Abstract Submitted
for the OSS11 Meeting of
The American Physical Society

Investigating photocurrent generation and transport in organic photovoltaics with event driven Monte Carlo simulations VINCENT ROBBIANO, JUTTA LUETTMER-STRATHMANN, University of Akron — The generation of photocurrent in organic solar cells starts with a photon being absorbed in the active layer and creating an excited electron/hole pair (exciton). The exciton is mobile and dissociates into electron and hole at an interface between donor and acceptor material, unless it decays before it reaches the interface. If they do not recombine, the charge carriers migrate toward the appropriate electrode and contribute to the photocurrent. Thus, the efficiency of organic solar cells depends strongly on the morphology and electronic properties of the donor/acceptor materials. Simulating in detail the processes described above is of interest since it enables the modeling of devices with different architectures and materials properties. Since processes such as exciton absorption, electron hopping, and recombination take place on vastly different time scales, we employ an event-driven Monte Carlo algorithm to simulate a coarse grained lattice model of the active layer of organic solar cells.

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Date submitted: 11 Mar 2011 Electronic form version 1.4