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Printed films of conjugated high-efficiency polymers and small acceptor molecules

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Organic Solar Cells are a promising alternative to conventional silicon-based devices as they offer several potential advantages e.g. low weight, high mechanical flexibility and low-cost production. Resent research focuses on identifying new high-efficiency polymers and acceptor molecules to reach high power conversion efficiencies.
To date, a Power Conversion Efficiency of 13% could be obtained with a PBDB-T-SF: IT-4F based organic solar cell device. The fluorinated conjugated polymer PBDB-T-SF acts as a donor whereas the fluorinated small molecule IT-4F acts as an electron acceptor. Both molecules are promising for photovoltaic applications as they show higher absorption coefficients, higher efficiency in exciton separation and charge transport as well as enhanced chemical stability as compared with their non-fluorinated counterparts.
With a view to commercialization, the solar cell performance must be optimized and an up scale of the thin layer deposition is necessary. Printing of the individual layers of the solar cells can overcome the up-scale challenge.

Characterization techniques such as UV/Vis spectroscopy, photoluminescence as well as X ray and neuron scattering methods such as GISAXS/GIWAXS and GISANS/GIWANS can be applied 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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