



Recent advances on organic solar cells based on non-fullerene acceptors: materials and device optimization

Ganesh Datt Sharma

Department of Physics, The LNM Institute of Information Technology, India

Abstract:

Organic solar cells (OSCs) consist of a bulk heterojunction (BHJ) active layer of carbon-based donor (D) and acceptor (A) materials, have many environmental advantages compared to other inorganic counterparts' technologies. Moreover, OSCs can be manufactured through low cost printing technology on flexible substrates and have short pay-back time. In addition, OSCs can be made of different colors and semitransparent or transparent offering unique application, i.e. building integration and green houses. Early progress in OSCs are mainly based on fullerene derivatives (PC61BM or PC71BM) and achieved overall Power conversion efficiencies (PCEs) of around 11%, using either conjugated polymer or small molecule as donor component BHJ active layer [1]. However, fullerene derivatives suffer from several drawbacks, such as weak absorption in visible region of the solar spectrum, high synthesis costs, limited tailoring of energy levels and high voltage loss. As a consequence, it is not possible to improve the PCE of fullerene devices further. In an effort to overcome these obstacles, in the past two years a great deal of attention has been paid to the development of non-fullerene acceptors (NFAs), especially small molecule acceptors (SMA) [2]. After the limited time of research work on the designing of new SMA, the overall PCE of more than 16% [3-5] and 17 % [6] have been achieved for single junction and tandem based structures, respectively, and are on the road to the commercial reality.

Biography:

Prof. Ganesh Datt Sharma is working as Senior Professor of Physics and Dean (Research and development) at The LNM Institute of Information Technology (Deemed University), Jaipur (Raj.), India since Nov, 2015. Prof. Sharma obtained his Ph.D. degree from India Institute of Technology in 1985 and after than he had joined as Assistant Professor at JNV University, Jodhpur (Raj), India in Nov 1985. After than he had appointed as Professor of Physics and Electronics in 2004, in same



university. In 1990 he was awarded a prestigious BOYCAST Fellowship by Department of Science and Technology, Government of India in 1990 to work as Visiting Scientist at Department of Electrical and Computer Science, The state University of New Jersey for two years. His area of Research is Organic solar cells, nanocrystalline organic-inorganic hybrid solar cells and fuel cells, organic electronics and nanomaterials for energy conversion and storage. He has delivered many invited/plenary lectures in many International conferences in India and abroad. Subject expert in project advisory committee, Department of Science and Technology, Govt of India, DRDO, Government of India. He is Subject expert: European commission for project evaluation, Russian Science foundation, Moscow.

Recent Publications:

- Sharma G.D, Am J Trop Med Hyg. 2020
- Sharma G.D, Physiol Res. 2019
- Sharma G.D, Phys Chem Chem Phys .2017
- Sharma G.D, Phys Chem Chem Phys .2016
- Sharma G.D, Protein Cell. 2012

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