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Energy level alignment of zinc tetraphenylporphyrins derivatives adsorbed on wide band gap semiconductor oxides. SYLVIE RANGAN, ROBERT ALLEN BARTYNSKI, ELENA GALOPPINI, Rutgers University — Metalloporphyrins play an essential role in photosynthetic mechanisms and therefore are natural candidates for electron transfer mediator in dye sensitized solar cells (DSSCs). Among the possible metalloprophyrins, the zinc tetraphenylporphyrins (ZnTPP) derivatives have been found to have similar electron injection and charge recombination properties as the important standard ruthenium dye N3 for DSSCs, as well as reasonable performances using TiO_2 or ZnO as substrates. We have investigated the electronic structure, energy level alignment, and their changes with altered surface bonding geometries, using a selective functionalization with carboxylic anchoring groups of the meso-phenyl, of functionalized ZnTPP on single crystal TiO_2 and ZnO surfaces. Occupied and unoccupied electronic states were determined using direct (ultra-violet and x-ray) photoemission and inverse photoemission in the same ultra-high vacuum analysis chamber. Energy level alignment of the ZnTPP molecular orbitals with respect to the substrates band edges will be compared to the available literature.

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