Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Probing of Charge Transfer States at Buried Organic Interfaces with Even-Order Spectroscopy RAVINDRA PANDEY, AARON MOON, SEAN ROBERTS, University of Texas at Austin — Organic thin film photovoltaics (OPV) are an emerging economically competitive technology that combines manufacturing adaptability, low-cost processing and a lightweight, flexible device end-product. At junctions formed between organic electron-donating and electron-accepting materials, the abrupt change in the dielectric properties can strongly perturb the density of states of the OPV. This can substantially alter the driving force for charge transfer between these materials. Electronic Sum Frequency Generation (ESFG), owing to its inherent interfacial sensitivity, is ideally suited to probe buried interfaces. Here, we report the ESFG spectra of Copper Phthalocyanine (CuPc) films, deposited on SiO_2 measured for both reflection and transmission geometries. Three peaks are observed that roughly correlate with resonances that comprise CuPc's Q-band absorption but display slight shifts and amplitude changes with respect to CuPc's bulk absorption spectrum. Experimental results are compared with calculations based on a thin film interference model that accounts for ESFG emitted from both the CuPc:Air and CuPc:SiO_2 interface as well as contributions to the signal from higher order source terms from the bulk. The model reveals a difference in the density of states between the two interfaces and suggests that by combining experimental transmission and reflection data it is possible to separate bulk and interfacial contributions to ESFG spectra.

Ravindra Pandey
University of Texas at Austin

Date submitted: 23 Nov 2015 Electronic form version 1.4