Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Small Molecule Acceptors for Organic Photovoltaics DAVID P. OSTROWSKI, University of Colorado at Boulder, UNSAL KOLDEMIR, Colorado School of Mines, ALAN SELLINGER, Colorado School of Mines and National Renewable Energy Lab (NREL), SEAN E. SHAHEEN, University of Colorado at Boulder and Renewable and Sustainable Energy Institute (RASEI) — Organic photovoltiacs (OPVs) have demonstrated solar power conversion efficiencies in the regime of 10-12% from several classes of materials, including conjugated polymers and small-molecules. Of note, in each of the classes, the electron-accepting molecule is based on C_{60}. While C_{60} is a very effective electron-acceptor and transporter, it has low optical absorption strength in the solar spectrum and it is difficult to tune its optoelectronic properties. Here we present results on small molecule acceptors based on a core unit of benzothiodiazole (BT) whose optoelectronic properties are readily tunable. A library of these small molecule acceptors has been synthesized with a variety of absorbance bands in order for OPV technologies to harness a greater amount of the solar spectrum. Through utilization of a range of solvents, co-solvent mixtures and orthogonal solvents, devices are fabricated with contrasting bulk heterojunction (BHJ) morphologies or bi-layer architectures. Device performance is compared over a range of active layer morphologies, with particular emphasis on the effectiveness of photocurrent generation when light is absorbed in the acceptor molecule with subsequent charge (hole) transfer to the donor (channel 2 photocurrent generation).

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Date submitted: 15 Nov 2013 Electronic form version 1.4