Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Poly(3-hexylthiophene) Band Alignment With SiO2 Determined By Internal Photoemission WEI LI, National Institute of Standards and Technology, Physical Measurement Laboratory, Gaithersburg, Maryland, USA, XUELEI LIANG, Key Laboratory for Physics and Chemistry of Nano Devices, Peking University, Beijing, China, JAMES BASHAM, KUN XU, QIN ZHANG, OLEG KIRILLOV, RUSEN YAN, CURT RICHTER, National Institute of Standards and Technology, Physical Measurement Laboratory, Gaithersburg, Maryland, USA, THOMAS JACKSON, Pennsylvania State University, University Park, PA 16801 USA, N.V. NGUYEN, DAVID GUNDLACH, National Institute of Standards and Technology, Physical Measurement Laboratory, Gaithersburg, Maryland, USA — We report band alignment for the widely studied organic semiconductor, Poly(3-hexylthiophene) (P3HT), by using internal photoemission (IPE). P3HT solution was spin coated onto 280 nm thick SiO_2 on heavily doped P-type silicon. A 10 nm thick aluminum (Al) electrode with adjoining 70 nm thick Al contact pad were deposited onto the P3HT film through aligned shadow masks. Photocurrent in the IPE measurement was generated using a monochromator with photon energy ranging from 1.5eV to 6.0eV (0.05 eV steps) and with a DC voltage which ranged from 20V to -20V (-2V steps) applied between the silicon backside and the thick Al contact. Both positive photocurrent and negative photocurrent were observed. For the IPE measurement, the yield (Y) is defined as the ratio of the carriers contributing to the photocurrent to the incident photon flux, and the threshold at each applied voltage is obtained by extrapolating $Y^{1/3}(h\nu)$ to zero. The barrier height is determined from Schottky plots extrapolated to zero field. By using this established method we extract a barrier height of 4.2 eV $\pm$ 0.1 eV for the Si:SiO2 interface and 4.0 eV $\pm$ 0.1 eV for the P3HT:SiO_2 interface, respectively.

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Date submitted: 20 Dec 2012 Electronic form version 1.4