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Doping of an Ambipolar DPP Polymer with an Organometallic Dopant ERIN PERRY, CHIEN-YANG CHIU, Univ of California - Santa Barbara, KARTTIKAY MOUDGIL, Georgia Tech, CRAIG HAWKER, Univ of California - Santa Barbara, SETH MARDER, Georgia Tech, MICHAEL CHABINYC, Univ of California - Santa Barbara — We report the n-doping of the non-planar ambipolar polymer Poly((E)-3-(5-([8,8'-biindeno[2,1 b] thiophenylidene]-2-yl)thiophen-2-yl)-2,5-bis(2-octyldodecyl)-6(thiophen-2-yl)pyrrolo[3,4-c]pyrrole-1,4(2H,5H)-dione) (P(BTP-DPP)) with the organometallic dimer pentamethylcyclopentadienyl mesitylene $(RuCp^*mes)_2$ processed via sequential spin-casting. Maximum n-type conductivities of 0.45 S/cm are observed, which are amongst the highest reported for n-type semiconducting polymers. Using a combination of photoemission, spin resonance and optical spectroscopy we have studied the impact of processing conditions on the resulting electronic structure of the doped polymer. Significantly, we observe evidence of the coexistence of polarons and bipolarons in optimally doped films. The origin of the increased electrical conductivity observed in this system was probed using structural methods such as grazing incidence X-ray scattering and atomic force microscopy. Our results suggest that sequential processing allows for formation of efficient percolation pathways for charge transport. This work provides us with a framework for developing future high conductivity systems using sequential processing of semiconducting polymers with non-planar backbones that enable efficient packing of dopants.

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