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Editorial

Intelligent Materials for Solar Cells

Surya Prakash Singh[1] and Ashraful Islam[2, 3]

[1] *Inorganic & Physical Chemical Chemistry Division, CSIR-Indian Institute of Chemical Technology, Hyderabad 500607, India*
[2] *Photovoltaic Materials Unit, National Institute for Materials Science (NIMS), 1-2-1 Sengen, Ibaraki, Tsukuba 305-0047, Japan*
[3] *Center of Excellence for Research in Engineering Materials (CEREM), College of Engineering, King Saud University, Riyadh 11421, Saudi Arabia*

Correspondence should be addressed to Surya Prakash Singh, singhspiict@gmail.com

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Globally, the growth rate of the human population is increasing; therefore, there is a huge demand of energy to fulfill their requirements like vehicles, TVs, computers, ACs, and so forth. This causes global warming. Therefore, CO_2-free energy is an emergent issue. In this context, solar energy is an alternate of fossil fuels. Dye-sensitized solar cells (DSSCs), organic thin-film solar cells, quantum dot solar cells, schottky solar cells, inorganic-organic heterojunction solar cells, and many others have been developed as an efficient, low-cost technology during the last years.

In dye-sensitized solar cells, the sensitizer is one of the key components for high power conversion efficiency. Among various organic/inorganic dyes, the most successful charge transfer sensitizers should be credited to black dye, N3 dye, and N719 dye. Dye-sensitized solar cells based on ruthenium complexes have broad absorption spectra extending into the near-IR region and produce solar-to-electrical energy conversion efficiencies of up to 11% under AM 1.5 irradiation. In order to improve the performance of solar cells, the sensitizer should absorb photons in the near-IR region as well as over the entire visible region of the solar spectrum, and long-term stability is another serious issue. To further improve the efficiency of dye-sensitized solar cells device, our main focus lies in the development of new sensitizers with a good spectral match with the solar emission.

This special issue contained high-quality research work addressing the latest innovations in nanomaterials research focused on solar cells, and synthetic nanomaterials considering the importance of light-harvesting materials in the design of novel generation of solar cells and smart nanomaterials.

We hope that this collection of papers will be a source of ideas and motivation for scientists across different fields in academia and industry to continue further research on organic solar cells.

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Surya Prakash Singh
Ashraful Islam