SUPPORTING INFORMATION

Photochemical synthesis, characterization, and electrochemical sensing properties of CDs-AuNPs nanohybrids

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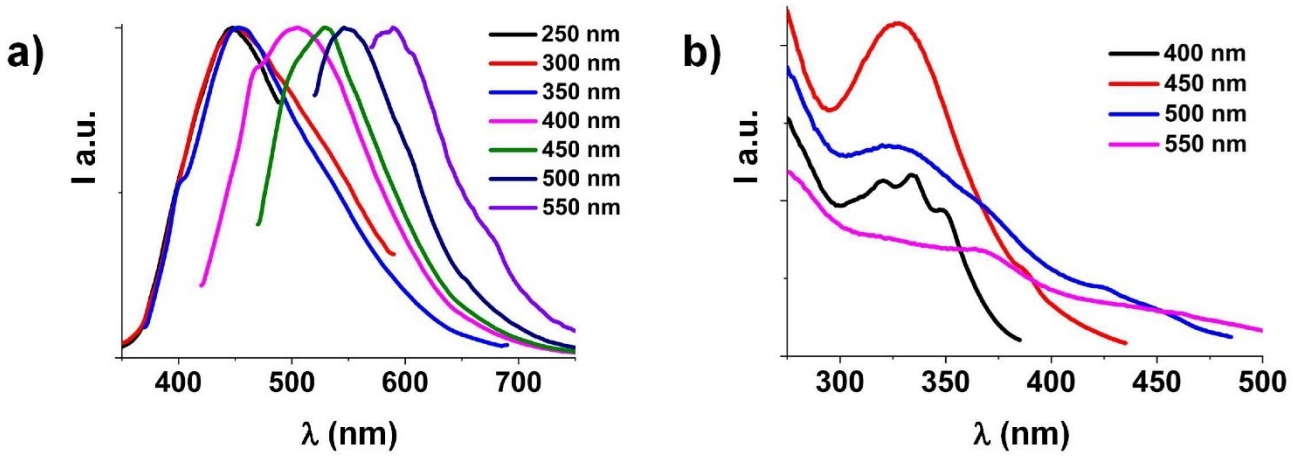

Figure S1. *Optical spectroscopy characterization of CDs: a) A selection of normalized emission spectra ($\lambda_{excitation}$ = 250-550 nm, excitation wavelength in legend); B) A selection of excitation spectra ($\lambda_{emission}$ = 400-550 nm, emission wavelength in legend)*

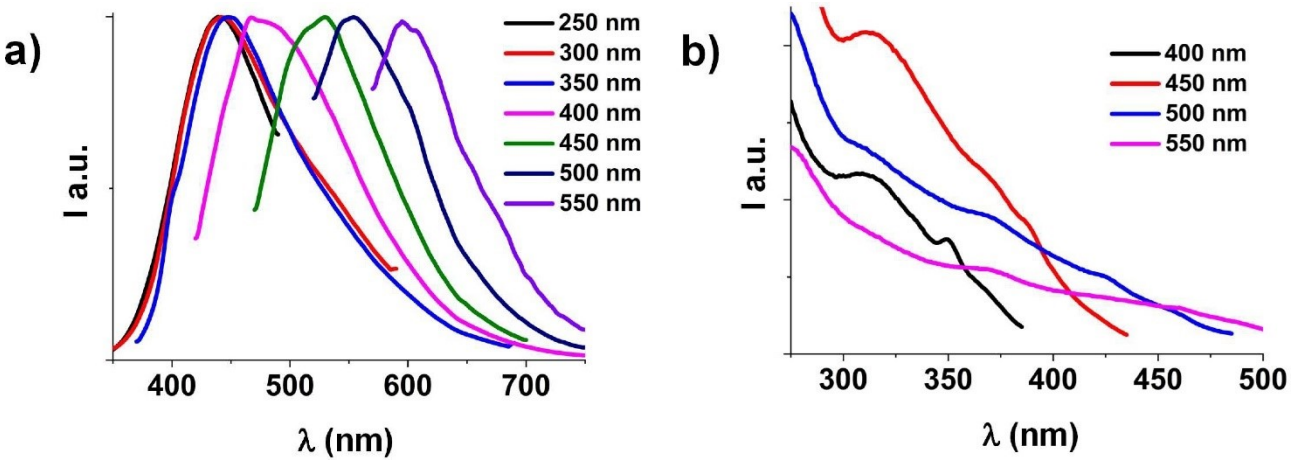

Figure S2. *Optical spectroscopy characterization of CDs-Ethylenediamine (CDs-E): a) A selection of normalized emission spectra ($\lambda_{excitation}$ = 250-550 nm, excitation wavelength in legend); c) A selection of excitation spectra ($\lambda_{emission}$ = 400-550 nm, emission wavelength in legend)*

