Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Influence of the hole-collecting interlayer on the stability and lifetime of inverted organic solar cells BERTRAND TREMOLET DE VILLERS, BRADLEY MACLEOD, DANA OLSON, Natl Renewable Energy Lab — In organic photovoltaics (OPVs), interlayers between the photoactive layer and the electrodes are often used to modify the work-function of the electrode, provide charge-blocking selectivity, and improve the lifetime of the solar cell. To date, PEDOT:PSS has been the most commonly-used interlayer; however, due to its acidic and hygroscopic nature, it can facilitate degradation. To improve the stability of the device, molybdenum oxide (MoO_3) has emerged as an attractive alternative to PEDOT:PSS, and solar cells utilizing MoO_3 have shown significantly enhanced lifetimes. Furthermore, degradation of low work-function cathode metals such as calcium can be eliminated when the typical cell design is inverted. In inverted solar cells, interlayers remain a critical component but we find their role in the degradation of the OPV changes. Contrary to what is observed in a conventional-architecture OPV, degradation studies of inverted solar cells under constant illumination lasting >1000 hours reveal solar cells utilizing a MoO_3 interlayer degrade faster than those with PEDOT:PSS. Understanding the influence of the charge-collecting interfaces in OPVs provides a pathway to increased reproducibility and longer lifetimes.

Bertrand Tremolet de Villers
Natl Renewable Energy Lab

Date submitted: 15 Nov 2013 Electronic form version 1.4