Supplementary Materials

CdSe-ZnO Core–Shell Quantum Dots for Protein Detection: A Potential Sensing Platform

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The full-width-half-maxima (FWHM) of the narrow emission peaks (for the corresponding samples with absorption spectra shown in Figure S1) increased from 28 nm for the CdSe two-minute aliquot core to 33 nm for the CdSe coated with 4 monolayers (MLs) of ZnO (see Figure S2). The increase of the FWHM can be attributed to the addition of the ZnO MLs which naturally have broad trap emissions due to oxygen-related defects near the photoluminescence range of 450–550nm. The photoluminescence spectra of ZnO nanoparticles have characteristically displayed exciton emission approximately between 350 nm and 380 nm with some trap emission between 450 nm and 550 nm and also beyond this. The photoluminescence spectra of the core-shell CdSe-ZnO systems also revealed a strong enhancement and consistent red-shifting of the CdSe QDs with increasing shell thickness. The core-shell CdSe-ZnO system with 4 MLs of ZnO displayed the highest intensity (see Figure S2). The strong enhancement and red-shifting is indicates effective surface passivation of the core and an increased particle size upon addition of ZnO MLS. The red-shifting also confirms the lack of oxidation or reduction in the CdSe-ZnO system which is normally exhibited in the CdSe-ZnS systems.

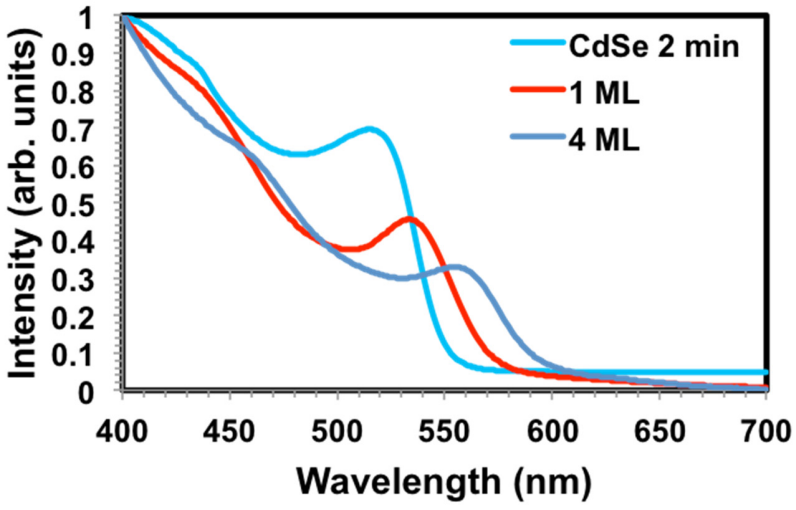

Figure S1. The absorption spectrum of CdSe two-minute aliquot QDs and the core-shell CdSe-ZnO with 4 MLs of ZnO.

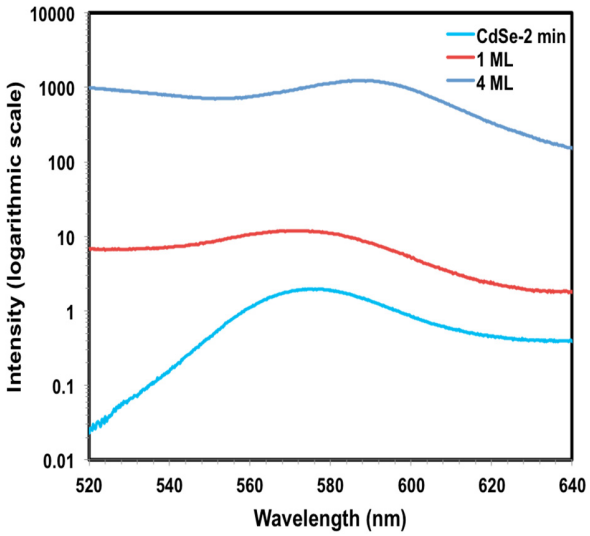

Figure S2. The PL spectrum of CdSe two-minute aliquot QDs and the core-shell CdSe-ZnO with 1 and 4 MLs of ZnO.