Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Effect of Ag/Au Bilayer Assisted Etching on the Strongly Enhanced Photoluminescence and Visible Light Photocatalysis from Si Nanocrystal Decorated Si Nanowires Array

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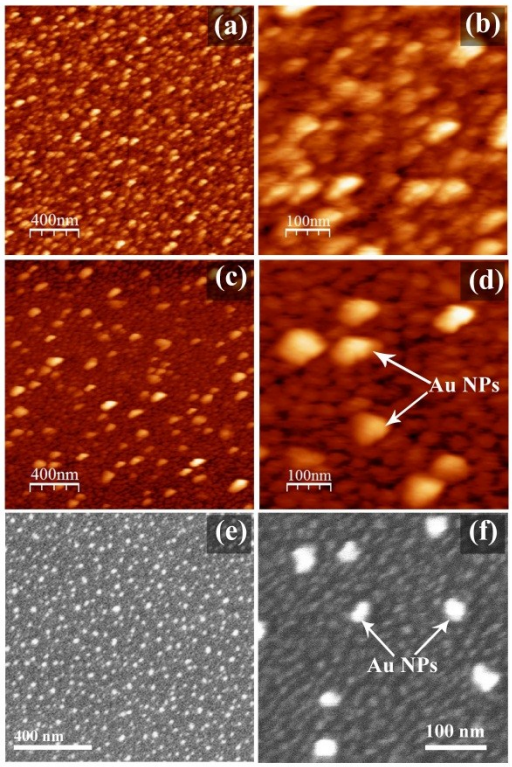

Figure S1. AFM topography images of: (a, b) 10 nm Ag on Si and (c, d) 10 nm Ag + 2 nm Au on Si, at different magnifications. (e, f) FESEM images of the corresponding Ag and AgAu layers.

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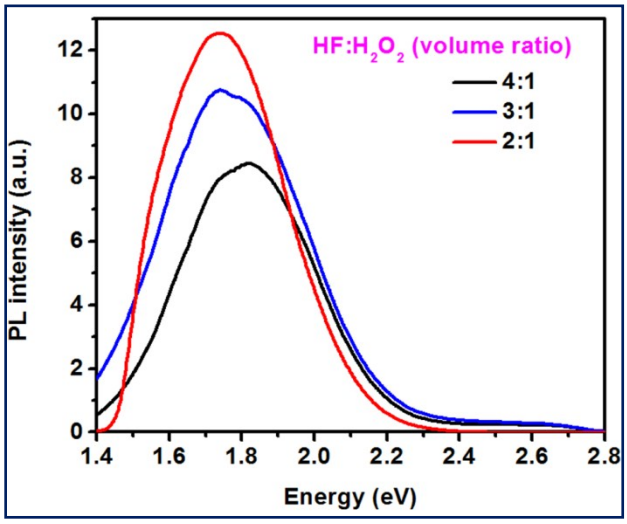

Figure S2. Comparison of PL spectra of Si NWs/NCs grown with different ratio of HF and H_2O_2, with Ag/Au bilayer catalyst.

