Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Time-resolved electric force microscopy of charge traps in polycrystalline pentacene films MICHAEL JAQUITH, Department of Chemistry and Chemical Biology, Cornell University, ERIK MULLER, Department of Physics, Cornell University, JOHN MAROHN, Department of Chemistry and Chemical Biology, Cornell University — The microscopic mechanisms by which charges trap in organic electronic materials are poorly understood. Muller and Marohn recently showed that electric force microscopy (EFM) can be used to image trapped charge in working pentacene thin-film transistors [E. M. Muller *et al*, *Adv. Mater.* **17** 1410 (2005)]. We have extended their work by imaging trapped charge in pentacene films with much larger grains. In contrast to the previous study in which charge was found to trap inhomogeneously throughout the transistor gap, we find microscopic evidence for a new trapping mechanism in which charges trap predominantly at the pentacene/metal interface in large-grained devices. We have also made localized measurements of the trap growth over time by performing pulsed-gate EFM experiments. Integrated-rate kinetics data supports a charge trap mechanism which is second order in holes, e.g., holes trap in pairs, although the charge-trapping rate appears to depend on gate voltage.

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Date submitted: 12 Dec 2005 Electronic form version 1.4