Abstract for an Invited Paper
for the MAR10 Meeting of
The American Physical Society

Interfacial Modification for Enhanced Performance of OPV Devices[1]

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Organic Photovoltaics (OPV) represent a potentially low cost, scalable approach to produce renewable energy at near the Terrawatt scale. Their low temperature solution based processing potentially leads to cost/per watt well below $0.50. Over the last year OPV has seen a rapid evolution in efficiency to a now certified 7.9% for Solarmer. As important module efficiencies are nearing 4% supporting scalability. There is now a pretty clear pathway for developing acceptors and donors so as to achieve 10% or greater. One of the key questions remaining is that of the stability of OPV devices and the potential for their lifetime to be sufficient for commercial viability. Critical to this is both the intrinsic stability of the donor/acceptor phase separated mixture and the stability of the interfaces especially those between the inorganic and organic phases. We will report on a number of recent studies beginning to look at the mechanisms of degradation in OPV device structures and on their potential resolution through new materials, new device configurations and enhanced encapsulation. Current data indicates that there is no inherent instability in the bulk heterojunction and that solving the interfacial issues may lead to devices of sufficient stability for commercial viability.

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[1]We gratefully acknowledge the support of the DOE PV program and EFRC lead by University of Arizona.