

HL 34: Invited Talk Elizabeth von Hauff

Time: Tuesday 9:30–10:00

Location: POT 081

Invited Talk

HL 34.1 Tue 9:30 POT 081

Influence of molecular structure, conformation and morphology on the performance of polymer solar cells — ●ELIZABETH VON HAUFF — Physics of Energy, Department of Physics and Astronomy, Vrije Universiteit Amsterdam, The Netherlands

Organic semiconductors offer vast potential for low cost, flexible energy production. The polymer-fullerene bulk heterojunction solar cell is the most widely investigated type of organic solar cell. The extended donor-acceptor interface facilitates efficient charge transfer while providing pathways for carrier transport for the extraction of photocurrent at the contacts. One major challenge for improving device performance is to understand how key processes at the molecular scale and between material interfaces determine device performance in these complex systems. In this talk, the influence of molecular structure, conformation and morphology on the performance of polymer solar cells is discussed. The photocurrents in these devices are inherently limited by the poor

electrical properties of the organic active layer. Strategies to tune carrier transport in the active layer, such as molecular doping and nanomorphological manipulation [1,2], are presented. In operational devices, interfacial phenomena, such as electrical losses between the active layer and contact materials, are significant in determining solar cell performance and solar cell lifetime. Impedance spectroscopy [3,4] is a useful technique to probe the electrical properties of solar cells at different operational points in the current-voltage characteristics, and isolate materials and interfaces which limit performance.

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

[2] A. V. Tunc, A. Giordano, B. Ecker, E. Da Como, B. J. Lear, E. von Hauff, *J. Phys. Chem. C*, 117 (2013) 22613

[3] B. Ecker, J. Nolasco, J. Pallares, L. Marsal, J. Posdorfer, J. Parisi, E. von Hauff; *Adv. Funct. Mat.* 21 (2011) 2705-2711

[4] B. Ecker, H.-J. Egelhaaf, R. Steim, J. Parisi, E. von Hauff; *J. Phys. Chem. C*, 116 (2012) 16333-16337