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Exciton dissociation by fullerene versus non-fullerene acceptors at organic photovoltaic interfaces STEVEN ROBEY, NIST — Extensive development of polymer and small molecule donors has produced a steady increase in the efficiency of organic photovoltaic (OPV) devices. However, OPV technology would benefit from the introduction of non-fullerene acceptors. Recent progress has been promising, but efforts to replace fullerenes often lead to reduced efficiencies, possibly due to unfavorable non-fullerene morphologies and/or to more favorable excitation/carrier delocalization in fullerenes. Significantly increased exciton dissociation with fullerenes, associated with the fullerene molecular excited electronic structure, has also been predicted as the source of increased efficiency. This would provide a more critical barrier to achieving comparable performance with non-fullerenes. This hypothesis was tested using time-resolved two-photon photoemission (TR-2PPE) to compare exciton dissociation at interfaces between zinc phthalocyanine (ZnPc) and the non-fullerene acceptor, perylene tetracarboxylic dianhydride (PTCDA) versus dissociation at the analogous interface with C_{60}. Exciton dissociation rates were found to be comparable for phthalocyanine interfaces with both classes of acceptors, suggesting that other effects dominate higher efficiencies with fullerene acceptors.

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