

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Addition of ferrocene controls polymorphism and enhances charge mobilities in poly(3-hexylthiophene) thin-film transistors** BRANDON SMITH, Penn State University, Department of Chemical Engineering, MICHAEL CLARK, The Dow Chemical Company, CHRISTOPHER GRIECO, ALEC LARSEN, JOHN ASBURY, Penn State University, Department of Chemistry, ENRIQUE GOMEZ, Penn State University, Department of Chemical Engineering — Crystalline organic molecules often exhibit the ability to form multiple crystal structures depending on the processing conditions. Exploiting this polymorphism to optimize molecular orbital overlap between adjacent molecules within the unit lattice of conjugated polymers is an approach to enhance charge transport within the material. We have demonstrated the formation of tighter  $\pi$ - $\pi$  stacking poly(3-hexylthiophene-2,5-diyl) polymorphs in films spin coated from ferrocene-containing solutions using grazing incident X-ray diffraction. As a result, we found that the addition of ferrocene to casting solutions yields thin-film transistors which exhibit significantly higher source-drain current and charge mobilities than neat polymer devices. Insights gleaned from ferrocene/poly(3-hexylthiophene) mixtures can serve as a template for selection and optimization of next generation small molecule/polymer systems possessing greater baseline charge mobilities. Ultimately, the development of such techniques to enhance the characteristics of organic transistors without imparting high costs or loss of advantageous properties will be a critical factor determining the future of organic components within the electronics market.

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Date submitted: 03 Nov 2014

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