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Doping Kinetics of Organic Semiconductors and Wavelength Resolved ODMR

Organic semiconductors offer advantages over their inorganic counterparts such as light weight, partial transparency and flexibility. Moreover, production costs can potentially be lower due to the solubility of organic semiconductor materials which enables device production through printing. Despite major investigations and developments over the recent years, the fundamental doping mechanisms of organic semiconductors are not yet fully understood which is reflected in low doping efficiencies [1, 2]. In this work, doping kinetics in solution were examined with quantitative electron paramagnetic resonance (EPR) spectroscopy on the model polymer Poly(3-hexylthiophene) (P3HT) doped with the strong Lewis acid tris(pentafluorophenyl)borane (BCF). It is found that doping already occurs in solution with slow kinetics and is accelerated with light. In the second part, an optically detected magnetic resonance (ODMR) spectrometer was implemented into an existing EPR setup.

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[2] P. Pingel, M. Arvind, L. Kölln, R. Steyrleuthner, F. Kraffert, J. Behrends, S. Janietz, and D. Neher, *P-Type Doping of Poly(3-hexylthiophene) with the Strong Lewis Acid Tris(pentafluorophenyl)borane,* Advanced Electronic Materials **2**, 1 (2016).