

Functional Fullerenes for Solar Energy Conversion

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Interpenetrating blends of semiconducting polymers and functionalized fullerenes have emerged as promising materials for photovoltaic devices [1]. Upon photoexcitation, an ultrafast electron transfer from the polymer (the electron-donor component, D) to the fullerene (electron-acceptor, A) takes place. The process is reversible, metastable with a quantum yield close to 100%. In particular, highly soluble, functionalized conjugated polymers and fullerene derivatives have been employed for the preparation of highperformance plastic solar cells that, recently, reached power conversion efficiencies of 2.5% under AM1.5 illumination [2]. In this contribution the performance of solar cells based on novel functionalized fullerenes and polythiophenes will be presented. Optimization of the D/A interpenetrating network morphology and expansion of the fullerene absorption spectral region were pursued for enhancing charge generation and transport and matching the solar spectrum respectively.

[1] C.J. Brabec, N.S. Sariciftci *Monatshefte Chem.* **2001**, 132, 421 and references cited therein.

[2] S.E. Shaheen, C.J. Brabec, N.S. Sariciftci, F. Padinger, T. Fromherz, J.C. Hummelen *Appl. Phys. Lett.* **2001**, 78, 841.