

# Generalized Synthesis of Hybrid Metal-Semiconductor Nanostructures tunable from the Visible to the Infrared

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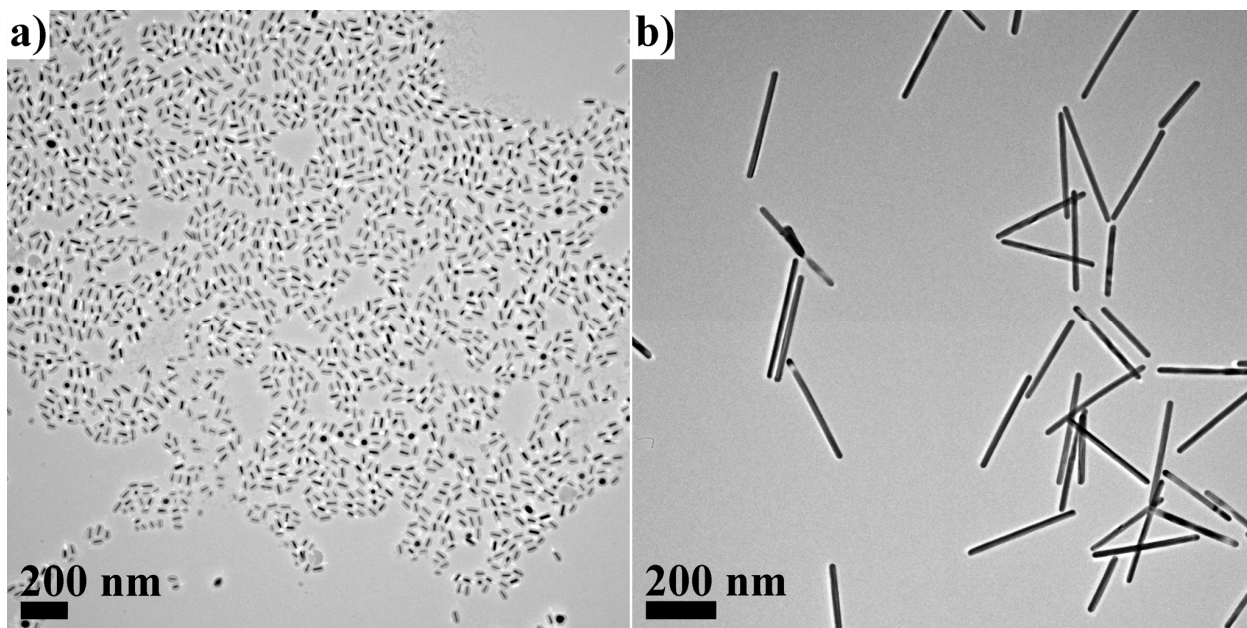
