Supporting Information

Plasmonic Hot Carrier Induced Photosensitization of CdSe Quantum Dots: Role of Phonons

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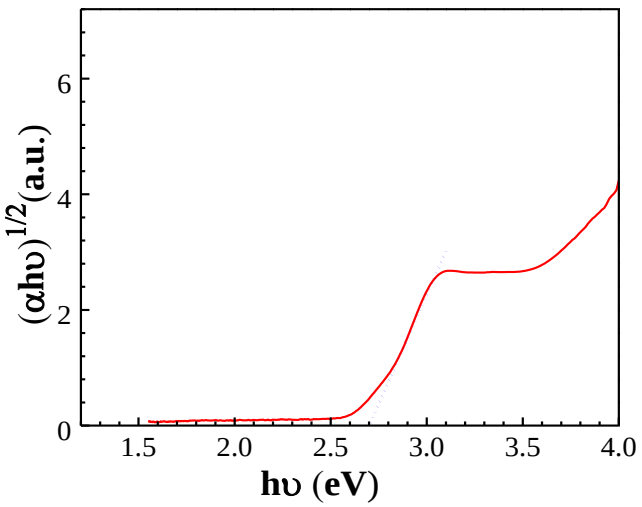

Figure S1. Tauc plot showing the band gap energy 2.7 eV derived from the UV-vis absorption spectrum of CdSe QDs ink solution.

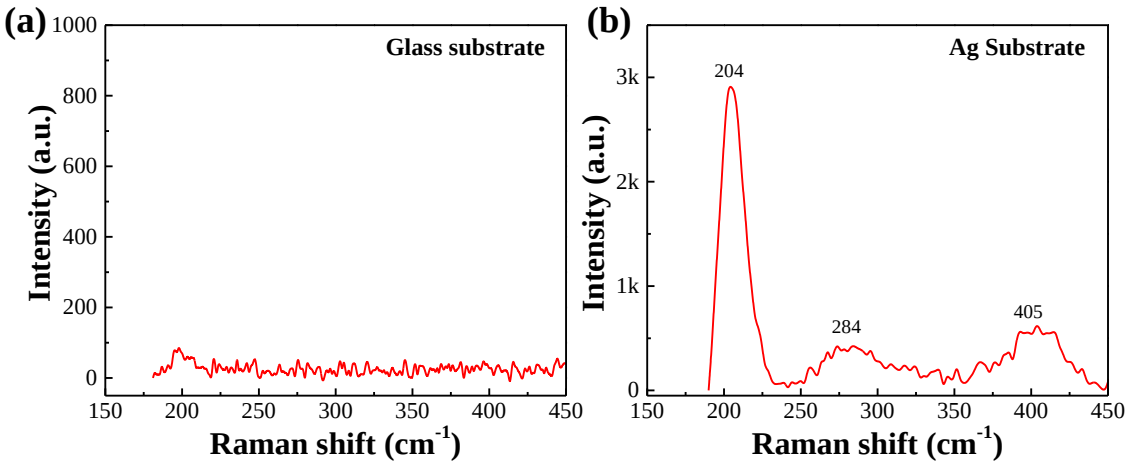

Figure S2. (a) Raman scattering spectrum of CdSe QDs thin-film deposited over borosilicate glass substrate. 532 nm laser line is used as excitation source. (b) Raman spectrum of the same QDs sample thin-film deposited over e-beam deposited silver (e-Ag) substrate is recorded using 488 nm laser wavelength as the source of excitation.

