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**Tunable Surface Energy Morphologies of P3HT-PCBM Bulk Heterojunction OPV's**<sup>1</sup> ABUL M.A. HUQ, ALAMGIR KARIM, Department of Polymer Engineering, University of Akron, USA — In this study we used the commonly studied blend of Phenyl-C61-butyric acid methyl ester (PCBM) and Poly(3-Hexylthiophene) (P3HT) and studied their morphological development (1:1 ratio) under different substrate surface energy conditions. Confined and tunable surface energy can direct the morphology of immiscible blends which can be successfully utilized to gain desired properties of the semiconducting organic materials. We first show that solvent and temperature of film casting have equally dominant effect on the final P3HT:PCBM morphology. We observe that P3HT crystal size and size distribution depend upon the nature of substrate, thickness of the film, temperature of casting solution, and overall blend concentration in solvent. We can also tune P3HT:PCBM morphology by sandwiching the blend films between two PDMS films with well defined surface energies. These studies offer insights for development of highly controlled bulk heterojunction morphology for improving the efficiency of organic photovoltaics (OPVs).

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