

Abstract Submitted
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Poly(3-hexylthiophene) Brush-Modified Interfaces for Control of Active Layer Morphology and Properties S. MICHAEL KILBEY, W. MICHAEL KOCHEMBA, University of Tennessee, DEANNA PICKEL, JOSE ALONZO, Oak Ridge National Laboratory — Tailoring the morphology of donor-acceptor blends based on conjugated polymers and fullerenes is an essential part of optimizing the power conversion efficiency of organic photovoltaic (OPV) devices. While a variety of studies have demonstrated the importance of the nanoscale morphology of donor-acceptor blends on efficiency, a clear understanding of the links between morphology, processing, interfacial structure and device-level properties is yet to emerge. Here we turn to well-defined layers of end-tethered poly(3-hexylthiophene) (P3HT) chains as modifiers, or buffer layers, that straddle the inorganic/organic interface and exert control over the morphology of donor-acceptor blends. In addition to improving device performance characteristics, ostensibly due the presence of surface dipoles brought about by confinement, P3HT brushes affect the penetration of the fullerene derivative, 6,6-phenyl-C61-butyric acid methyl ester, PCBM, into the brush as well as the morphology of bilayers and blends of P3HT and PCBM coated atop the brushes. The role of molecular weight, chain grafting density, and thermal aging and light cycling on these behaviors will be highlighted.

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