

Abstract Submitted
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Elucidating Vertical Phase Separation of Active Layers in Polymer Solar Cells via NEXAFS HE WANG, Department of Electrical Engineering, Princeton University, ENRIQUE GOMEZ, Department of Chemical Engineering, Princeton University, ZELEI GUAN, ANTOINE KAHN, Department of Electrical Engineering, Princeton University, CHERNO JAYE, DANIEL FISCHER, National Institute of Standards and Technology, JEFFREY SCHWARTZ, Department of Chemistry, Princeton University, YUEH-LIN LOO, Department of Chemical Engineering, Princeton University — Using synchrotron-based near-edge x-ray absorption fine structure (NEXAFS) spectroscopy, we have quantified the surface compositions of bulk-heterojunction active layers comprising poly(3-hexylthiophene) (P3HT) and [6,6]-phenyl-C61-butyric acid methyl ester. By delaminating the active layers from the underlying substrates, we have also quantified the compositions at the once-buried film-substrate interface. For active layers on hydrophilic substrates, the surface composition is 97wt% P3HT. In comparison, the P3HT composition is lower at the film-substrate interface (65wt%). By increasing the hydrophobicity of the substrates through the adsorption of phosphonic acid derived self-assembled monolayers, we observe an enrichment of P3HT (89wt%) at the film-substrate interface of the active layers. Accordingly, devices of the conventional architecture fabricated on hydrophobic surfaces show improved performance.

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