Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Polymer/Polymer Heterojunctions for Ambipolar Charge Transport in Organic Electronics FELIX KIM, SELVAM SUBRAMANIYAN, SAMSON JENEKHE, University of Washington — Understanding of charge transport in polymer semiconductor heterojunctions is of basic interest in developing high-performance organic optoelectronic devices based on multicomponent polymer semiconductors. We report ambipolar charge transport in thin films of layered heterojunctions and bulk heterojunctions of solution-processable unipolar polymer semiconductors. Selective solubility of the polymer semiconductors, poly(thiazolothiazole)s and ladder-type poly(benzobisimidazobenzophenanthroline), in organic and acidic solvents enabled the sequential deposition or blending of the polymer semiconductors. Charge carrier mobilities of 0.001-0.01 cm2/Vs were observed for both electrons and holes in the polymer/polymer heterojunction field-effect transistors. Thin film deposition and processing with various solvents are effective to improve charge-carrier mobilities by a factor of 100-1000. We have investigated the effects of the processing methods on morphology, and photophysical and charge transport properties of the polymer semiconductor heterojunctions. Integrated circuits and solar cells based on the polymer semiconductor heterojunctions are also demonstrated.

Felix Kim
University of Washington

Date submitted: 19 Nov 2010 Electronic form version 1.4