrier. International Journal of Hydrogen Energy 71 (2024): 131-142.
26. N Jada, S K Bhaumik. Hydrodynamics of liquid-liquid parallel flow in novel microextractors: Review. Physics of Fluids 36 (2024): 101308.

Patents

1. S K Pandit, A Kumar. A Biodegradable Water-Repellent Coating for Paperboard Packaging Materials and a process for the preparation thereof. Indian Patent (Patent Application No. 202431069866).
2. Srishti, A Kumar. A water-repellent and biodegradable-polymer enhanced stiff jute-cotton blended (Juco) fabric and a process for the preparation thereof. Indian Patent (Patent Application No. 202431069395).

Editorial Board

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