Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Dissociation Processes of Singlet and Triplet Excitons in Organic Photovoltaic Cells ZHIHUA XU, YUE WU, BIN HU, University of Tennessee — The dissociation processes of singlet and triplet excitons were studied based on single-layer photovoltaic cells using: fluorescent Aluminum (III) 8-hydroxyquinoline (Alq_3) and phosphorescent *fac* tris (2-phenylpyridine) iridium ($Ir(ppy)_3$) molecules. We found that triplet exciton dissociation leads to a more efficient photovoltaic response as compared to singlet excitons. The short-circuit photocurrent action spectra suggest that the triplet excitons dissociate mainly at the metallic electrode interface while the singlet excitons exhibit bulk dissociation. This interface dissociation of triplet excitons forms a mechanism for phosphorescent organic materials to show efficient photovoltaic responses. Therefore, control of singlet-to-triplet exciton ratio presents a new pathway to enhance photovoltaic response from organic materials.

Bin Hu
University of Tennessee

Date submitted: 28 Nov 2005 Electronic form version 1.4