

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Fully three dimensional calculations of c-AFM current flow patterns, including space charge effects, traps and fibrous morphologies**  
KANOKKORN PIMCHAROEN, PHILLIP DUXBURY, Department of Physics and Astronomy, Michigan State University — Organic semiconductors are promising materials for many optoelectronic devices due to their versatile applications and low-cost fabrication, including organic photovoltaics (OPV), light-emitting diodes (OLED), and thin-film transistors (OTFT). The performance of these devices are controlled by charge transport which primarily depends on the nanoscale morphology. Unlike other microscopies, conductive Atomic Force Microscope (c-AFM) is capable of characterizing both nanoscale morphology and local electronic properties simultaneously. With this unique ability, c-AFM has been used extensively to characterized these organic semiconductor devices in the past decade, however the spreading of current from the tip geometry in the presence of traps, which are ubiquitous in these materials, is not well understood. We have developed a fully three dimensional device simulation tool enabling treatment of inhomogeneous systems including c-AFM tip geometry, spatially varying trap distributions, and fibrous morphologies. Results characterizing charge transport in the fibrous morphologies and in the presence of traps will be discussed, including the effect of traps and space charge effects on current spreading from the c-AFM tip.

Kanokkorn Pimcharoen  
Department of Physics and Astronomy, Michigan State University

Date submitted: 14 Nov 2014

Electronic form version 1.4