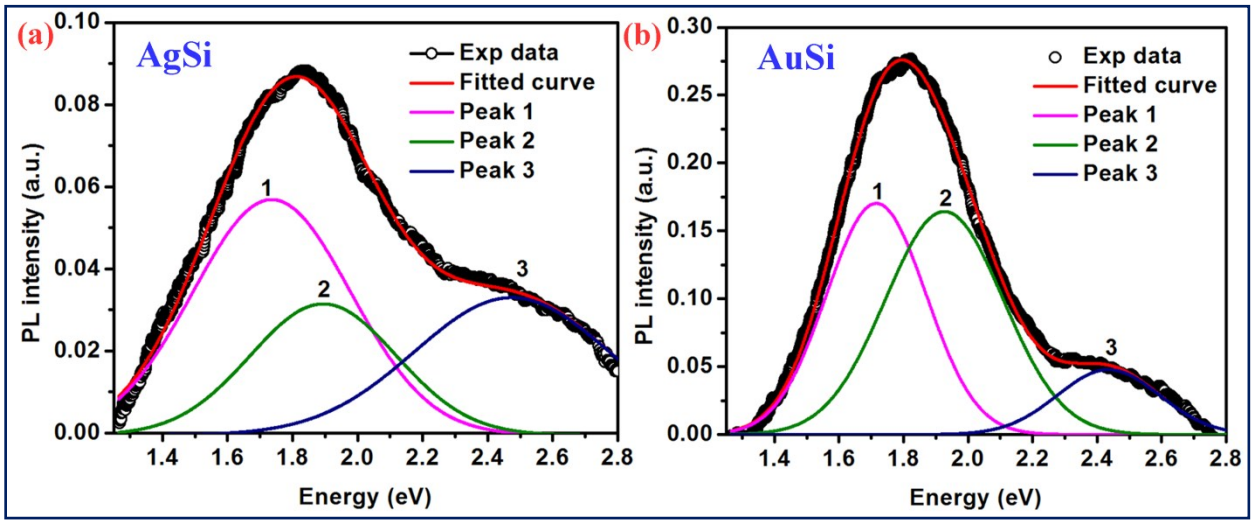

Figure S3. PL spectra (symbols) of : (a) AgSi and (b) AuSi. Each spectrum is fitted with three Gaussian peaks (1, 2, 3) (solid lines).

Table S1: *Summary of the fitted parameters for PL spectra of different samples.*

Samples	Peak 1		Peak 2		Peak 3	Intensity ratio, Peak 1/Peak 2
	Center (eV)	Intensity	Center (eV)	Intensity	Center (eV)	
AgSi	1.74	0.03	1.89	0.02	2.47	1.5
AuSi	1.72	0.17	1.92	0.16	2.45	1.06
AgAuSi	1.74	5.79	1.92	4.28	2.50	1.35
AgAuSi_HF	1.72	47.10	1.90	20.5	2.57	2.29
AgAuSi_HF, 150 sec laser exposed	1.74	15.20	1.86	18.30	2.68	0.83
AgAuSi, 100 mW laser exposed	1.74	11.30	1.89	10.50	2.66	1.07
Peak identity/origin	Si NCs		NBOHC		O_V	

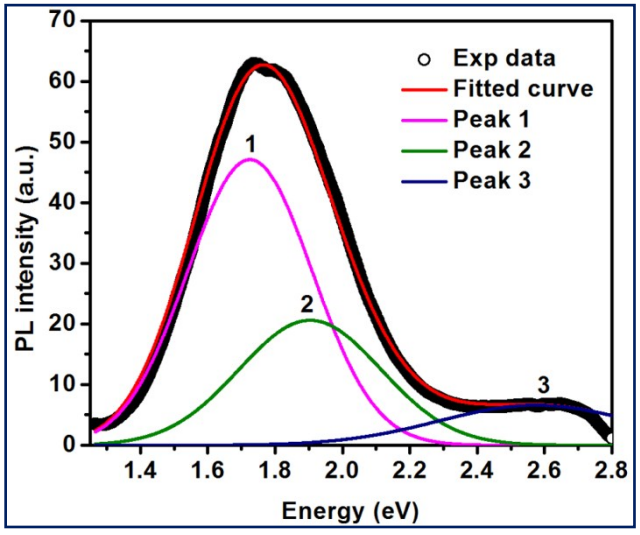

Figure S4. PL spectrum (symbols) of AgAuSi_HF, fitted with three Gaussian peaks (solid lines).

