Shuttling Photoelectrochemical Electron Transport in Tricomponent CdS/rGO/TiO_2 Nanocomposites

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Supporting information

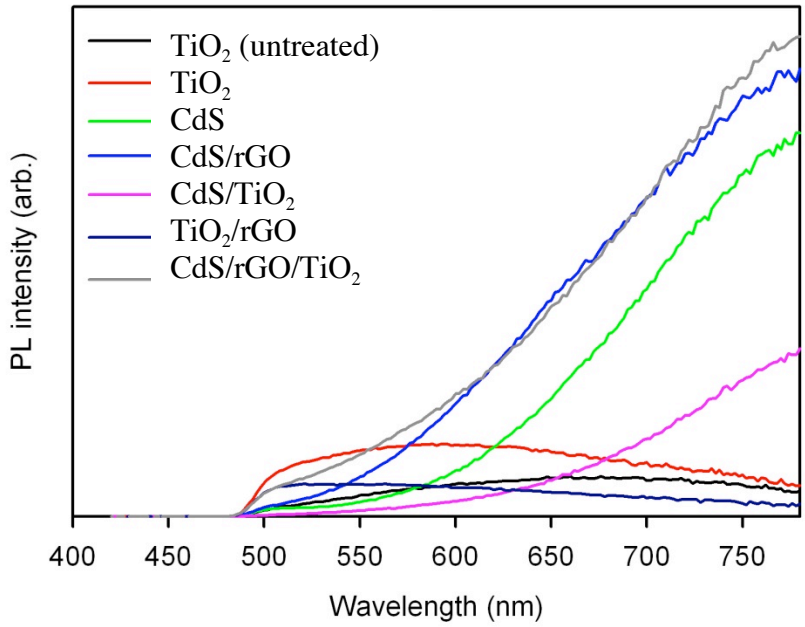

Figure S1. Photoluminiscence spectra of solvothermally-prepared samples, as well as untreated TiO_2. Samples were cast films as discussed in the main text. In order to reduce the scattered excitation light intensity (405 nm) three short wavelength cut off filters (λ_{cutoff} = 470nm) were inserted after the samples. Without these filters the scattered pump light appeared at out of band wavelengths and greatly distorted the true emission spectra.

In samples containing CdS the emission is broad and continues to increase into the IR, long beyond the emission wavelengths for bulk crystalline CdS or even small quantum confined CdS nanoparticles. This indicates emission from trap states. The greater part of the emission from TiO_2 in the combinations and films containing TiO_2 NPs lies below the filter cut-off wavelength and so cannot be directly observed in such highly scattering films. Additionally a shorter excitation wavelength would ideally be required for efficient excitation of such short wavelength bandedge emission. However, under the excitation

conditions used here, the TiO_2 containing samples all display a weaker broad emission spanning the visible spectrum and extending weakly into the near IR also in most cases. Again this is indicative of radiative recombination after trapping. Solvothermally-treated TiO_2 shows evidence of increased trapped emission following the treatment, consistent with surface modification by S cations.