

Brief Report of the International Symposium on  
“Recent Trends in Sustainability in Chemical Sciences”

held on 16<sup>th</sup> December 2023

Organized by the Department of Chemistry,  
Sri Sathya Sai Institute of Higher Learning

The International Symposium on Recent Trends in Sustainability in Chemical Sciences began with the vedam chanting and ceremonial lighting of the lamp invoking the Divine Presence of Bhagawan Sri Sathya Sai Baba. Prof. Rajni Bhandari, Head, Department of Chemistry delivered the welcome address followed by introductory remarks on the significance of holding the symposium on the theme of sustainability.

Hon’ble Vice-Chancellor Prof. B. Raghavendra Prasad set the tone for the symposium with his inaugural address on the importance of sustainability in chemical sciences in line with the 10 objectives envisioned by the United Nations that have to be fulfilled by 2030. He stressed that concerted efforts by academia, scientists, industry professionals, policymakers, and the public are essential for promoting sustainable practices in Chemical Sciences. Sharing knowledge, best practices, and fostering interdisciplinary collaborations can accelerate the adoption of sustainable solutions. He concluded with Swami's quote - “You have to realize that nature is a manifestation of God. Hence, nature should not be ignored.”

The first speaker of the day, Prof. Somenath Mitra, Executive Director, Otto York Center for Environmental Engineering and Science, Distinguished Professor, Chemistry and Environmental Science, New Jersey Institute of Technology, USA, spoke on “**Sustainability through advanced chemical separations.**” He opined that the process of thermal distillation accounts for over 10–15% of the world’s total energy consumption, spanning chemical industries like petroleum refining, chemical manufacturing, solvent purification, etc. Advanced membrane technologies such as membrane distillation and pervaporation operate at lower temperatures compared to traditional distillation, thereby decreasing the energy requirements for heating and vaporization, and contributing to overall energy efficiency. His group has pioneered the development and production of a membrane-based downstream processing technology utilizing functionalized carbon nanotubes (CNTs). They succeeded in lowering CAPEX thereby proving that biofuel processing and solvent recycling can be a viable industrial practice if the right technology is implemented.

[Dr. Dhurjati Siva Mudigonda](#), Director, Product Development, Pixelle Speciality Solutions, USA, delivered the second talk on **“Sustainable flexible packaging: An overview.”** He reviewed how the packaging industry plays a pivotal role in minimizing its environmental footprint and provided an overview of sustainability in the context of flexible packaging, delving specifically focused on paper-based substrates. Various categories of flexible packaging and their barrier requirements, use of eco-friendly materials such as biopolymers, and recyclability/compostability were analyzed based on criteria of eco-sustainability. He discussed the challenges faced in designing sustainable materials and concluded that focused and motivated research driven by sustainability as the background would be the key to perfectly sustainable materials.

The last speaker for the morning session of the Symposium, [Sri Giri Guruswami](#), Director, Strategic Sourcing, STERIS, USA, presented **“The key challenges for sustainability in the global chemical industry”** as (1) Energy Intensity and usage, (2) CO<sub>2</sub> emission reduction, (3) Sustainable materials, (4) Water and Air pollution. He brought up the criticality of how the chemical industry can be both the engine and the guard of our economy. He spoke at length about the various aspects of sustainability in the chemical industry at a global level. In addition, he stressed on the forecasts for the Indian chemical industry which is projected to reach \$304 billion by 2025, and the market size of the Chemicals and petrochemicals sector in India is expected to grow to \$850-1000 billion by 2040, taking 10-12% share of the global chemicals market. He emphasized upon the importance of adopting sustainable methods and making chemistry clean and green by using renewable feedstocks, green catalysts, solvents, and atom economy.

In the afternoon session, [Prof. R. Gopichandran Professor](#), NTPC School of Business, INDIA, presented **“A case approach to substantiate paradigms for integrated management of chemicals: an ecosystems perspective to tackle local, regional and global scale externalities.”** He explained how the landscape of chemicals management has co-evolved with the growing understanding of earth system resilience. Political economy, the social contract of businesses to tackle externalities, spatial and temporal aspects of impacts, and mitigation are some of the factors dominating the contours of management options. The five important considerations were discussed and an example was presented with insights about the nexus across eight facets of chemical management.

The next speaker was [Dr. Srinivas Oruganti](#), Director, of Dr. Reddy's Institute of Life Sciences, and Head, of the Center for Process Research and Innovation, India. In his talk **“Towards greener lab & sustainability”** he exemplified the world of flow chemistry to the audience in a rather facile manner. He began by stating the importance of innovative and sustainable methods in chemical process development to address the current challenging requirements of the pharmaceutical industry. The advancements in instrumentation and engineering solutions have made it possible for this new technology to permeate into various aspects of chemical research and development at the laboratory level. The talk also showcased the myriads of challenges, breakthroughs, and ultimately, success stories at Dr. Reddy's Institute of Life Sciences, Hyderabad.

[Dr. Raman Vedarajan](#), Scientist, Center for Fuel Cell Technology, ARCI, India, delivered the last talk for the symposium on **“A gateway to sustainable solution through green hydrogen.”** The Importance of Green hydrogen as a pivotal gateway to sustainable solutions across diverse sectors was thoroughly expounded. Hydrogen is a potent game changer, capable of revolutionizing energy production, transportation, and industrial processes without carbon emissions, through processes like (1) decarbonizing heavy industries such as steel and cement, (2) enabling energy storage to balance the grid, (3) powering transportation through hydrogen fuel cells and (4) providing clean energy for residential and commercial applications. The generation, transportation, and utilization are three pivotal arms of the hydrogen economy. The talk wrapped up an expansive, and comprehensive overview of the materials, methods, protocols, and potentials of the green hydrogen economy.

The concluding remarks were presented by [Dr. S. Lakshminath](#), Associate Professor, Prasanthi Nilayam Campus. He summarized the key takeaways from the symposium and reiterated on the imminent necessity of sustainability in chemical sciences. The vote of thanks was delivered by [Dr. Kumar Sai Smaran](#), Assistant Professor, Brindavan Campus, and the symposium ended by offering Mangal Arati to Bhagawan Sri Sathya Sai Baba.