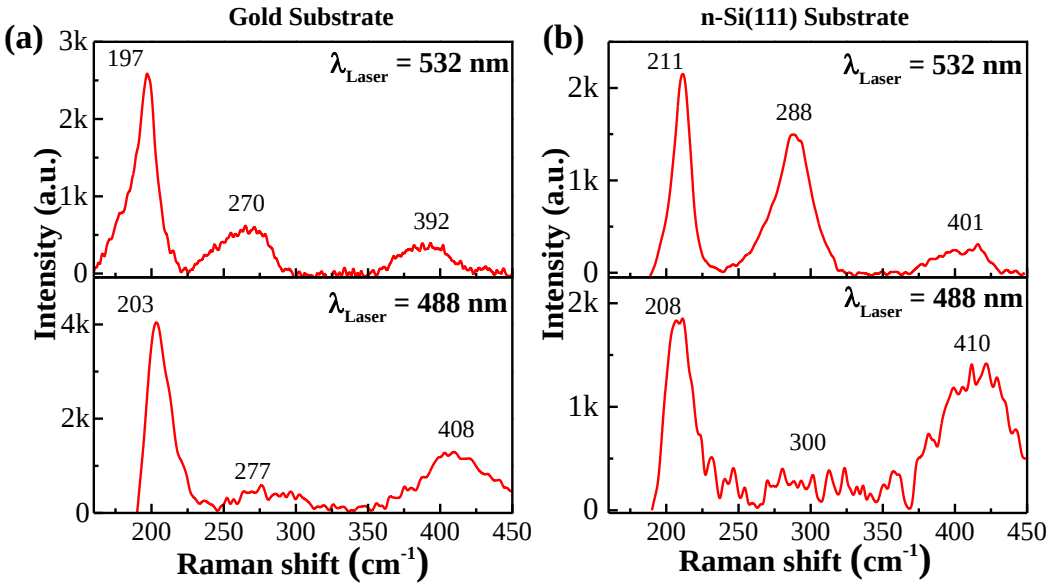

Figure S3. Raman scattering spectra of CdSe QDs thin-film deposited over (a) gold (e-Au) and (b) highly conducting n-Si(111) substrate. 532 nm laser excitation is used for top panel and 488 nm laser excitation is used for bottom panel.

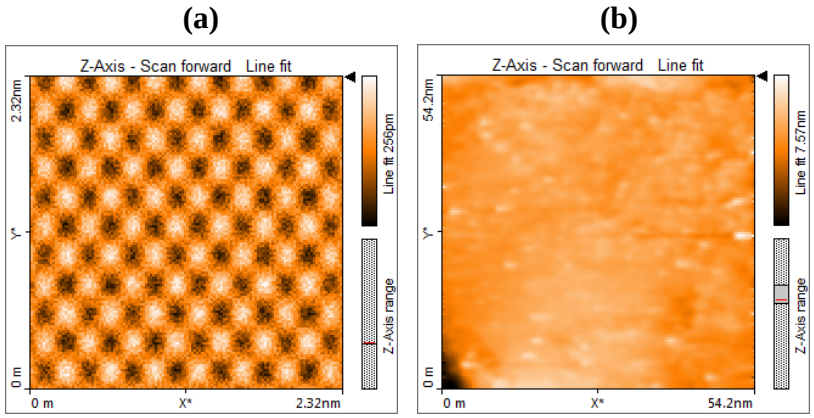

Figure S4. STM topography images of (a) HOPG only and (b) highly conducting As-doped bare silicon.

