Tayebeh Ameri, J Nucl Ene Sci Power Generat Technol 2017, 6:3(Suppl)
DOI: 10.4172/2325-9809-C1-002

Ternary sensitization of organic solar cells: A multifunctional concept to boost power conversion efficiency

Tayebeh Ameri
University of Erlangen-Nuremberg, Germany

During the last 10 years, organic photovoltaics (OPVs) have evolved from an early research effort to a major main stream research field and a tremendous progress has been made in the synthesis and production of organic solar cells. Compared to inorganic solar cells, organic photovoltaics offer many advantages, such as low cost, high throughput production, flexible devices, and lightweight products, as well as custom-designed colors. On the down side, OPVs still have significantly lower efficiency values and lifetime expectations as compared to their inorganic counterparts. To boost the efficiency, different strategies have to be developed in parallel. Recently, we have centered our research on an elegant alternative approach to overcome the photocurrent and the performance limitation of polymer: Fullerene solar cells in a simple single-junction structure by implementing a sensitizer with complementary absorption profile into the host matrix. To boost near infrared light harvesting, we investigate different semiconductor systems such as low bandgap polymers, small molecules, dye compounds as well as hybrid and inorganic nanoparticles/nanostructures. We carry out in-depth investigations on how the structural properties of the host system as well as the sensitizer will be influencing the microstructure formation and the functionality of ternary systems. To illuminate on the modified recombination mechanisms in ternary systems, we also investigate the charge or energy transfer and charge transport between the constituent components. Finally based on our understanding of these key issues, we engineer multi-composites such as to guarantee spectrally broad absorption, to maximize open circuit voltages and to reduce parasitic loss mechanisms like non-radiative recombination. In this presentation, we discuss our highlight achievements on the aforementioned topics with a central focus on the fundamentals of microstructure and charge transport.

Biography

Tayebeh Ameri is a Senior Researcher in the group of Prof. Brabec in the Institute of Materials for Electronics and Energy Technology (i-MEET) at the Friedrich Alexander University Erlangen-Nürnberg, where she leads the ternary sensitization team and carries out her Habilitation. She studied Physics and Solid State Physics at Isfahan University of Technology and Ferdowsi University of Mashhad in Iran, respectively. After her Master's study, she joined Konarka GmbH Austria and received her PhD in Engineering Sciences from Johannes Kepler University Linz in 2010. Her main research interests include investigation and development of organic and hybrid optoelectronic device. She has published over 100 articles in this field in reputed journals.

tayebeh.ameri@fau.de

Notes: