Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Scanned Probe Characterization of Atmospheric Effects on diF TESADT Thin-Film Transistors[1] CORTNEY BOUGHER, Appalachian State University, SHAWN HUSTON, Radford University, JEREMY WARD, ABDUL OBAID, Wake Forest University, MARSHA LOTH, JOHN ANTHONY, University of Kentucky, OANA JURCHESCU, Wake Forest University, BRAD CONRAD, Appalachian State University — Single crystal organic semiconductors have been shown to exhibit carrier mobilities comparable to the silicon currently used in photovoltaics. However, during solution deposition of common organic semiconducting materials the resultant thin-film is often polycrystalline. Device performance and electrical properties of organic thin-film transistors are highly dependent on crystal structure and molecular packing. In polycrystalline thin-films, boundary regions between crystal grains can affect the overall performance of devices, as crystal structure and packing may differ from that of the surrounding crystal regions. These boundary regions may also serve as defect sites, allowing environmental factors, such as oxygen content and humidity, to alter local charge transport through devices. We utilize Kelvin Probe Force Microscopy (KPFM) to characterize how grain boundaries alter local conductivity and device performance as a function of doping in 2,8-difluoro-5,11-triethysilylethynyl anthradithiophene (diF TESADT) thin-film transistor surfaces. Device voltage drops at grain boundaries are characterized as a function of both atmospheric dopants and transition time between dopants.

[1]NC Space Grant Consortium, Appalachian State University Office of Student Research, Ralph E Powe Junior Faculty Enhancement Award

Cortney Bougher
Appalachian State University

Date submitted: 15 Nov 2013 Electronic form version 1.4