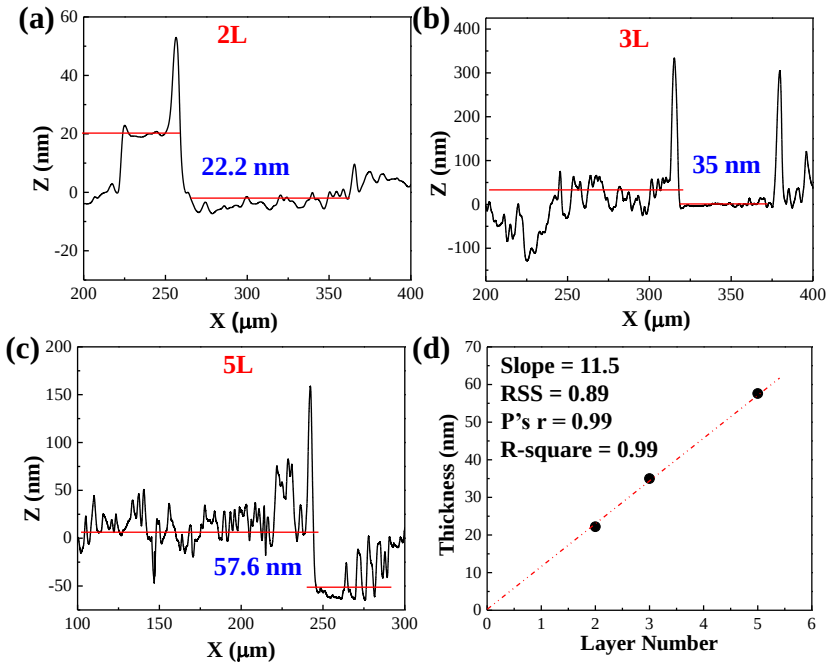

Figure S5. Profilometer line profiles of scratched CdSe QDs thin-film deposited over smooth quartz coated glass substrate by varying number of spin coating layer such as (a) 2 layer, (b) 3 layer, and (c) 5 layer. (d) Layer number vs. thin-film thickness plot showing nice linear nature.

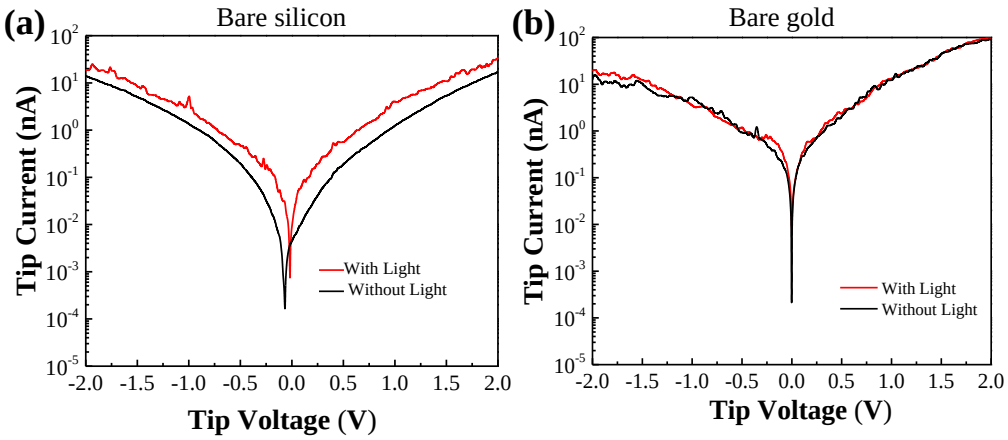

Figure S6. Tunnelling *I-V* characteristics of (a) bare silicon and (b) e-Au only with (red line) and without (black line) light illumination.