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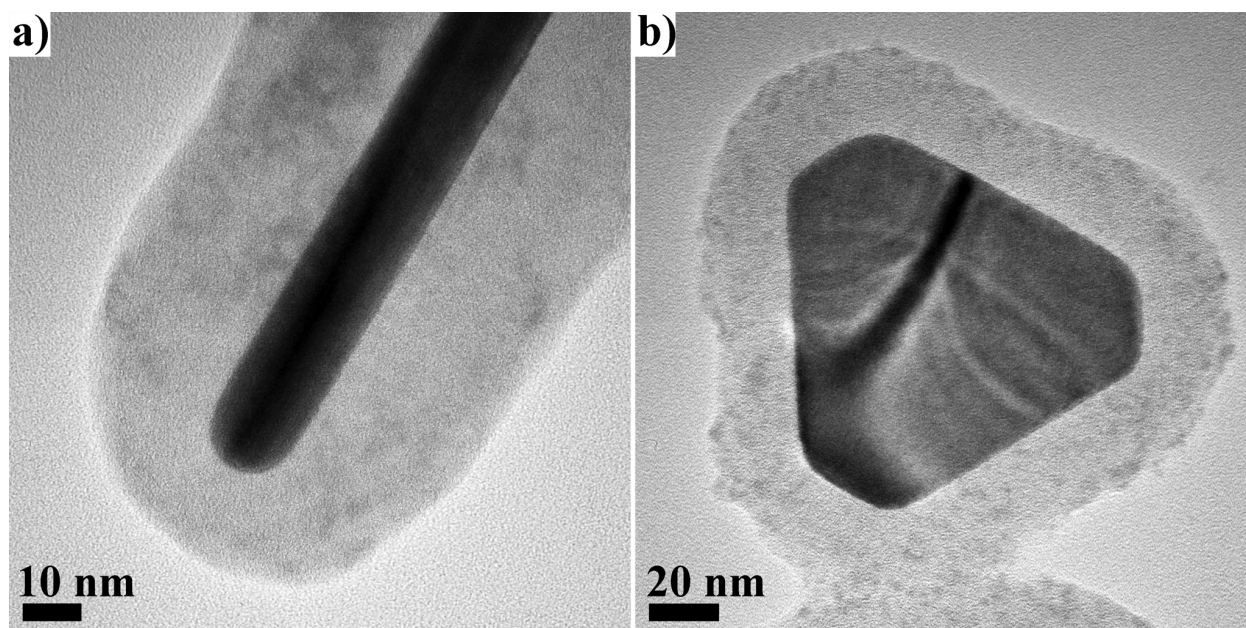
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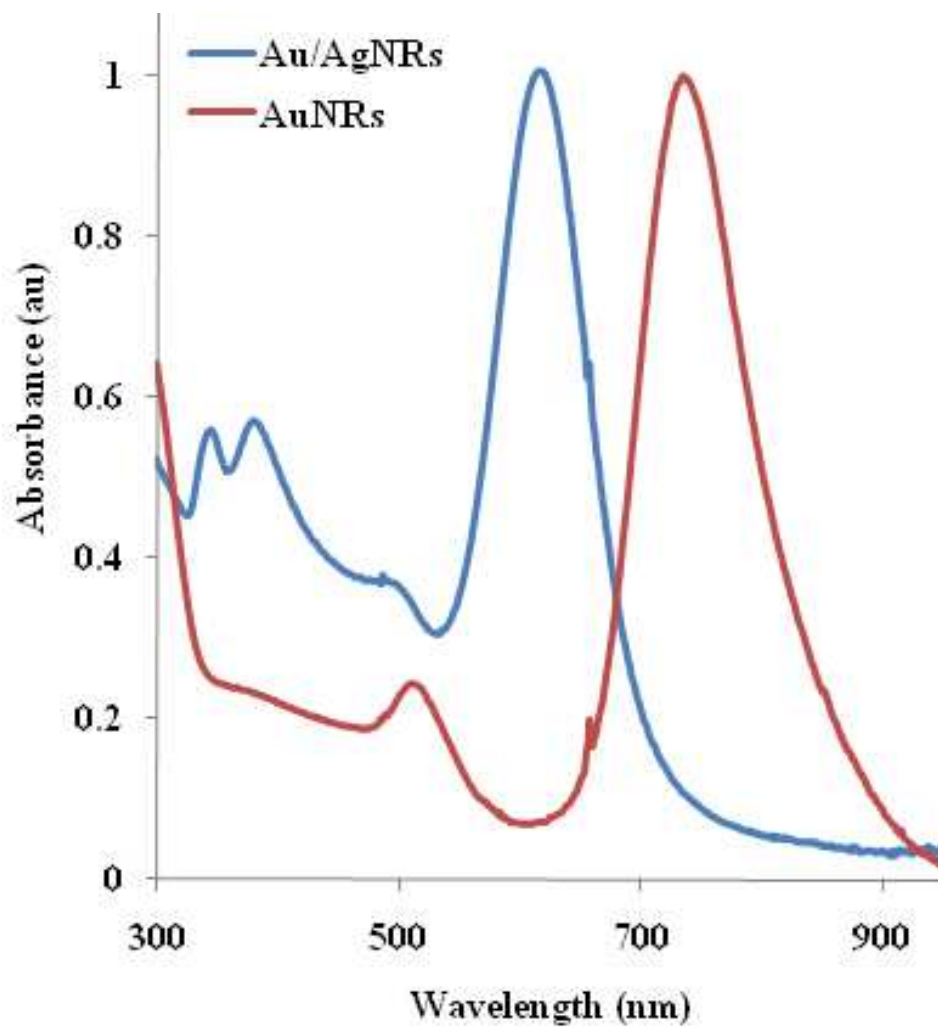
## Supporting Information



