

Photoinduced charge separation and carrier transport: the role of molecular structure and conformation on solar energy conversion

Elizabeth von Hauff
Organic photovoltaics & Electronics,
Institute of Physics, Albert-Ludwigs University of Freiburg

Organic semiconductors are interesting materials for creating thin layers with good opto-electronic properties for electronics, including devices for solar energy conversion. Molecular structure and thin film morphology play complex roles in determining the efficiency of organic photovoltaics, by mediating processes such as photoinduced charge transfer and carrier transport. For sophisticated devices like solar cells, understanding correlations between these physical processes is a prerequisite to create high performance applications. In this talk I will introduce the key principles in organic photovoltaics. Factors which limit performance, such as the low intrinsic carrier mobilities in organic semiconductors and inherent instabilities in materials and at device interfaces, will be discussed. Strategies to successfully implement doping to induce electronic order enhanced carrier transport in disordered organic films will be presented. Impedance spectroscopy is implemented as a method to investigate electronic states, and localise carrier trapping in multi-layer systems.

[1] M. Hallermann, E. Da Como, J. Feldmann, M. Izquierdo, S. Filippone, N. Martin, S. Jüchter, E. von Hauff, *Appl. Phys. Lett.*, 97 (2010) 023301

[2] A. V. Tunc, A. De Sio, D. Riedel, F. Deschler, E. Da Como, J. Parisi, E. von Hauff, *Org. Electron*, 13 (2012) 290-296

[3] B. Ecker, J. Nolasco, J. Pallarés, L. Marsal, J. Posdorfer, J. Parisi, E. von Hauff, *Adv. Funct. Mater.*, 21 (2011) 2705–2711