Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Nanocrystalline organic solar cells. FAN YANG, Department of Electrical Engineering, Princeton University, KAI SUN, Electron Microbeam Analysis Laboratory, University of Michigan, Ann Arbor, STEPHEN FORREST, Departments of EECS & Physics, University of Michigan, Ann Arbor — Donor/acceptor (DA) heterointerfaces effectively dissociate excitons into carriers in organic solar cells. Unfortunately, the low carrier mobility of amorphous DA blends limits the active layer thickness to $\sim$25 nm, resulting in low solar absorption. Solar cells made from blends of organic and inorganic semiconductor nanorods overcome the low charge mobility in disordered organic films but have disadvantages due to the mismatch between the nanorods and organic material properties. Here we demonstrate organic solar cells in which both DA materials grow into an extended nanocrystalline network. Structural analysis confirms the existence of crystalline phases of the constituent donor molecule, copper phthalocyanine (CuPc), and the acceptor, C_{60}. The structure has a power conversion efficiency of 6.2$\pm$0.3% at 1 sun, AM1.5 simulated solar illumination. This cell shares many of the merits of all organic DA blends and organic/inorganic nanorod cells without many of their disadvantages.

Fan Yang
Department of Electrical Engineering, Princeton University

Date submitted: 25 Nov 2006 Electronic form version 1.4