

# Synthesis of Perylene-Monoimide-Phenylene-Perylene-Monoimide Acceptors and their Application in Non-Fullerene Solar Cells

Bettina Schweda, Stefan Weber, Matiss Reinfelds, Gregor Trimmel

Institute for Chemistry and Technology of Materials, Graz University of Technology,  
8010 Graz, Austria

In the last years, non-fullerene acceptors (NFAs) for organic photovoltaics have gained large attention due to their easier synthetic access and superior photochemical properties when compared to fullerene-based acceptors. We present our work on novel acceptor-donor-acceptor type NFAs based on central benzene ring flanked with two or three perylene monoimides (Figure 1).

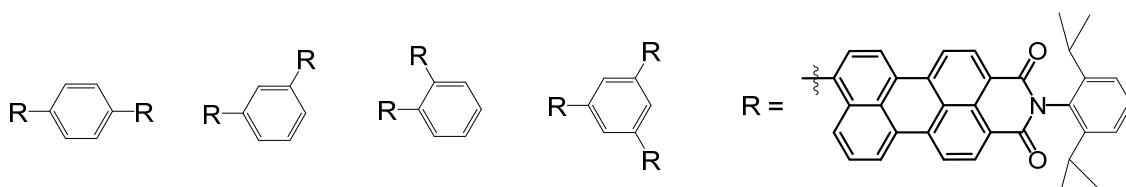


Figure 1: Perylene monoimides tested in this study.

We prepared series of compounds using simple synthetic procedures with Suzuki coupling as the key step. The molecular design was guided by DFT computations. The properties of the obtained NFAs were characterized using optical spectroscopy and electrochemical techniques. These compounds were tested in a combination with suitable donor polymers in bulk heterojunction type organic solar cells. To that end, optimization of coating methods and testing of different device architectures was done. The (photo-)electrochemical characterization of the solar cells identified the most promising perylene monoimide for further studies.