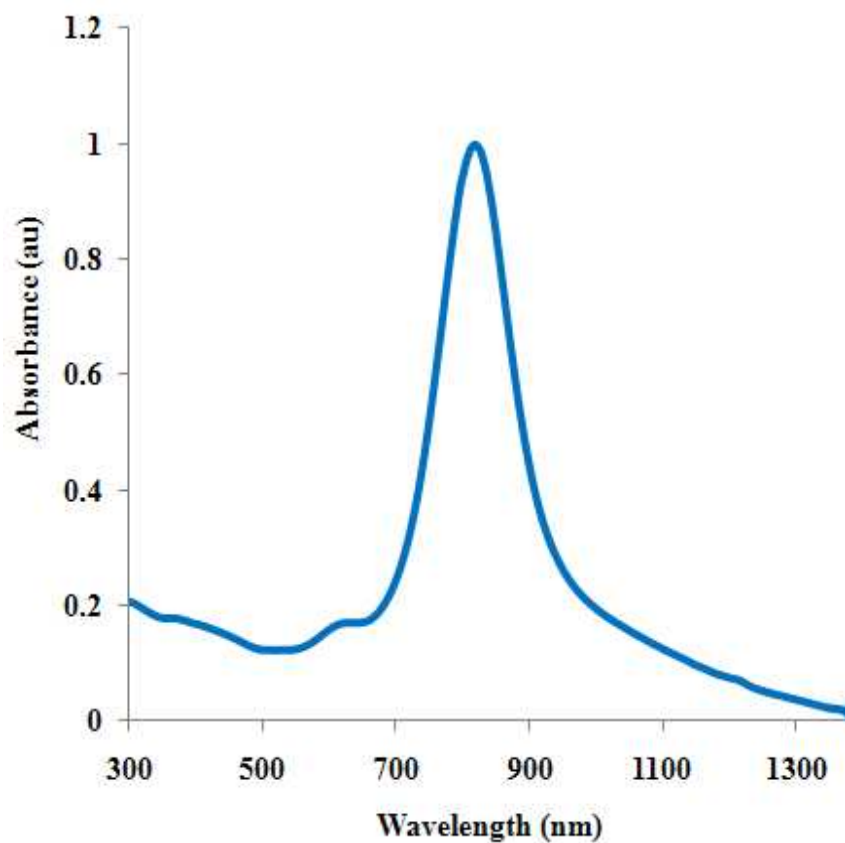
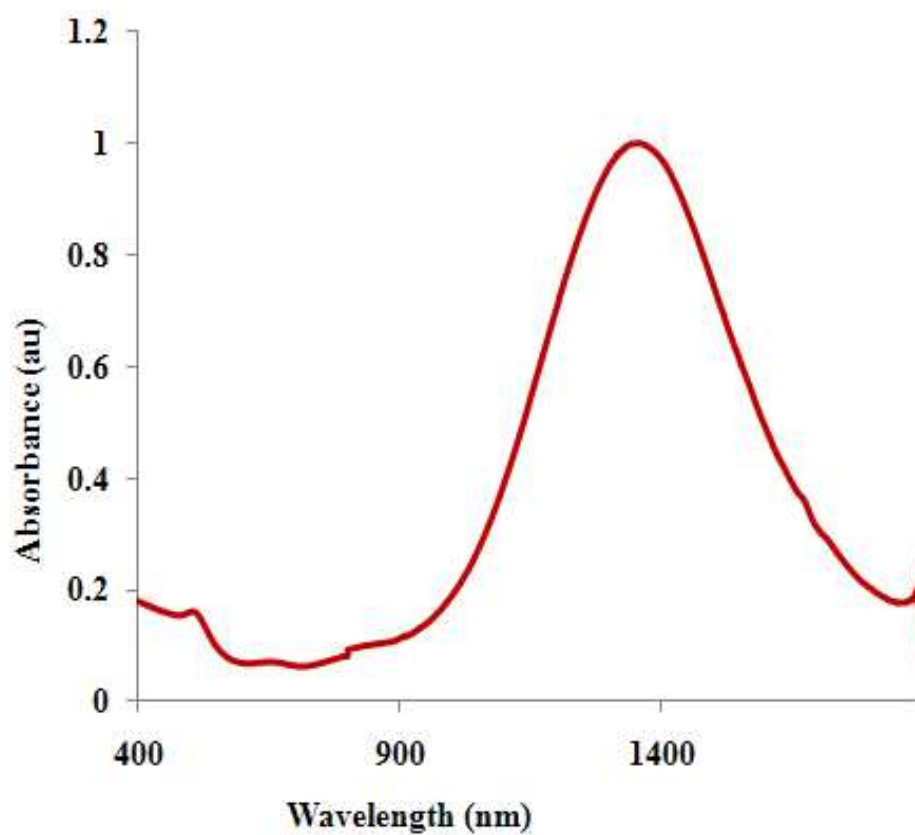
**Figure S1.** Low magnification TEM image of silica coated single crystalline AuNRs (a) and pentahedrally twinned AuNRs (b).



