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Design of Radical Polymers as Transparent Conductors in Organic Photovoltaic Devices LIZBETH ROSTRO, SI HUI WONG, LUCIO GALICIA, BRYAN W. BOUDOURIS, Purdue University — Much of the interest in electronically-active macromolecules has focused on conjugated systems where electron delocalization facilitates charge transport. However, our recent work has demonstrated that radical polymers, an amorphous class of polymers containing stable radical sites pendant on the repeat unit, can efficiently transport charge in the solid state. Furthermore, we have established that a specific radical polymer, poly(2,2,6,6-tetramethylpiperidinyloxy methacrylate) (PTMA), can be tuned to have relatively high solid-state electrical conductivity values while remaining highly transparent (due to the lack of backbone conjugation) in the solid-state. As such, the optimized PTMA was incorporated into organic photovoltaic devices as the anodic modifier in inverted geometry devices. Due to PTMA's high transparency and charge transport ability, the fabricated devices demonstrated higher performance than devices fabricated in the absence of an anodic modifier. Specifically, devices with 15 nm of PTMA demonstrated the highest performance. Importantly, these devices retained their high performance stable after prolonged exposure to ambient conditions, and this performance also was demonstrated to be independent of reflective metal (*e.g.*, gold or silver) deposited on top of the radical polymer interlayer.

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