

Photo-crosslinkable Electroactive Polymers for Efficient Thermally Stable Organic Photovoltaics

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We report a new series of functionalized polythiophene (PT-x) copolymers for use in solution processed organic photovoltaics (OPVs). PT-x copolymers were synthesized from two different monomers, where the ratio of the monomers was carefully controlled to achieve a UV photo-crosslinkable layer while leaving the π - π stacking feature of conjugated polymers unchanged. Photo-crosslinkable PT-x was demonstrated as effective electron donors in OPVs. The crosslinking stabilizes PT-x/PCBM blend morphology preventing the macro phase separation between two components, which lead to OPVs with remarkably enhanced thermal stability. The drastic improvement in thermal stabilities is further characterized by microscopy as well as grazing incidence X-ray scattering (GIXS). Our novel photo-crosslinkable materials have opened up an attractive way to achieve efficient bilayer devices, in which the fundamental study of photophysics, charge generation and transport across well-defined interface can be achieved.