**Figure S2.** High magnification TEM image of a) pentahedrally twinned AuNR/SiO<sub>2</sub>/CdSe NQDs b) CdSe NQDs on silica coated multifaceted triangular shaped gold nanoplatelets.

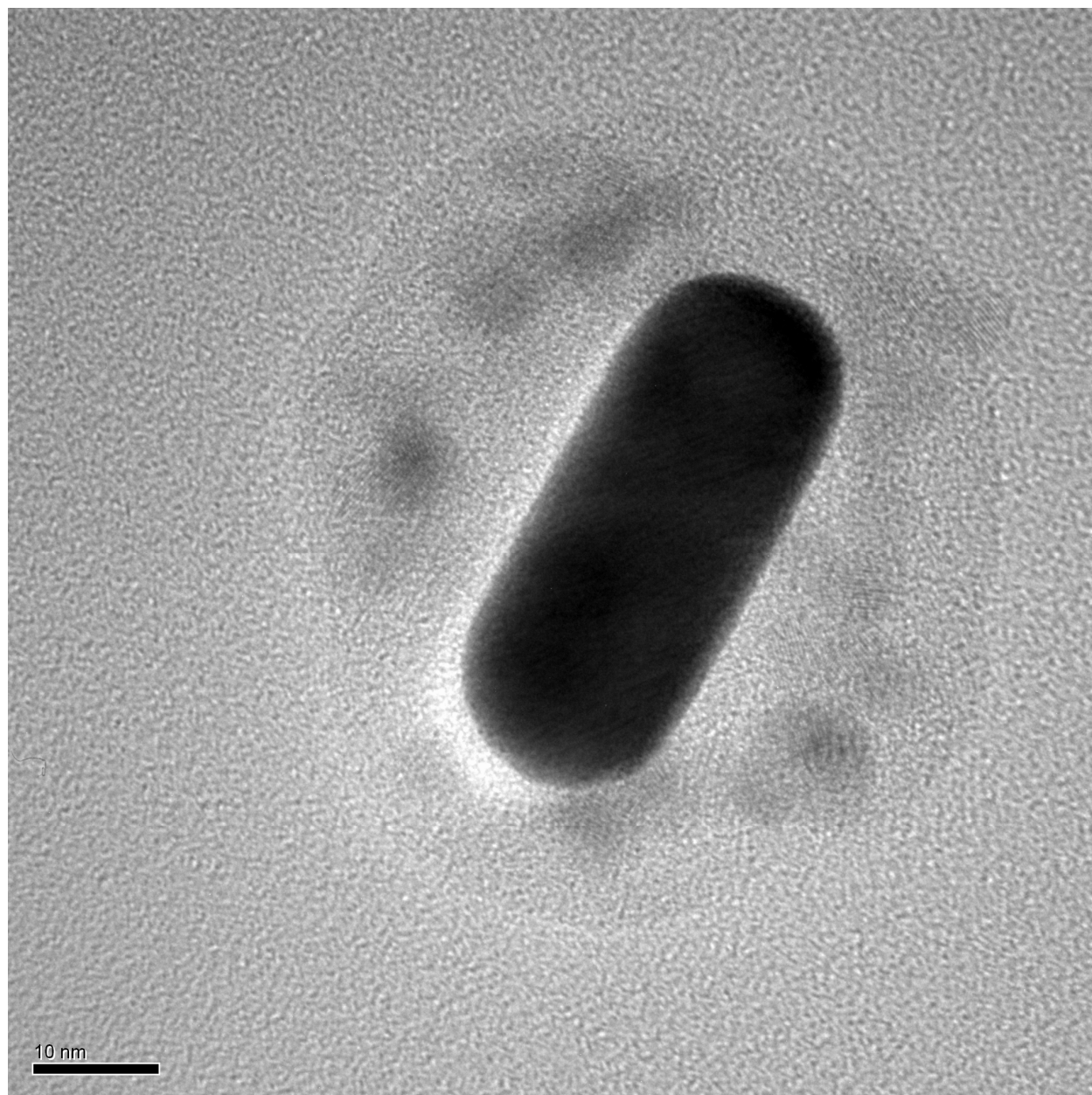


**Figure S3.** UV-Vis spectra of Au NRs and Au/Ag bi-metallic nanorods

