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Diketopyrrolopyrrole (DPP)-based low band gap polymers for efficient solar cells FENG LIU, YU GU, UMASS-Amherst, CHENG WANG, LBNL, WEI ZHAO, DIAN CHEN, ALEJANDRO BRISENO, THOMAS RUSSELL, UMASS-Amherst — For bulk heterojunction (BHJ) organic photovoltaic (OPV) devices, effective strategies to maximize the performance have to be developed and fundamentally understood. In BHJ-type solar cells, the ability to control and optimize the active layer morphology is critical. A BHJ OPV of diketopyrrolopyrrole (DPP)-based low band gap polymer with phenyl-C71-butyric acid methyl ester (PCBM) was studied. DPP-based polymers are highly crystalline. The use of mixed solvents was critical in developing an optimal BHJ morphology, that was characterized by GISAXS and GIWAXS. In thin films, the polymer adopts an edge-on orientation and the blends are phase separated without thermal annealing. The diffusion of PCBM into the DPP polymer is markedly different from that observed with P3HT. The development of the morphology during solvent evaporation was studied in real-time by x-ray scattering and diffraction.

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