

“Lifetime and Stability of Organic Solar Cells”

Organic photovoltaic (OPV) is an emerging economically competitive photovoltaic technology that has advantages over conventional inorganic PV technology including low fabrication cost, lightweight, semi-transparency and mechanical flexibility. Despite these advantages, OPVs have comparably low power conversion efficiencies and rather short lifetimes, which are the most critical factors hampering their application. In order to overcome these barriers and close the gap between laboratory achievements and industrial scale requirements, a detailed understanding of the device degradation mechanism is required. Charge transfer (CT) states, representing intermediate states between exciton dissociation and recombination at donor-acceptor interface, play hereby a crucial role.

The main purpose of this PhD project, as part of the FP7 ITN network THINFACE, is to study the degradation mechanism and charge transfer loss, taking place at the donor-acceptor heterointerface. We established some new methods for obtaining information about charge-transfer states in organic solar cells, which is a fundamental need for gaining a deeper insight into the physical working principle of the cells, here including also device efficiency and stability, which is strongly related to the aim of this PhD work. These investigations are done by means of sensitive external quantum efficiency and electroluminescence measurements, as well as surface-sensitive microscopy techniques.