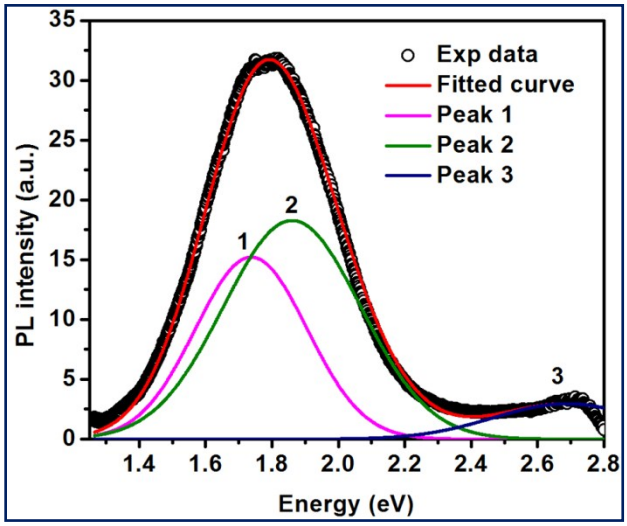

Figure S5. PL spectrum (symbols) of the HF etched AgAuSi 150 sec laser exposure in air. The solid lines shows the Gaussian fitted peaks (1, 2, 3).

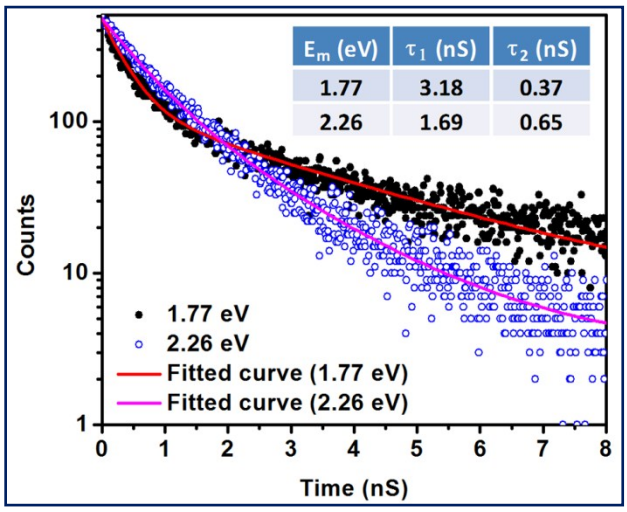

Figure S6. Comparison of the TRPL decay for AgAuSi monitored at two different emission energies (E_m). Each curve is fitted by a bi-exponential decay and the fitted parameters are tabulated in the inset.