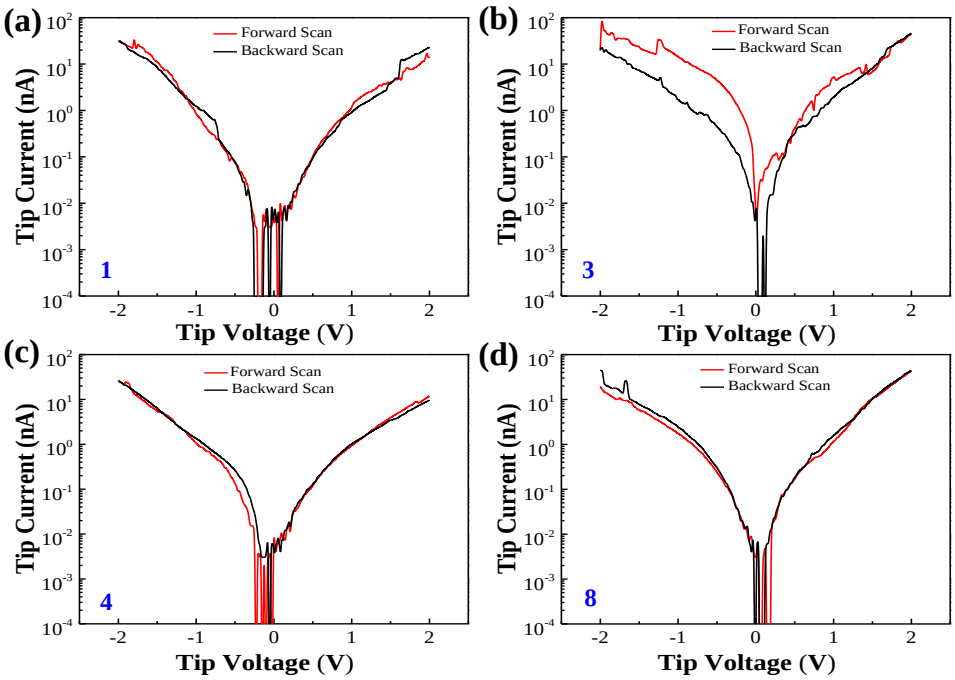

Figure S7. Tunnelling *I-V* characteristics for the simultaneous forward (red line) and backward (black line) sweep direction under light illumination of the device n-Si(111)/CdSe/Pt-Ir recorded on different locations such as (a) 1, (b) 3, (c) 4, and (d) 8 on the same measurement line in the main manuscript text.

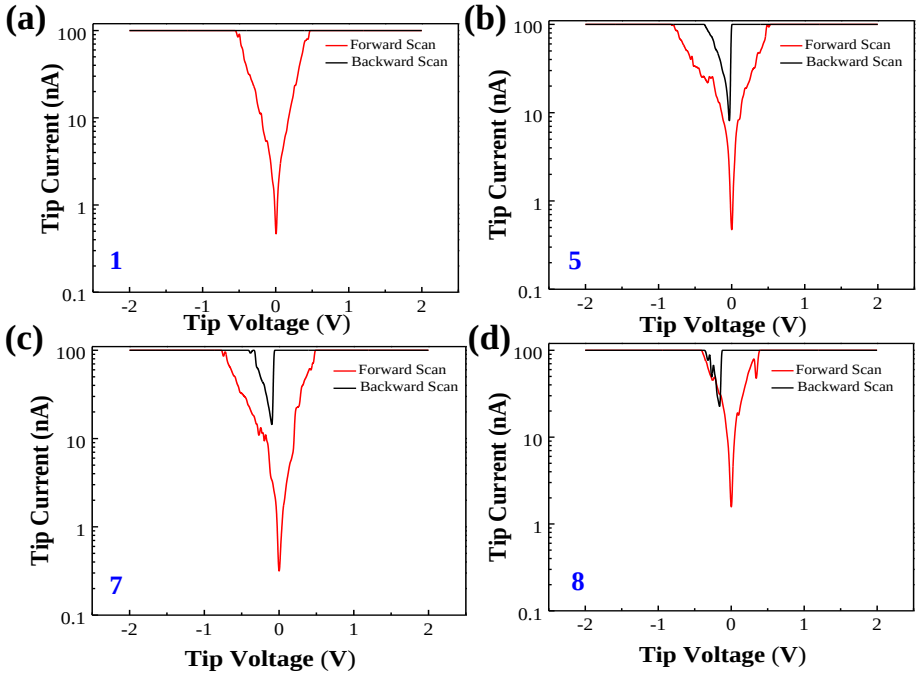

Figure S8. Tunnelling *I-V* characteristics for the simultaneous forward (red line) and backward (black line) sweep direction under light illumination of the device e-Au/CdSe/Pt-Ir recorded on different locations such as (a) 1, (b) 5, (c) 7, and (d) 8 on the same measurement line in the main manuscript text.

Table S1: STM tip approaching set points for different substrates and devices.

S/N	Substrate	Thin Film	Condition	Tip Bias Voltage (V_{tip})	Tip current (I_{tip})
1	HOPG	None	Dark	50.1 mV	1.0 nA
2	e-Au	None	Dark	1.05 V	1.0 nA
3	n-Si(111)	None	Dark	1.5 V	1.0 nA
4	e-Au	$(CdSe)_{5L}$	Dark	1.05 V	1.0 nA
			Light	1.05 V	1.0 nA
5	n-Si(111)	$(CdSe)_{5L}$	Dark	1.0 V	1.0 nA
			Light	1.05 V	1.0 nA