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The role of donor-acceptor intermixing in the performance of polymer-polymer OPVs ELENI PAVLOPOULOU, STEPHANIE LEE, CHANG SU KIM, YUEH-LIN LOO, Department of Chemical and Biological Engineering, Princeton University, ZHIHUA CHEN, ANTONIO FACCHETTI, Polyera Corporation, MICHAEL F. TONEY, Stanford Synchrotron Radiation Lightsource — We investigated the effect of donor-acceptor intermixing in bulk-heterojunction active layers on device performance of polymer-polymer organic photovoltaics (OPVs). Poly(3-hexylthiophene) (P3HT) was blended with poly{[N,N'-bis(2-octyldodecyl) -naphthalene-1,4,5,8-bis(dicarboximide)-2,6-diyl]-alt-5,59-(2,29-bithiophene)} (PNDI) and P3HT/PNDI films were spin-cast from dichrolobenzene, a good solvent for PNDI; chlorobenzene, a good solvent for P3HT; and xylene, a bad solvent for both. The short-circuit current densities and device efficiencies vary with casting solvent quality; devices with active layers cast from xylene exhibit the highest efficiencies while those cast from dichlorobenzene the lowest. Grazing Incidence X-ray Diffraction show that intermixing on a molecular scale increases with decreasing dissolution of the polymers in the parent solutions. Accordingly, increasing intermixing enhances device efficiencies.

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