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Ultrafast Excited state dynamics of a direct heteroarylation derived bithiophene-isoindigo copolymer and application in inverted ITO free solar cells.

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Abstract content
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A low band gap copolymer ($E_g = 1.6\text{ eV}$) with bithiophene as a donor and isoindigo as an acceptor units was designed and synthesized by direct heteroarylation method. Absorbance of the polymers spans from 300nm to 780nm with a deeper HOMO level of -5.42 eV and LUMO level of -3.72 eV . It exhibits absorption coefficient (ϵ) as high as 96 L/g cm in solution at its maxima. Steady state spectroscopy measurements showed solvent polarity independent absorption but the emission spectra was red shift with increasing solvent polarity. Femtosecond-transient absorption measurement in solution showed the presence of intramolecular charge transfer state (ICT) in the relaxation of the polymer in monodisperse system. The intersystem conversion to generate the ICT state was as fast as 2ps. Inverted ITO free solar cells were prepared in bulk heterojunction with PCBM71 and moderate efficiency of 1.02% with high open circuit voltage of 0.81V was obtained.

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Heinrich Schwoerer

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