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**TR-2PPE Studies of Ultrafast Charge Separation at Organic Photovoltaic Interfaces** S.W. ROBEY, G.J. DUTTON, NIST, W. JIN, J.E. REUTT-ROBEY, University of MD — Dissociation of excitons in organic photovoltaic (OPV) devices occurs exclusively at interfaces between donor and acceptor molecular materials. To help understand critical charge separation processes, we have performed time-resolved two-photon photoemission (TR-2PPE) studies of sub-picosecond exciton dynamics at well-characterized organic donor-acceptor interfaces. Interfaces between phthalocyanines and C<sub>60</sub> were engineered using organic MBE and characterized using STM, STS, and UPS. Ultrafast TR-2PPE measurements were performed on CuPc\C<sub>60</sub> structures by pumping the lowest optical  $\pi \rightarrow \pi^*$  transitions (Q-band) to generate CuPc singlet (S<sub>1</sub>) excitons and probing this population with a time-delayed UV pulse. For thick films, CuPc S<sub>1</sub> decay is dominated by vibrational relaxation (several 100's femtoseconds) and singlet-to-triplet conversion ( $\sim 1$  picosecond). Directly at the interface, however, charge transfer to C<sub>60</sub> dominates decay of S<sub>1</sub> exciton, ( $\sim 100$  femtoseconds) . We also find evidence for important recombination routes from the charge separated state back to lower-lying CuPc T<sub>1</sub> triplet excitons. To test the impact of intersystem crossing to triplet levels, we have performed analogous investigations for H<sub>2</sub>Pc\C<sub>60</sub> interfaces. Results for this interface will be compared and contrasted with the CuPc\C<sub>60</sub> case.

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