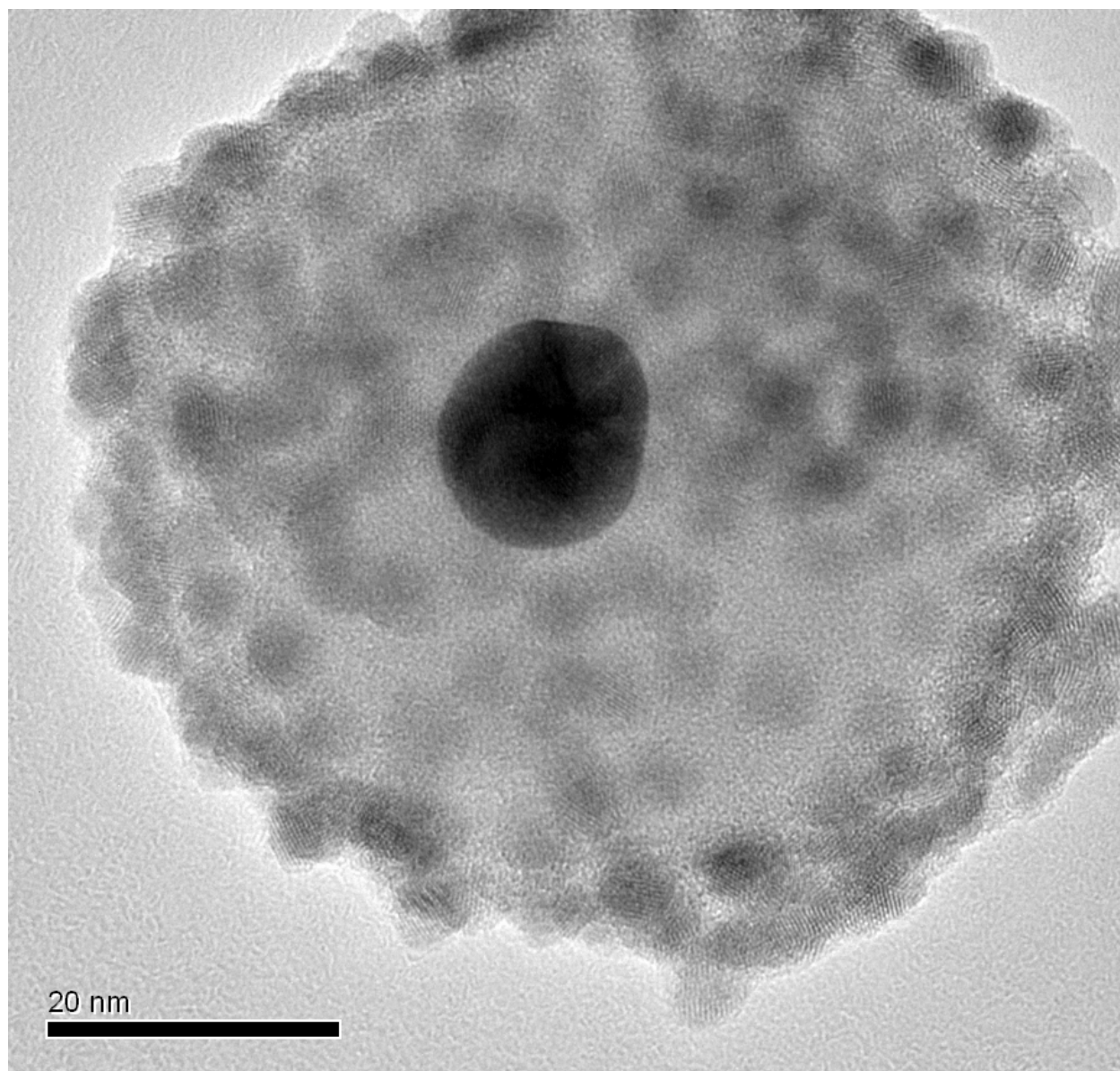


**Figure S4.** UV-Vis-NIR spectrum of pentahedrally twinned Au NRs (red) and 2D platelets (blue)

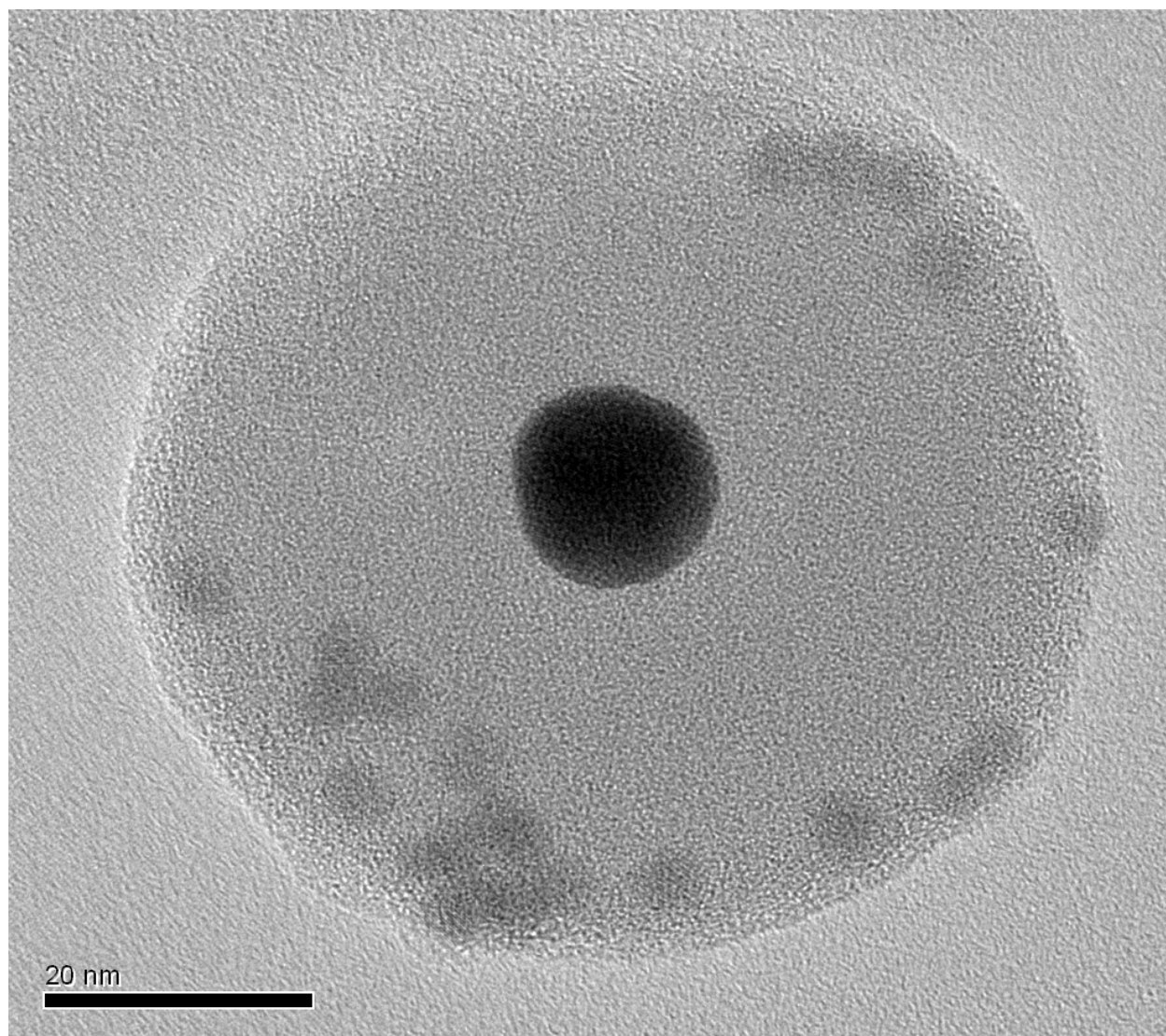




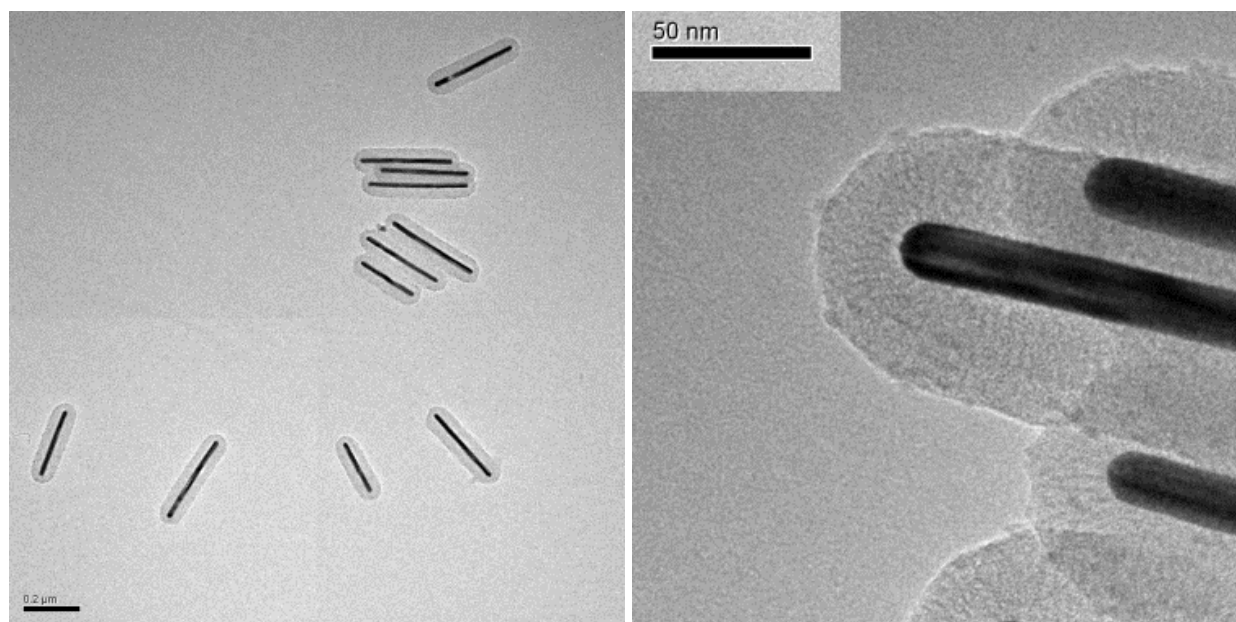
**Figure S5.** TEM image of CIS/CdS NC on an AuNR/SiO<sub>2</sub> structure.



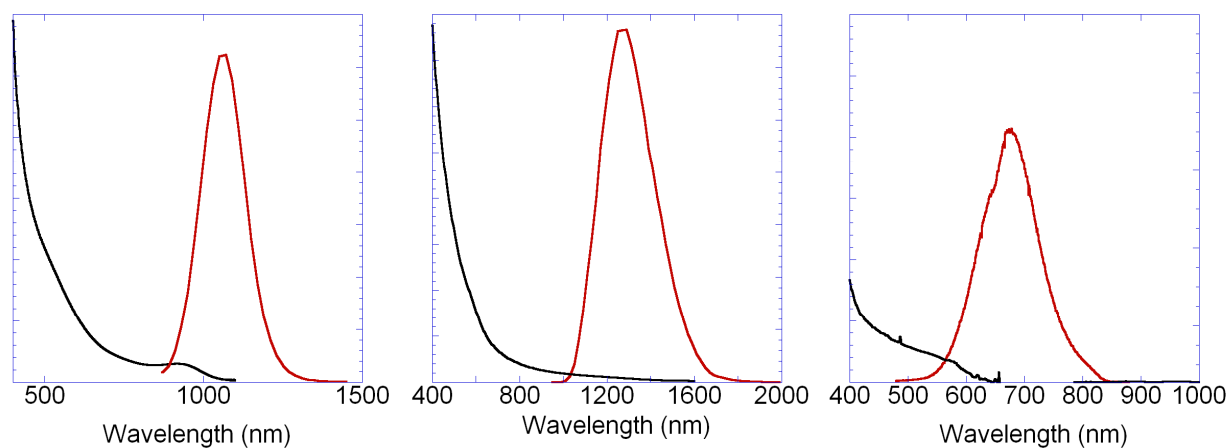
**Figure S6.** TEM image of single Au NP|SiO<sub>2</sub>|PbSe/CdSe superstructure (same sample as Figure 5).



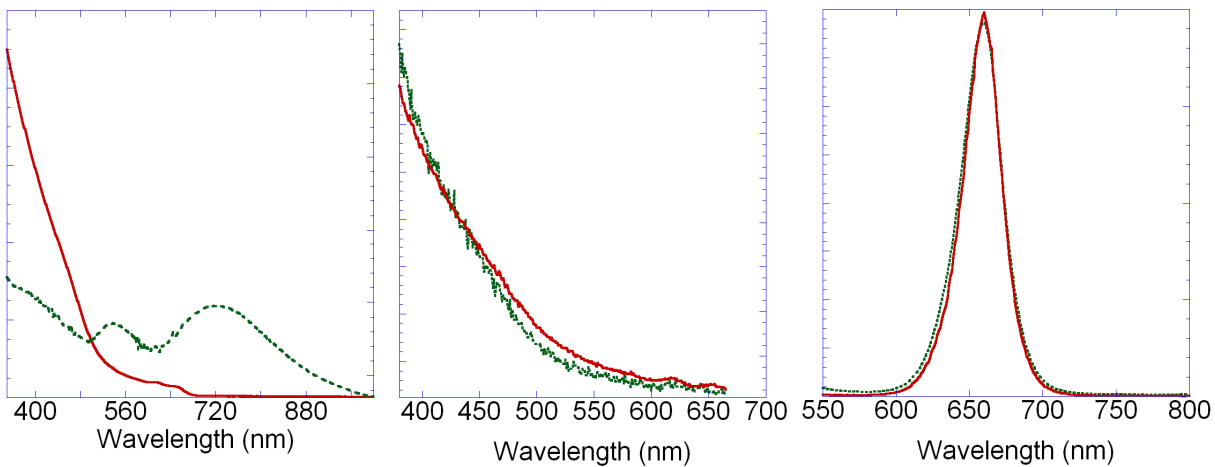
**Figure S7.** TEM image of single Au NP@SiO<sub>2</sub>@PbSe/CdSe superstructure with lower loading.



**Figure S8.** TEM images of CdSe/ZnS NCs on AuNR structures. Note the absence of free NCs in the wide area image of the left panel.



**Figure S9.** PL and Absorption spectra of (from left to right) PbS/CdS, PbSe/CdSe and CIS/CdS NCs used in figure 4 in the text.



**Figure S10.** Comparison of spectra of CdSe/ZnS NC before attachment (red, solid) and Au NR-based superstructure after attachment (dashed green). From left to right: absorption, PLE and PL spectra. Spectra are normalized to allow meaningful comparison.