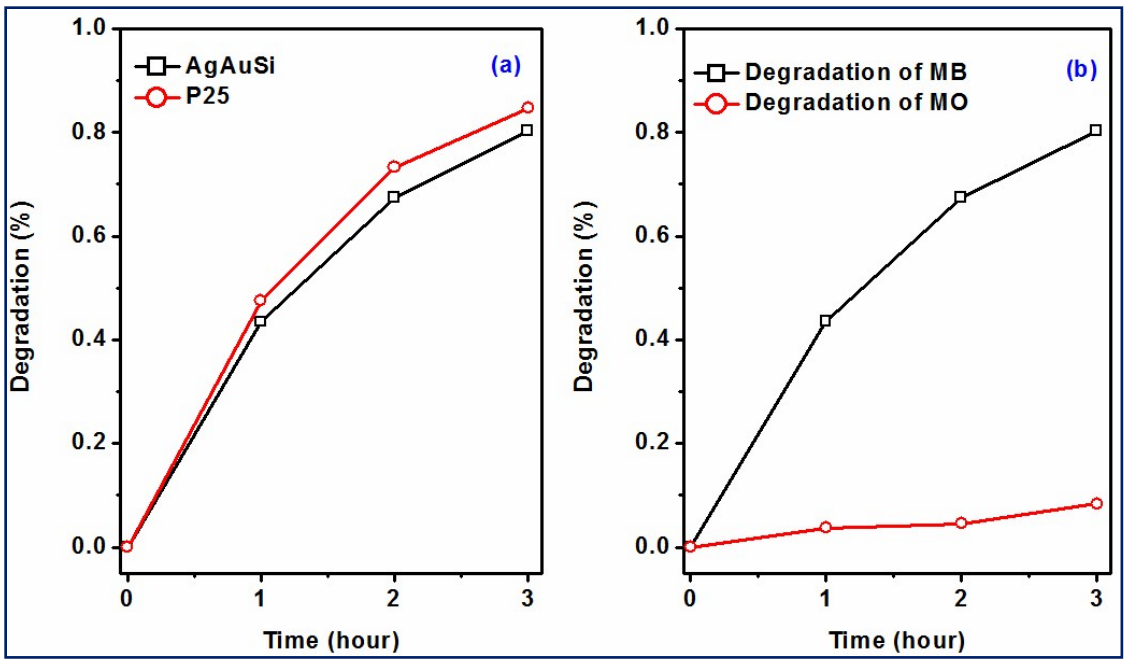

Figure S7. (a) Comparison of the photocatalytic efficiency of AgAuSi with that of the standard reference sample P25 (Degussa). (b) Comparison of the photocatalytic efficiency of AgAuSi in the photodegradation of MB and MO.

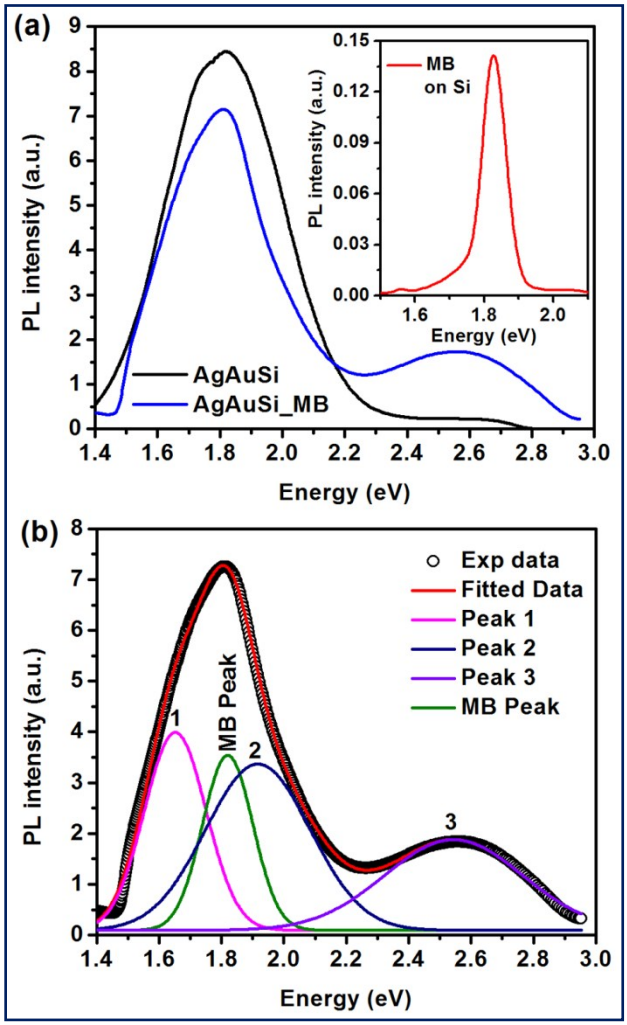

Figure S8. (a) Comparison of the PL spectra for AgAuSi before and after photocatalysis (MB under visible light illumination for 3 hrs). The inset shows the PL spectrum of MB on pristine Si wafer. (b) PL spectrum of AgAuSi after photocatalysis, fitted with four Gaussian peaks including the peak corresponding to MB.

