Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

High Efficiency InP Solar Cells Through Nanostructuring DANIEL GOLDMAN, JOSEPH MURRAY, JEREMY MUNDAY, University of Maryland, College Park — We describe high efficiency InP solar cells which utilize a periodic array of optically designed TiO_2 nanocylinders. Optical and electronic simulations were performed to determine the spectrally resolved reflectivity and I-V characteristics of potential devices under AM1.5G illumination. The reflectivity of InP solar cells with these nanocylinders is found to have an average value of 2% over the visible and near-IR spectral range, which outperforms traditional antireflection coatings. Coupling between Mie scattering resonances and thin film interference effects is found to accurately describe the optical enhancement provided by the nanocylinders. These nanostructured solar cells have power conversion efficiencies greater than 23%, which is comparable to the highest quoted efficiencies for InP solar cells.

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Date submitted: 06 Nov 2015 Electronic form version 1.4