Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Solvent-vapor concentration imparts selectivity on the propagation front during polymorphic transformation in molecular-semiconductor thin films GEOFFREY PURDUM, Dept. of Chemical and Biological Engineering, Princeton University, THOMAS GESSNER, R. THOMAS WEITZ, BASF SE, GMV 67056, Germany, YUEH-LIN LOO, Dept. of Chemical and Biological Engineering, Princeton University — Post-deposition processing allows precise control over the structural development of molecular-semiconductor thin films. In particular, solvent-vapor annealing converts thin films of a core-chlorinated naphthalene diimide from its triclinic polymorph to its monoclinic polymorph. By tuning the concentration of solvent vapor, we can simultaneously impact the morphology of the resulting monoclinic thin film. At low solvent-vapor concentrations, transformation in-plane is isotropic; we observe comparable transformation rates along the b- and c-axes, resulting in plate-like domains. At high solvent-vapor concentrations, transformation along the c-axis is instead favored, resulting in the formation of needle-like domains. Extended solvent-vapor annealing at these conditions can lead to isolated needles in the active channels of field-effect transistors; these devices exhibit electron mobilities exceeding 1 cm^2/Vs.

Geoffrey Purdum
Dept. of Chemical and Biological Engineering, Princeton University

Date submitted: 09 Nov 2015 Electronic form version 1.4