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Effect of electron transfer on direct vs. indirect contact of CdSe quantum dots on TiO_2 nanoparticles TESS R. SENTY, OSHADHA RANASINGHA, SCOTT K. CUSHING, West Virginia University, CONGJUN WANG, NETL, JAMES P. LEWIS, West Virginia University, CHRISTOPHER MATRANGA, NETL, ALAN D. BRISTOW, West Virginia University — CdSe quantum dots (QD) attached to TiO_2 semiconductors (SC) have been extensively studied over the last decade. They have shown promising results for uses as energy materials including capture of light in solar cells [1] and photocatalytic reduction of CO_2 [2]. The length of linker molecules between the QD and SC has been shown to decrease the electron transfer (ET) rate exponentially for an increasing linker length [3]. Studies also indicate that this exponential decrease breaks down for direct contact [4] although the exact mechanism is not fully understood. Through visible and NIR transient absorption spectroscopy we directly probe the electron and hole dynamics of CdSe QDs on TiO_2 nanoparticles comparing intimate contact with mercaptopropionic acid linked QDs. We find that with this direct contact, the ET rate decreases, deviating from previous results. We investigate the mechanisms for this deviation including the effect of oxidation on the QD surface.

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Tess R. Senty
West Virginia University

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