Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Nanocoax Solar Cells[1] M.J. NAUGHTON, K. KEMPA, Z.F. REN, J. RYBCZYNSKI[2], T. PAUDEL, Y. GAO, Y. XU, Boston College — A novel architecture for high efficiency solar energy conversion, employing separated photo– and –voltaic pathways and antenna-based light collection, is described. This *material-independent* architecture solves the "thick-and-thin" conundrum of solar photovoltaics, wherein solar cells must be thick enough to absorb light yet thin enough to allow for charge extraction. Our solar cells are comprised of arrays of high aspect ratio, vertically-aligned, nanoscale, metallic coaxial wires (*nanocoax*) which are indeed simultaneously thick (tall) and thin (narrow). Photons captured by nanoscale antennas are channeled axially as TEM-mode radiation in the nanocoax annulus, which is filled with a PV medium. This annulus is unprecedentedly thin radially ($\sim$100 nm), such that exciton lifetimes and subsequent electron and hole diffusion lengths of virtually any PV material are sufficiently long to enable highly efficient solar energy conversion. We discuss results with radial $p-i-n$junctions using a-Si PV and carbon nanofiber coax center conductors, where nanocoax solar cell efficiencies exceed those of comparable planar junctions. Moreover, this nanoscale architecture can be considered a feasible portal to 3^{rd} generation solar power.

[1]This work was supported by Solasta Inc, Newton, Mass.
[2]Present address: Solasta Inc.

M.J. Naughton
Boston College

Date submitted: 22 Nov 2007 Electronic form version 1.4