

Preface

Energy demand has been rising remarkably due to increasing population and urbanization. Global economy and society are significantly dependent on the energy availability because it touches every facet of human life and its activities. Transportation and power generation are major examples of energy. Without the transportation by millions of personalized and mass transport vehicles and availability of 24×7 power, human civilization would not have reached contemporary living standards.

First International Conference on ‘Sustainable Energy and Environmental Challenges’ (SEEC-2017) was organized under the auspices of ‘International Society for Energy and Environmental Sustainability’ (ISEES) by the ‘Center of Innovative and Applied Bioprocessing’ (CIAB), Mohali, from February 26 to 28, 2017. ISEES was founded at IIT Kanpur in January 2014 with an aim of spreading knowledge in the fields of energy, environment, sustainability, and combustion. The Society’s goal is to contribute to the development of clean, affordable, and secure energy resources and a sustainable environment for the society and to spread knowledge in the above-mentioned areas and spread awareness about the environmental challenges, which the world is facing today. ISEES is involved in various activities such as conducting workshops, seminars, conferences in the domains of its interests. The Society also recognizes the outstanding works done by the young scientists and engineers for their contributions in these fields by conferring them awards under various categories.

This conference provided a platform for discussions between eminent scientists and engineers from various countries including India, USA, South Korea, Norway, Malaysia, and Australia. In this conference, eminent speakers from all over the world presented their views related to different aspects of energy, combustion, emissions, and alternative energy resource for sustainable development and cleaner environment. The conference started with four mini-symposiums on very topical themes, which included (i) New Fuels and Advanced Engine Combustion, (ii) Sustainable Energy, (iii) Experimental and Numerical Combustion, and (iv) Environmental Remediation and Rail Road Transport. The conference had 14 technical sessions on topics related to energy and environmental sustainability and a

panel discussion on ‘Challenges, Opportunities and Directions of Technical Education and Research in the Area of Energy, Environment and Sustainability’ to wrap up the three-day technical extravaganza. The conference included 2 plenary talks, 12 keynote talks, 42 invited talks from prominent scientists, 49 contributed talks, and 120 posters. A total of 234 participants and speakers attended this three-day conference, which hosted Dr. V.K. Saraswat, Member NITI Ayog, India, as a chief guest for the award ceremony of the ISEES. This conference laid out the road map for technology development, opportunities, and challenges in this technology domain. The technical sessions in the conference included Advances in IC Engines and Fuels; Conversion of Biomass to Biofuels; Combustion Processes; Renewable Energy: Prospects and Technologies; Waste to Wealth-Chemicals and Fuels; Energy Conversion Systems; Numerical Simulation of Combustion Processes; Alternate Fuels for IC Engines; Sprays and Heterogeneous Combustion of Coal/Biomass; Biomass Conversion to Fuels and Chemicals—Thermochemical Processes; Utilization of Biofuels; and Environmental Protection and Health. All these topics are very relevant for the country and the world in the present context. The society is grateful to Prof. Ashok Pandey for organizing and hosting this conference, which led to germination of this series of monographs, which included 16 books related to different aspects of energy, environment, and sustainability. This is the first time that such voluminous and high-quality outcome has been achieved by any society in India from one conference.

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This monograph is intended for researchers working in the field of solar energy, and we hope that the book would be of great interest to the professionals and postgraduate students involved in the study of solar thermal collectors, energy

storage systems (using phase change materials), and power generation using solar energy. The main objective of this monograph is to promote a better and more accurate understanding of the various applications of solar energy.

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