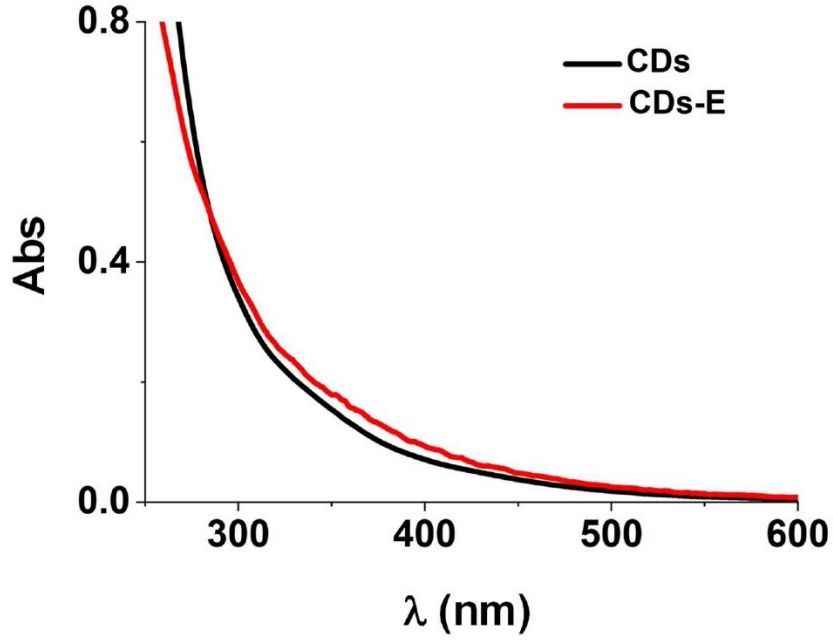

Figure S3. *UV/Vis absorption spectra of CDs (black line) and CDs-E (red line)*

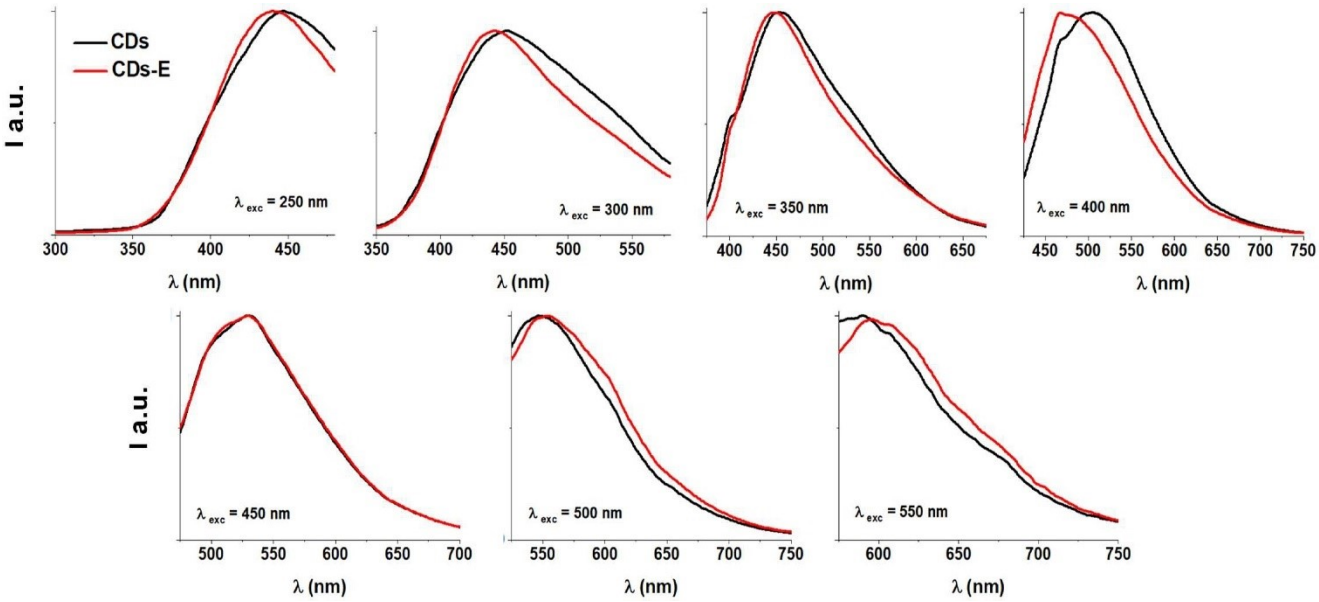

Figure S4. *Comparison of normalized emission spectra of CDs (black line) and CDs-E (red line). Excitation wavelengths: 250, 300, 350, 400, 450, 500 and 550 nm*

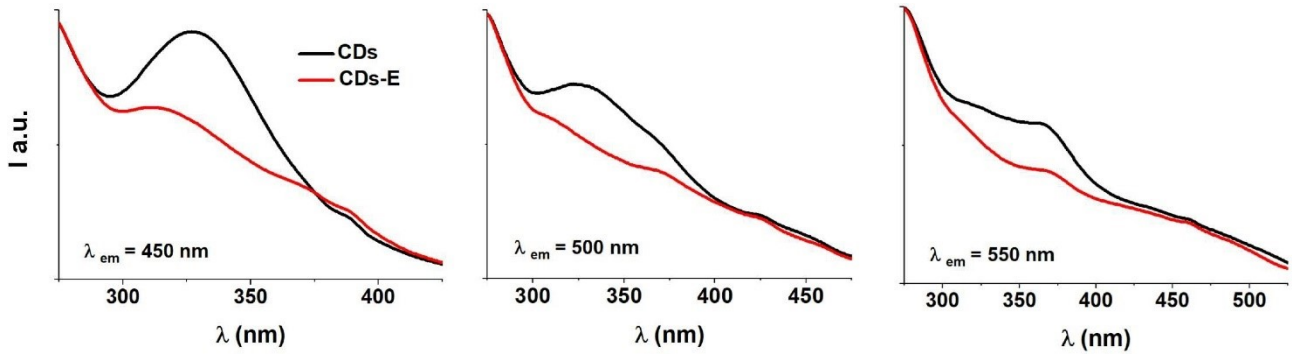

Figure S5. *Comparison of excitation spectra of CDs (black line) and CDs-E (red line). Emission wavelengths: 450, 500, 550 nm.*

Table S1. *Luminescence lifetimes of CDs-E and CDs. Samples were excited at 408 nm, luminescence lifetimes were recorded at different emission wavelengths.*

$\lambda_{emission}$ (nm)	CDs-E		CDs	
430	1.70 ns (62 %)	6.60 ns (38 %)	1.60 ns (69 %)	7.20 ns (31 %)
450	2.00 ns (57 %)	7.80 ns (43 %)	1.87 ns (57 %)	7.51 ns (43 %)
470	2.00 ns (52 %)	8.20 ns (48 %)	1.97 ns (52 %)	8.37 ns (48 %)
490	2.20 ns (48 %)	8.50 ns (52 %)	2.27 ns (45 %)	8.67 ns (55 %)
510	2.50 ns (49 %)	8.20 ns (51 %)	2.40 ns (42 %)	8.87 ns (58 %)
530	2.45 ns (45 %)	8.80 ns (54 %)	2.57 ns (43 %)	8.93 ns (57 %)

