Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Low temperature, field-dependent mobility in pentacene thin-film transistors.[1] ADRIAN SOUTHARD, Center for Nanophysics and Advanced Materials (CNAM) and the Department of Physics (DOP), University of Maryland (UM), VINOD SANGWAN, Laboratory of Physical Sciences (LPS), CNAM,, and DOP, UM, DAN LENSKI, MICHAEL FUHRER, CNAM and the DOP, UM, ELLEN WILLIAMS, LPS, CNAM, and the DOP, UM — We measure the field-effect and saturation mobility of Au bottom contact thin-film polycrystalline pentacene field-effect transistors while varying temperature, channel length, and gate voltage. We utilize Au bottom contacts without a wetting layer, and achieve contact resistance as low as 1 kΩ-cm despite disturbance of the pentacene morphology at the drain and source electrodes. By measuring multiple channel lengths, we extract a contact-resistance free mobility. We confirm this value using an alternative technique in which we short the source and drain electrodes and make two terminal measurements of the capacitance and loss between these electrodes and the gate as a function of frequency. We discuss the result of field-dependent mobility in the context of Poole-Frenkel theory to rationalize the non-linear dependence of drain current on drain voltage, and test the predictions of recently developed models for transport in such systems.

[1]Supported by the Laboratory for Physical Science at UM.

Adrian Southard
Center for Nanophysics and Advanced Materials (CNAM) and the
Department of Physics (DOP), University of Maryland (UM)

Date submitted: 17 Dec 2008 Electronic form version 1.4