

**Electronic properties of interfaces with conjugated polymers and polyelectrolytes**

The project focuses on polymer interfaces that are of *direct relevance* for organic photovoltaic cells (OPVCs), their function and efficiency. Our goal is to provide a complete understanding of the energy levels at all interfaces that occur in polymer/polymer heterojunction photovoltaic cells (i.e., donor polymer/anode, donor/acceptor and acceptor polymer/cathode interfaces) and how these energy levels influence the OPVC energy conversion efficiency. In the third project phase, these interfaces comprise new naphthalene diimide-based acceptor copolymers and also conjugated polyelectrolytes for a novel scheme of improved electron extraction, available through collaboration with the Scherf group (Uni Wuppertal) within this priority program. Using ultraviolet and X-ray photoemission spectroscopy as key experimental methods we will determine all relevant interfacial energy levels with the goal of revealing (i) the influence of polymer donor/acceptor interfacial electric fields due to energy level pinning and (ii) the energy level alignment mechanisms at acceptor polymer and polyelectrolyte interfaces. Our results will be used, in combination with OPVC characterization, to test existing device models, and to provide a reliable parameter base for improved understanding of device function. This work is performed in close cooperation with the project of Neher/Scherf (Uni Potsdam/Uni Wuppertal) which employs the same donor and acceptor polymers, as well as the conjugated polyelectrolytes, for OPVC fabrication and characterization. These concerted efforts will provide knowledge of the elementary physical properties of polymer interfaces and will thus lead to a significant advance in the understanding of elementary processes of organic photovoltaics.