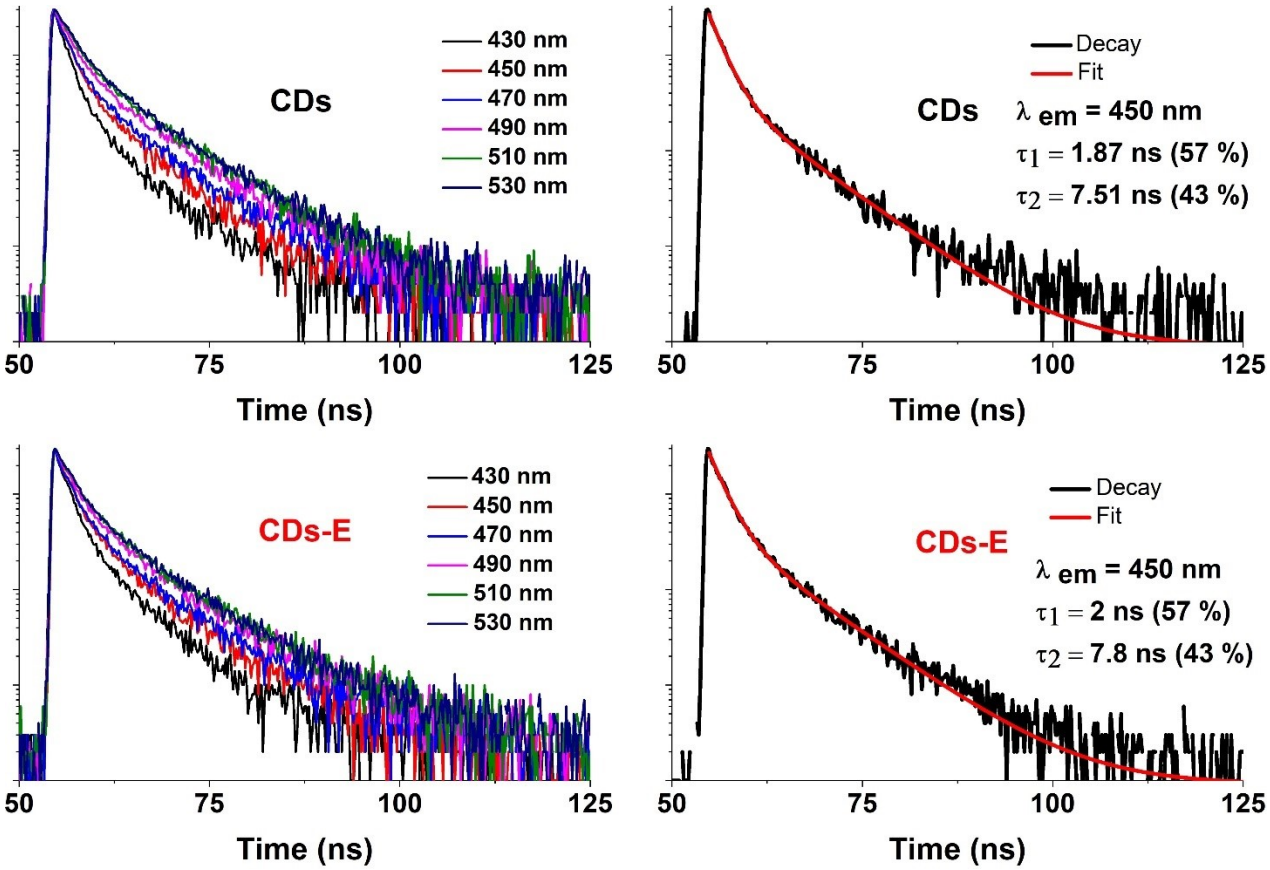

Figure S6. *Photoluminescence lifetimes of CDs and CDs-E: a) Decays recorded on different luminescence wavelengths of CDs; b) Lifetimes of CDs on* $\lambda_{emission}$ *= 450 nm; c) Decays recorded on different luminescence wavelengths of CDs-E; d) Lifetimes of CDs-E on* $\lambda_{emission}$ *= 450 nm.*

