

Preface

The International Energy Agency has forecasted that the energy demand may increase by about 50 % until the year 2030. Currently, most of our energy demands are met by fossil fuels which have energy share of more than 75%. However, the energy production from fossil fuels pose two major challenges namely, scarcity of fast depleting resources and the problem CO₂ emission leading to climate changes. Therefore, there is a worldwide concern and efforts to produce energy from renewable sources such as sun, wind, tides and bio mass. Scientists also look upon nanoscience and nanotechnology to prepare new materials and to develop new alternative technologies for energy production and storage which are cost effective and energy efficient.

With the help of nanostructures, it is possible to carry out band gap engineering in semiconductors to fabricate solar cells of higher efficiency. The application of nano technology has seen novel and steep developments in energy production and storage devices such as fuel cells, batteries and supercapacitors which offer higher life cycles. The success of these latter devices depends on optimized electrode materials and electrolytes. With the advent of sophisticated deposition systems and characterization techniques at nano-level, researchers are able to produce thin film based energy production and storage devices of improved efficiency. These technologies are not only low temperature processes but also cost effective and well automated for mass production.

The research articles of this book were part of the papers presented in the International Conference on “**Nanoscience and Nanotechnology for Energy Applications (EApp-2016)**” organized by the Centre for Nanoscience and Nanotechnology, Sathyabama University, Chennai in association with Institute Jean Lamour, University of Lorraine, France from 27th June to 29th June 2016. The Conference received papers on solar cells, fuel cells, batteries, supercapacitors, bio-energy, advanced materials for energy conversion, synthesis of nanomaterials and characterization. The Conference had 27 speakers from India, France, Scotland, China, Singapore and South Korea with 6 keynote lectures, 21 invited lectures and papers were presented in 16 parallel sessions and 1 poster session.

The current book contains 32 selected articles of different topics of energy research. We hope that these articles would benefit young researchers to understand the current scenario in the synthesis and characterization of materials used in the energy production and storage.

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