

In-situ study of printed active layers of conjugated polymers and small acceptor molecules for application in high-efficiency organic solar cells

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Recent research in organic photovoltaics focuses on identifying new high-efficiency polymers and acceptor molecules to reach high power conversion efficiencies (PCEs). To date, a PCE of 13% could be obtained with a PBDB-T-SF: IT-4F based organic solar cell device. However, towards commercialization, the solar cell performance must be optimized and an up-scale of the thin layer deposition is necessary. Printing of the active layer of organic solar cells can overcome the up-scale challenge. In-situ grazing incidence small angle X-ray scattering (GISAXS) during printing provides fundamental knowledge to better understand the drying kinetics and structure formation mechanism during printing. Characterization techniques such as UV/Vis spectroscopy, photoluminescence, optical microscopy and scanning electron microscopy (SEM) are applied after printing to get a deeper insight into the composition and morphology of the active layer of the printed films with the aim to further improve the solar cell efficiencies.

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