Functional Thiophene-Based Nanomaterials for Organic Photovoltaic

Peter Bäuerle

Institute of Organic Chemistry II and Advanced Materials,
University of Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany
E-mail: peter.baeuerle@uni-ulm.de

Oligo- and polythiophenes represent an important class of compounds in the field of organic materials and have successfully been used as active components in organic solar cells (OSC). Their main strength lies in their excellent optoelectronic properties and as well in their good charge transport properties, which are crucial for most applications.[1]

On the basis of oligothiophenes, we are currently synthesizing and investigating novel organic semiconductors, which are applied in various types of organic solar cells.[2] In this respect, acceptor-substituted oligothiophenes have been further developed and tuned with respect to their electrooptical and self-organization properties. Efficiencies in vacuum-processed small molecule organic solar cells could be increased to record values of 6.9% for single junction cells. X-ray structure analyses guide the understanding how intermolecular interactions in the bulk correlate with device performance.[3]

References:

[1] Mishra, A.; Ma, C.-Q.; Bäuerle, P. *Chem. Rev.* **2009**, *109*, 1141-1278 (Functional Oligothiophenes: Molecular Design for Multi-Dimensional Nanoarchitectures and their Applications).

[2] Mishra, A.; Bäuerle, P. *Angew. Chem. Int. Ed.* **2012**, *51*, 2020-2067 (Small Molecule Organic Semiconductors on the Move – Promises for Future Solar Energy Technology).

[3] Fitzner, R.; Elschner, C.; Weil, M.; Uhrich, C.; Körner, C.; Riede, M.; Leo, K.; Pfeiffer, M.; Reinold, E.; Mena-Osteritz, E.; Bäuerle, P. *Adv. Mater.* **2012**, *24*, 675-680 (Interrelation between Crystal Packing and Small-Molecule Organic Solar Cell Performance).