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Photo-crosslinkable Polythiophenes for Efficient Thermally Stable Organic Photovoltaics BUMJOON KIM, KAIST and UC Berkeley, YOSHI MIYAMOTO, BIWU MA, JEAN M.J. FRECHET, UC Berkeley — We report a new series of bromine-functionalized poly(3-hexylthiophene) (P3HT-Br) copolymers for use in solution processed organic photovoltaics (OPVs). P3HT-Br 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 $\pi - \pi$ stacking feature of conjugated polymers unchanged. Photo-crosslinkable P3HT-Br was demonstrated as effective electron donors in OPVs. The crosslinking stabilizes P3HT-Br/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). The use of these copolymers for solution processed efficient bilayer PVs is also described. Benefited from the little disturbance in $\pi - \pi$ stacking by crosslinkable units as evidenced in GIXS, P3HT-Br/PCBM bilayer device shows high power conversion efficiency at over 2.2% and excellent thermal stability.

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