Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Air-Stable Solution-Processed Thin-Thin Film Transistors with Hole Mobilities of 3.5 cm^2/Vs YAOCHUAN MEI, KATELYN GOETZ, Department of Physics, Wake Forest University, Winston-Salem, NC, MARSHA LOTH, JOHN ANTHONY, Department of Chemistry, University of Kentucky, Lexington, KY, OANA JURCHESCU, Department of Physics, Wake Forest University, Winston-Salem, NC — We report on organic thin-film transistors fabricated on a novel soluble small molecule organic semiconductor difluoro bis(triethylgermyl) anthradithiophene. Fabrication techniques are all applicable at room temperature and ambient pressure, and include drop-casting, spin-coating, and spray deposition. Devices exhibit remarkable electronic properties, including charge carrier mobilities as high as 3.5 cm^2/Vs, on/off current ratios of 10^5, and good environmental and operational stability. Chemical treatment of the contact surface with self-assembled monolayers allows us great control of the crystalline order within the organic semiconductor layer. Because thin-film microstructure defects such as grain boundaries reduce the charge transport capabilities of the active layer, high quality single crystals are grown by physical vapor transport for comparison. By correlating the electrical properties with the structural data obtained from X-ray diffraction, we find that a good $\pi - \pi$ overlap is responsible for this superior electronic behavior.

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Date submitted: 07 Nov 2011 Electronic form version 1.4