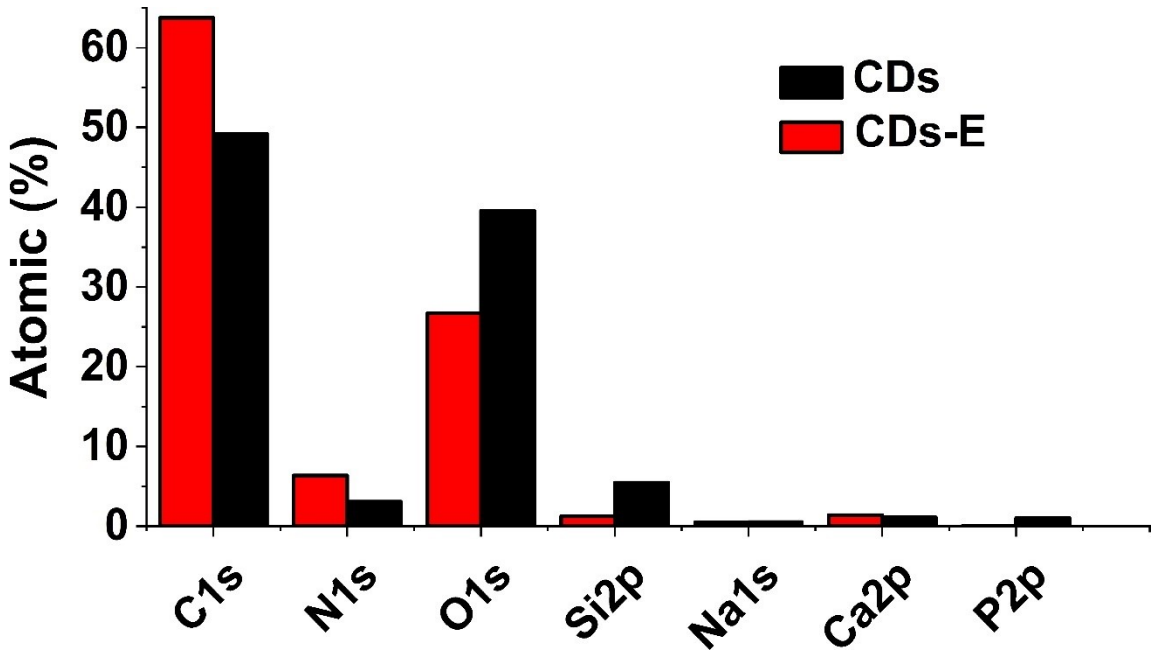

Figure S7. *Quantitative XPS analysis of CDs (black bar) and CDs-E (red bar).*

Table S2. *Zeta potential measurements of CDs and CDs-E aqueous dispersions estimated via the Dynamic Light Scattering (DLS) technique.*

SAMPLE	PDI (Polydispersity index)	ZETA POTENTIAL (mV)
CDs	0.192 ± 0.038	-23.40 ± 0.87
CDs-E	0.465 ± 0.051	-32.70 ± 2.36

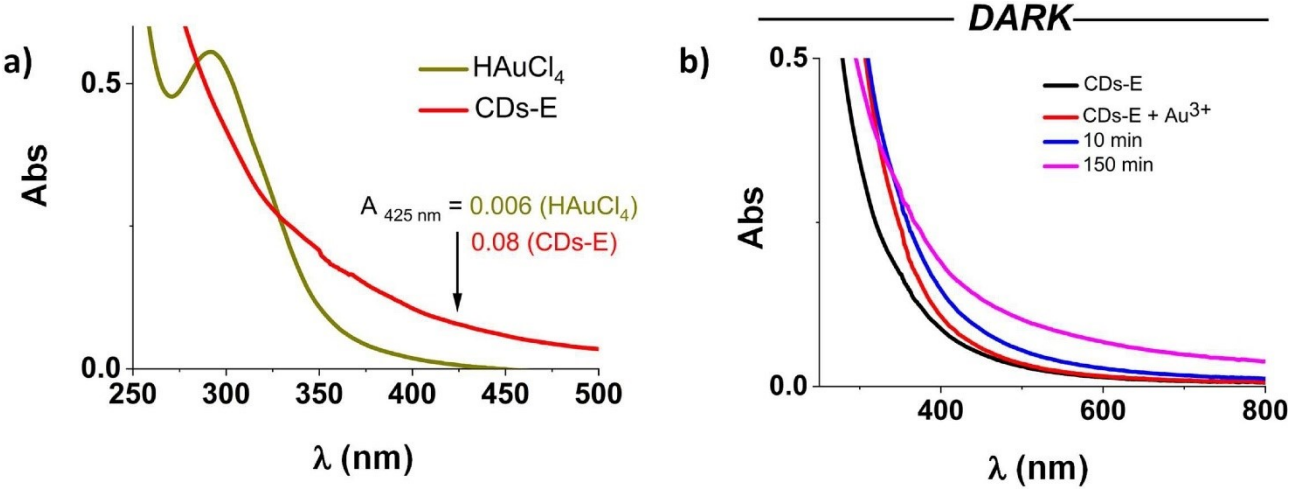

Figure S8. *a) UV/Vis absorption spectra of $HAuCl_4$ 2.5 · 10^{-4} mol/L and CDs-E in ultrapure water; b) Control experiment of CDs-Au nanohybrid synthesis, absorption spectral changes in darkness conditions using CDs-E.*

