The Impact of Fullerene Additives on the Morphology of P3HT Thin Films Processed From Binary Solvent Mixtures

Smirnova, Anna (School: Academic Magnet High School)

The effect of various solution preparation methodologies on the aggregation of P3HT is studied. The aggregation of P3HT was induced by the use of a chloroform:dichloromethane binary system at volume fractions of 40:60 and 60:40 CF:DCM with solution additives of phenyl-C61-butyric acid methyl ester (PCBM). The DCM was either added rapidly to induce aggregation immediately or added slowly to create a solvent-solvent interface that diffused in a gradual aggregation process. Films were produced from these solutions at 1000 rpm. The surface morphology of the films and structural order of the P3HT aggregates are studied with atomic force microscopy and a Spano excitonic coupling analysis using UV-Vis absorption spectroscopy. The PCBM additive has a significant impact on the P3HT spectra and generally reduces the excitonic coupling value. Films cast with the PCBM exhibit a more globular morphology than the nanowires produced in films of pure P3HT. It is clear that PCBM+P3HT films of different properties can be produced by changing the way the solutions are prepared; however, more consistent results are needed to make further conclusions.

Awards Won: