Supporting information

Heterostructured CIGS-Au nanoparticles: from Au-CIGS side-by-side structure to Au-core/CIGS-shell configuration

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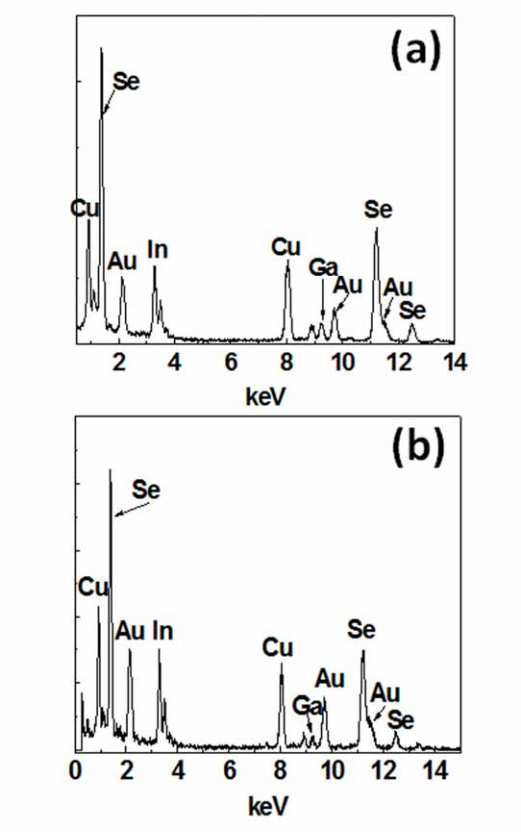

Figure S1: a) EDX taken from a single Au-CIGS side-by-side heterostructured particle (Au TEM grid is used); b) EDX taken from a single Au-core/CIGS-shell heterostructured particle (Au TEM grid is used).

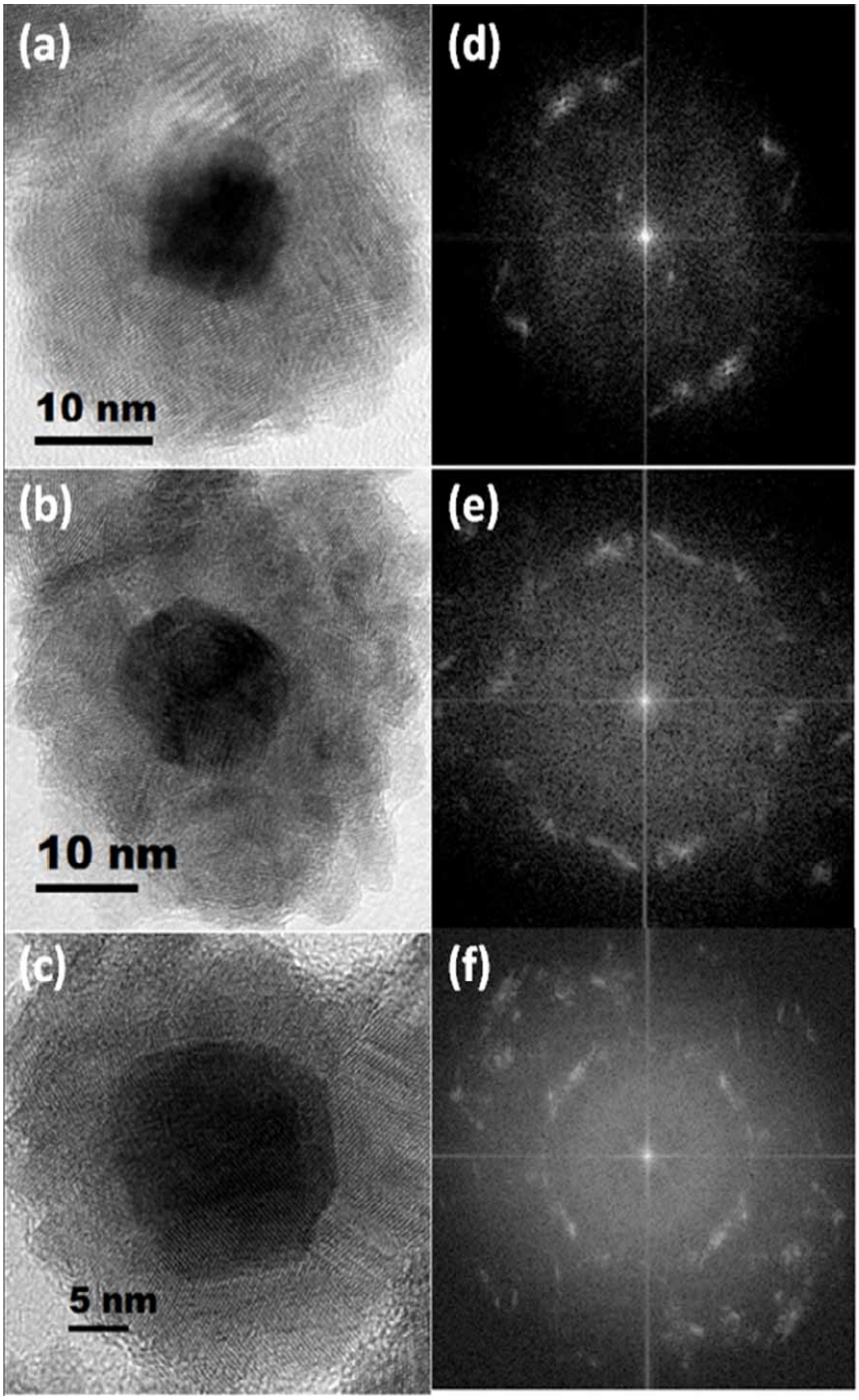

Figure S2. (a)-(c) Magnified TEM images of individual Au-core/CIGS-shell nanoparticles and (d)-(f) corresponding FFT.

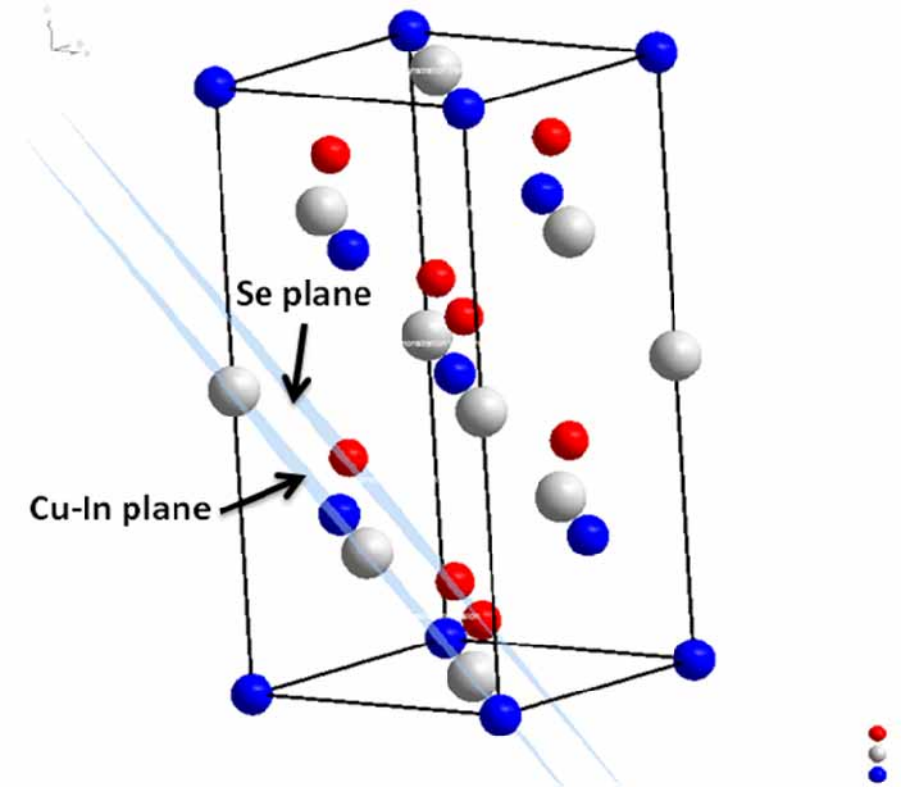

Figure S3: (112) planes of tetragonal chalcopyrite CIS with Cu-In metallic planes (white and blue) and Se plane (red dots). The CIGS shares the similar unit cell with the CIS, only with Ga taking some of the In sites in a substitutional manner.

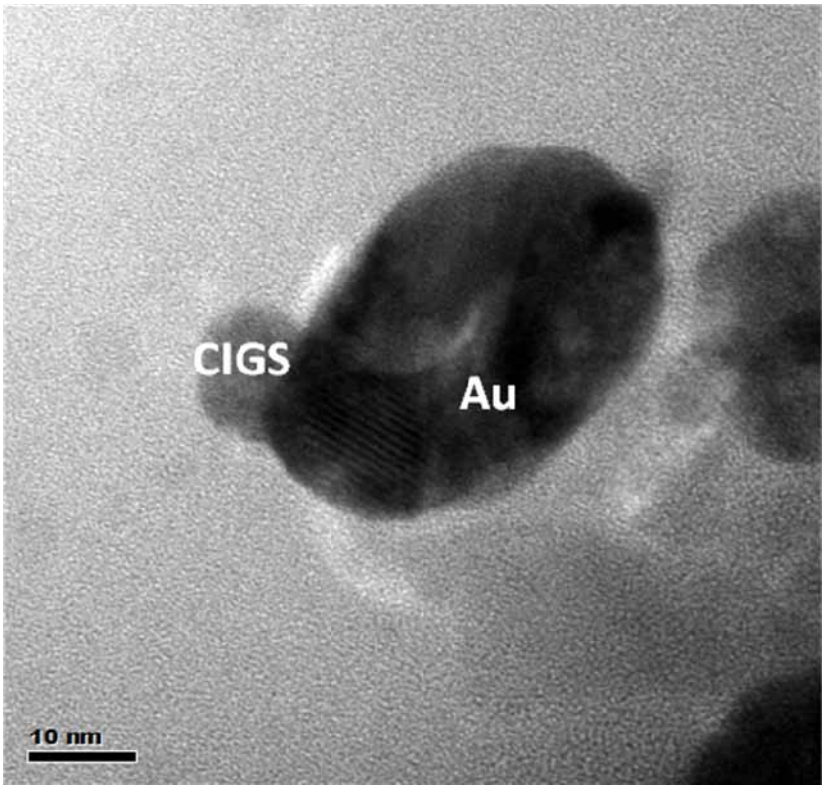

Figure S4: The gold growth with high Au source concentration in the Au/CIGS side-by-side nanostructure. Large Au nanoparticles are found to form on CIGS nanoparticles, maintaining the one-to-one configuration.

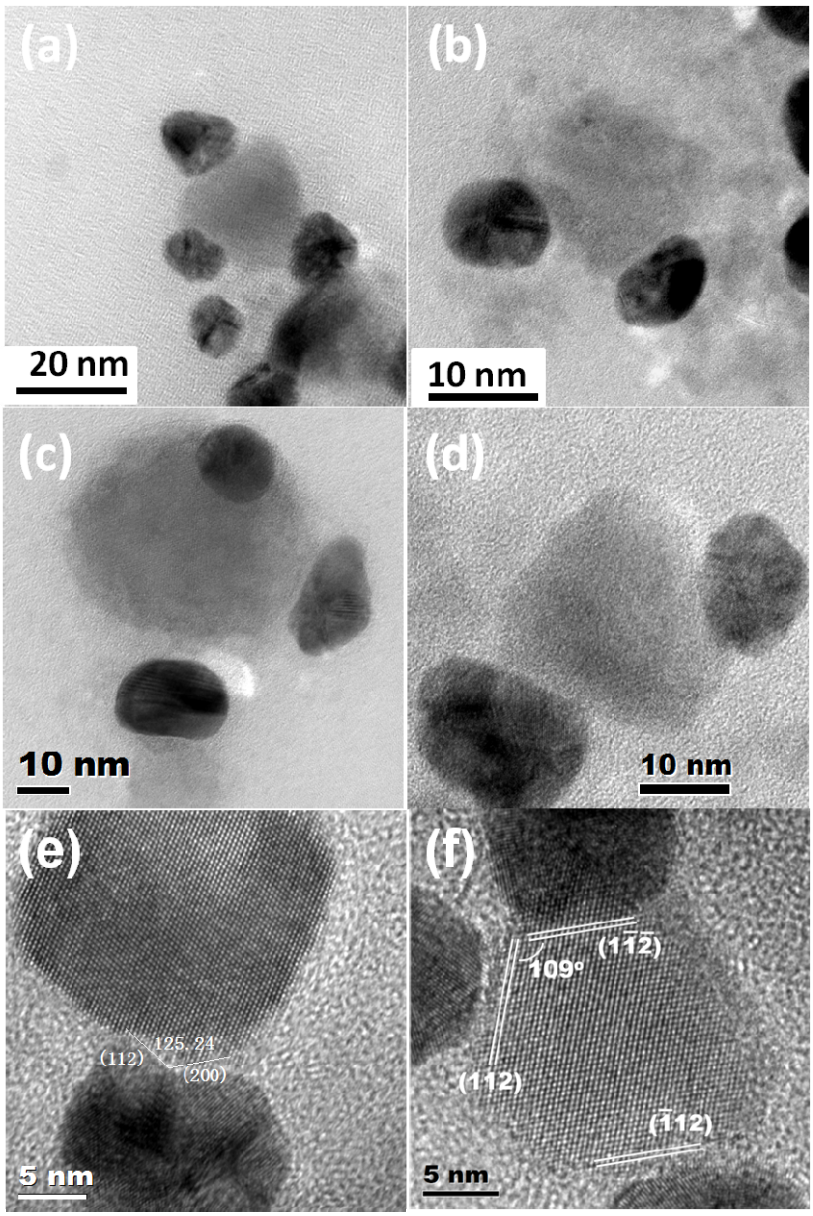

Figure S5: (a) - (d) Multiple Au nanoparticles adhered on single CIGS nanoparticle. The sample was synthesized at 120°C; (e) Gold particle growing on the corner of (200) /(112) surfaces of a CIGS particle; (f) high resolution TEM image of a one-CIGS-to-three-Au nanoparticle, in which all three Au particles grow on (112) planes.

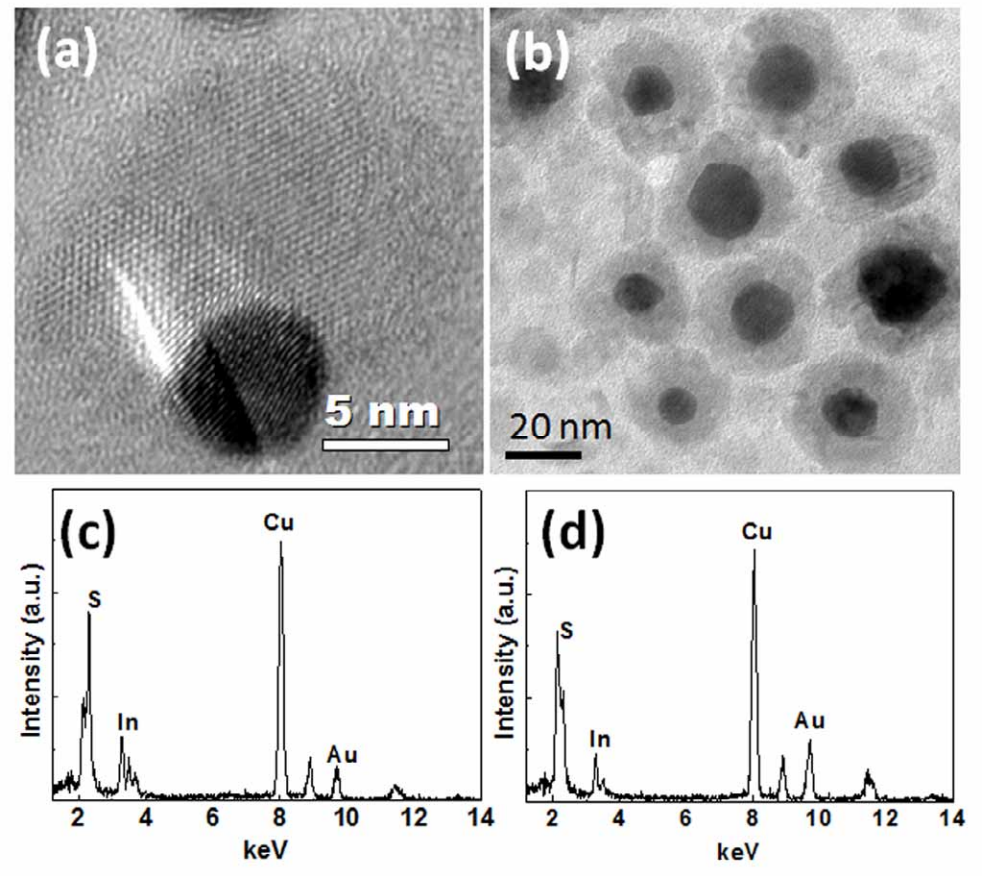

Figure S6. TEM image of (a) gold nanoparticle decorated $CuInS_2$ nanoparticles; and (b) Au-core/$CuInS_2$-shell nanoparticles; (c) and (d), corresponding EDX results taken from (a) and (b), respectively (Cu TEM grids are used in both samples).