Advances and challenges for sustainable ecosystems

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Developments with respect to sustainable ecosystem has been the topic of importance in the recent years as industrialization had affected the environment and society in an appreciable way. Sustainable ecosystems have direct implications on environment, safety, economic, and society of a country (Mangili and Prata 2020). Life cycle assessment is one major tool that were widely used by industries to assess the sustainability of the processes which provides complete details starting from the environmental impact assessment, raw materials, production, distribution, techno-economic, environmental management, etc. Sustainable indicators and process simulation could be used suitable to obtain sustainability of an industry. Another major issue that concerns the world is the demand of fresh water. Although seawater desalination has been proved to be effective, it too possess drawbacks such as brine water disposal and indirect contribution to greenhouse gas emission effects. Electrodialysis with bipolar membranes is one technology that could treat the brine water discharged from seawater reverse osmosis process (Herrero-Gonzalez et al. 2020). Generating value added products from waste biomass would reduce the solid waste disposal issues at the same time would generate revenue and offer employment improving societal economic crisis (Joglekar et al. 2019). Wang et al. (2018) had shown that nonvolatile memory device can be prepared from biomaterials which may come in a large way sooner replacing the existing electronic devices that had

led to huge e-waste generation. Another important aspect requiring sustainability is water/wastewater treatment wherein by establishing sustainable scenario measurable reduction in energy consumption and construction a composting unit would also reduce the pollution levels (Alizadeh et al. 2020).

This special of the *Environmental Science and Pollution Research* contains selected papers presented in the International conference on Advances and Challenges for Sustainable Ecosystems 2018 (ICACSE 2018) organized by the Department of Chemical Engineering, National Institute of Technology, Tiruchirappalli, India, from 6 to 8 December 2018. The conference was conducted with the theme “Exploring the challenges and opportunities for sustainable ecosystem” keeping in mind of the concept of eco-efficiency defined by World Business Council for Sustainable Development (WBCSD 2006) to create awareness and share the knowledge among the researchers. Based on this theme, conference had aimed to explore the advances on design and operation of chemical plants, development of advanced/novel functional materials and processes, modeling etc. along with focus on interdisciplinary areas. The topics of the papers were chosen with societal focus and conservation of ecosystems. This event had created immense opportunity for young scholars/researchers to interact with experienced delegates and utilized their expertise in the fields of chemical engineering, energy and environmental engineering for sustainable ecosystem.

The conference had attracted as many as 235 papers of which after preliminary scrutiny, 184 papers were accepted for oral presentation and 50 for poster presentation. This conference was conducted in 12 sessions, namely process modeling and simulation, environmental engineering, separation processes, bioenergy, wastewater treatment, nanotechnology, reaction engineering, process control and optimization, energy engineering, transfer operations, materials engineering, and process intensification. The eminent speakers have stressed on the few aspects for the future of sustainable environment, namely,

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conversion of biomass of all sorts into value added chemicals which include HMF, levulinic acid, GVL, acrolein, epichlorohydrin, glycerol carbonate, glycidol, and chemicals based on CO₂ will be the major sources of material and energy production; preparation of renewable transportation fuels from biomass for example, sweet sorghum as an ideal food-cum-bioenergy crop to produce food grains as well as bioethanol/algal oil-based biodiesel/highly valuable process by products like amino acids and polyunsaturated fatty acids; tackling municipal solid waste generation of 2.01 billion which was expected to reach 27 billion tonnes in 2050, and its management especially in the developing nations has become a great challenge due to steep rise in consumption and intensity. To have a sustainable waste management system, the functioning of four drivers (i.e., human, economic, environment, and institutional drivers) has proven to be vital; sustainable hydrate energy technologies has been seen as a future energy resource for innovative applications like carbon capture and seawater desalination.

High-quality research papers emphasizing new developments in pollution control were selected and allowed to upload in the journal portal for the special issue in the journal *Environmental Science and Pollution Research*. Accepted paper after completion of regress reviewing process is published in this special issue.

The organizers of the ICACSE 2018 would like to thank the Chief Editor and the team of this esteemed journal for supporting us to publish high-quality manuscript emerged out of this conference. Also, we would like to thank all the researchers who have shared their research work in our conference.

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His research areas are environmental pollution control, wastewater treatment, advanced oxidation technologies, sonochemical wastewater treatment, nanoparticle synthesis, and biodiesel synthesis processes. He had published several international journals, international conference presentations, and book chapters. He was awarded with a research project from Department of Science and Technology under DST-SERC Fast Track Project for Young Scientist in 2009 and had completed a Ministry of Environment and Forest sponsored research project in 2014. He is a constant reviewer for several international journals. He has been awarded “IEI Young Engineers Award 2013–2014 under Chemical Engineering Division” by the Institution of Engineers (India). To his credit, he has guided three Ph.D.’s and guiding several Ph.D.’s.

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