Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Structure of a pentacene monolayer deposited on SiO_2: Role of trapped interfacial water[1] SONGTAO WO, BINRAN WANG, HUA ZHOU, YIPING WANG, JONATHAN BESSETTE, RANDALL L. HEADRICKA, Department of Physics, University of Vermont, ALEX C. MAYER, GEORGE G. MALLIARAS, Department of Materials Science and Engineering, Cornell University, ALEXANDER KAZIMIROV, Cornell High Energy Synchrotron Source, Cornell University — *In situ* synchrotron x-ray reflectivity is used to probe the early stages of pentacene growth in real time, under conditions relevant to the fabrication of organic thin film transistors. The results reveal that there is an interfacial water layer initially present on the SiO2 substrate and that this water layer is still present at the interface after the deposition of a pentacene thin film. The thickness of the trapped interfacial water layer does not significantly change subsequent to film deposition, even after exposure to atmospheric pressure or during vacuum annealing at 70 $^{\circ}$C. However, a water layer is observed to form on the free surface of pentacene after sufficient exposure to water vapor, and the thickness of this layer can be reduced by subsequent vacuum annealing. These observations are correlated with organic thin film transistor mobilities measured at atmospheric pressure versus under vacuum.

[1]The National Science Foundation supported this work under Award No. DMR-0348354. CHESS is supported by the National Science Foundation and the National Institutes of Health/National Institute of General Medical Sciences under Award No. DMR-0225180.

Songtao Wo
Department of Physics, University of Vermont

Date submitted: 27 Dec 2006 Electronic form version 1.4