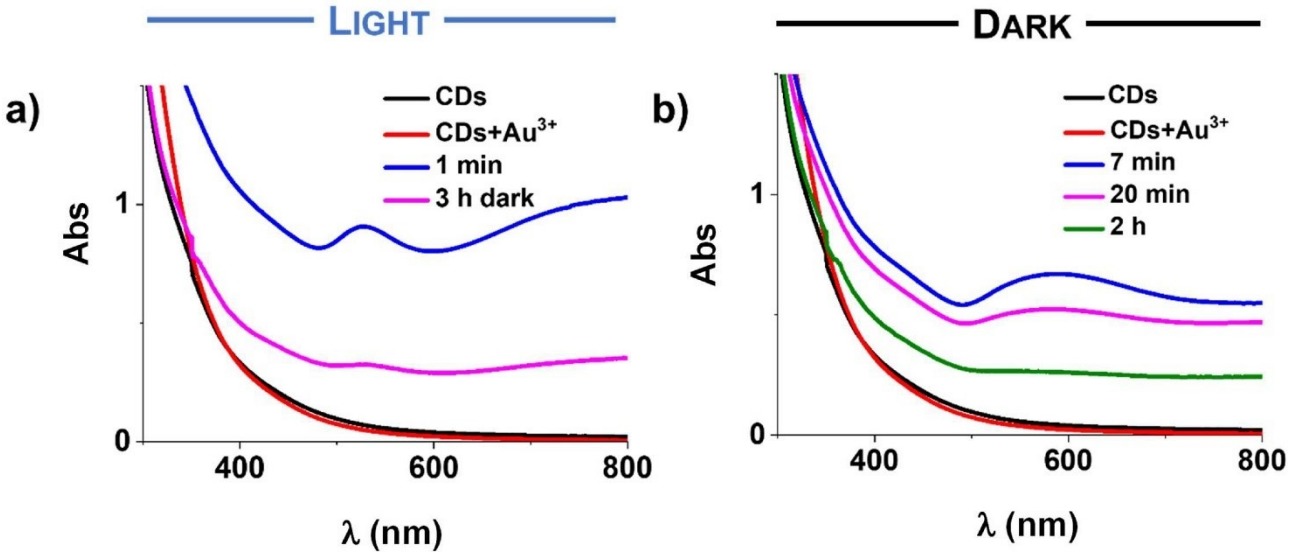

Figure S9. *Control experiment performed with CDs as reducing and capping agent: a) Blue (420-430 nm) light irradiated sample, b) Control in darkness condition.*