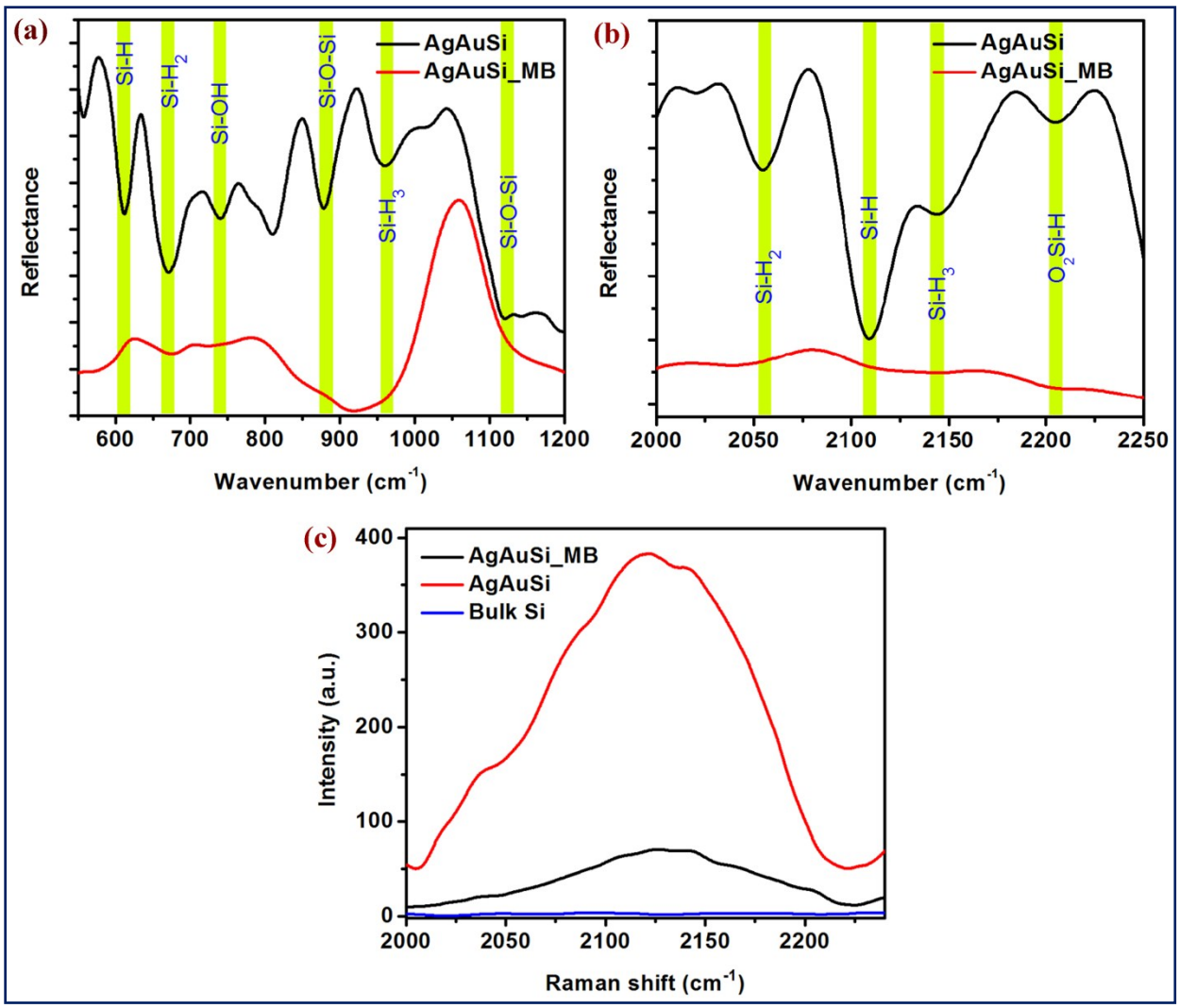

Figure S9. (a-b) Comparison of the FTIR spectra for AgAuSi and AgAuSi_MB showing different vibrational modes in two different regions of wavenumbers. The green vertical boxes indicate the position of the different characteristic modes of Si. (c) Comparison of the Raman spectra for AgAuSi before and after photocatalysis in MB.