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Session X49: Focus Session: Organic Electronics and Photonics - Polymer Dielectrics and Charge Transport

2:30 PM–5:30 PM, Thursday, March 1, 2012
Room: 162A

Sponsoring Units: DMP DPOLY
Chair: Peter Green, University of Michigan

Abstract ID: BAPS.2012.MAR.X49.13

Abstract: X49.00013 : Improving Order and Mobility in MEH-PPV Films by Reducing Polydispersity

4:54 PM–5:06 PM

Preview Abstract

MathJax ***On*** | *Off* ← *Abstract* →

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The effect of polydispersity on morphology and charge transport in drop cast films of poly[2-methoxy-5-(2'-ethylhexyloxy)-p-phenylene vinylene] (MEH-PPV) was investigated using grazing incidence X-ray diffraction and time-of-flight respectively. Morphologically, reducing polydispersity by removing short chain segments promoted the capability of crystallization. This resulted in higher hole mobility and non-dispersive transport down to lower temperatures for the lower polydispersity sample. The slope for the Poole-Frenkel relationship at 298 K was increased, and its change with temperature decreased, indicating reduced spatial inhomogeneity. Analysis using Bassler's Gaussian disorder model (GDM), found that the value for energy disorder (σ $\sim$53meV for both films) and infinite temperature zero field mobility ($\mu o \sim 3$ x10^{-6} cm^2/Vs) were similar for both films. However, a good fit for hopping site separation and spatial disorder was only possible for the lower polydispersity device, suggesting that the lower polydispersity films have less mesoscopic inhomogeneity.

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