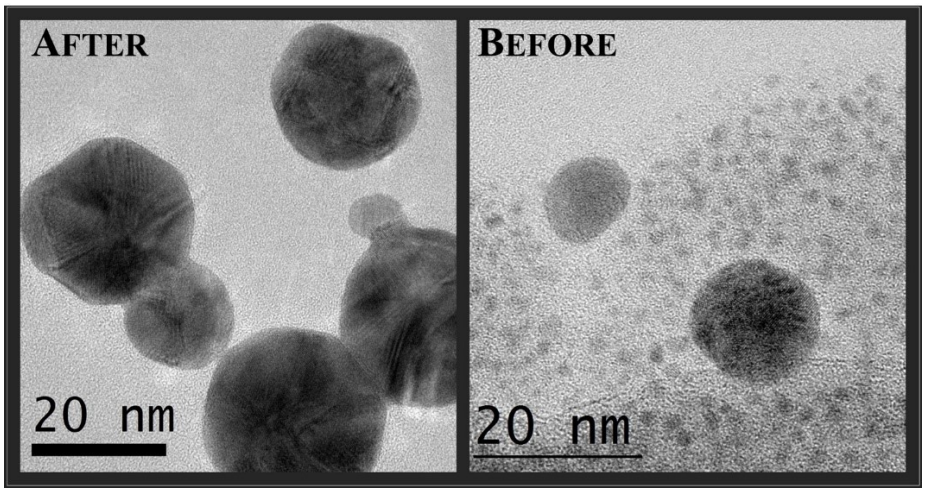

Figure S10. *TEM images of CDs-Au nanohybrid before and after purification*

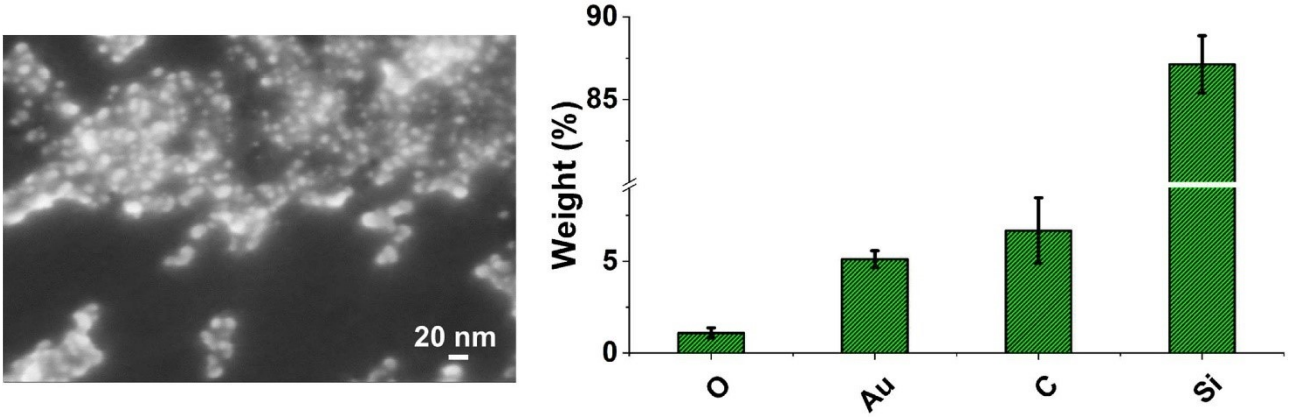

Figure S11. *a) SEM micrograph of CDs-Au nanohybrid (scalebar 20 nm). b) Energy-dispersive X-ray spectroscopy (EDS) characterization of CDs-Au nanohybrid on the SEM micrograph area of Fig. S11a.*

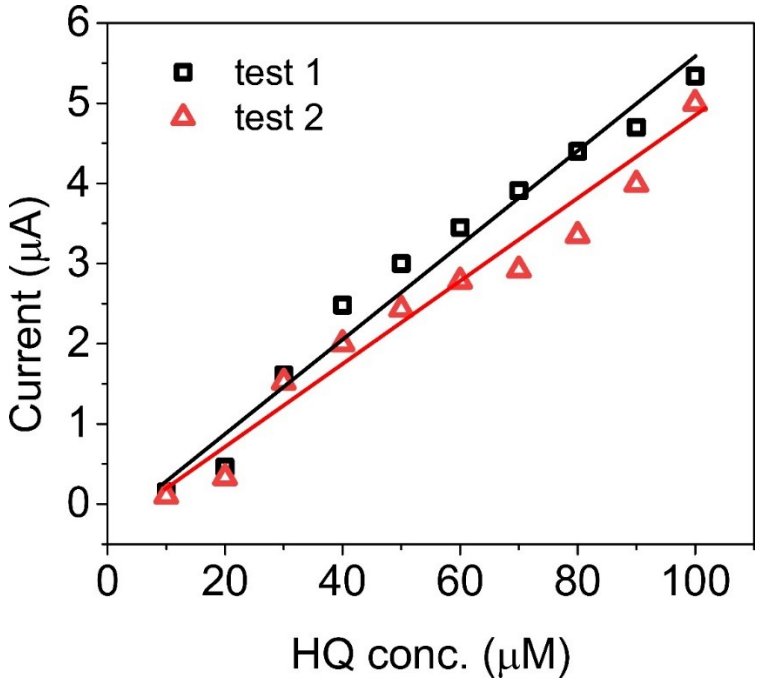

Figure S12. *Current (μA) versus hydroquinone concentrations (μM) for two tests performed for HQ detection with the same CDs-Au/SPCE sensor. Test 2 was replied after one week under identical operating conditions.*