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Spectral analysis of resonant scattering to quantify phase behavior in organic blends THOMAS FERRON, Washington State University, JON DOWNING, DEAN DELONGCHAMP, National Institute of Standards and Technology, BRIAN COLLINS, Washington State University — It is important in organic solar cells to understand how phase behavior and possible non-equilibrium states of device morphology relate to functionality. However, characterization of carbon based electronics can be a challenging endeavor due to low levels of crystallinity, anisotropic molecular structure leading to complex three dimensional morphologies, and low contrast that hamper traditional techniques such as electron microscopy or hard X-ray scattering. Recently, studies utilizing resonant x-rays have shown sensitivity to phase behavior but a quantitative characterization is vital to correlate device performance. Here we demonstrate a multi-domain analysis of spectrally resolved scattering using molecular optical constants to accurately calculate absolute domain volume fraction and composition of a model block co-polymer. Our methods address complex absorption and fluorescence that occur at the carbon edge in order to move current models beyond the Born approximation. Techniques developed have been applied to P3HT – PCBM solar cells to draw conclusions of device morphology.

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