

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Impedance Spectroscopy and Electroabsorption Studies of PCPDTBT-PCBM Bulk-Heterojunction Solar Cells CHRISTOPHER GREEN, ZANE COHICK, MARIAN TZOLOV, Lock Haven Univ — Bulk heterojunction polymer solar cells, consisting of PCPDTBT and PCBM, offer the potential for high light absorption and effective charge collection in sub-micron thick films. An understanding of the behavior of photo-generated charge transfer complexes in the polymer/small molecule blend is needed for further increases in the efficiency of such devices. In this study, we present experimental results on impedance spectroscopy indicating the formation of trapped electrical charges upon illumination. The population of the related energy states depends on the applied voltage. These results are supported by electroabsorption spectroscopy of the solar cells and of the films of the constituting materials. They indicate an additional electroabsorption feature not present in the individual films of the PCPDTBT and PCBM. The voltage dependence of the electroabsorption signal resulted in estimation of the built-in voltage in our solar cells of 1.1 eV. Our comparison of the photocurrent spectrum with the optical absorption spectrum of the solar cells indicate more efficient energy conversion for the light absorbed in the PCPDTBT compared to the light absorbed in PCBM.

Christopher Green
Lock Haven Univ

Date submitted: 14 Nov 2013

Electronic form version 1.4