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ARTICLE

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A Photo-responsive p-Si/TiO_2/Ag Heterostructure with Charge Transfer for Recyclable Surface-Enhanced Raman Scattering Substrate

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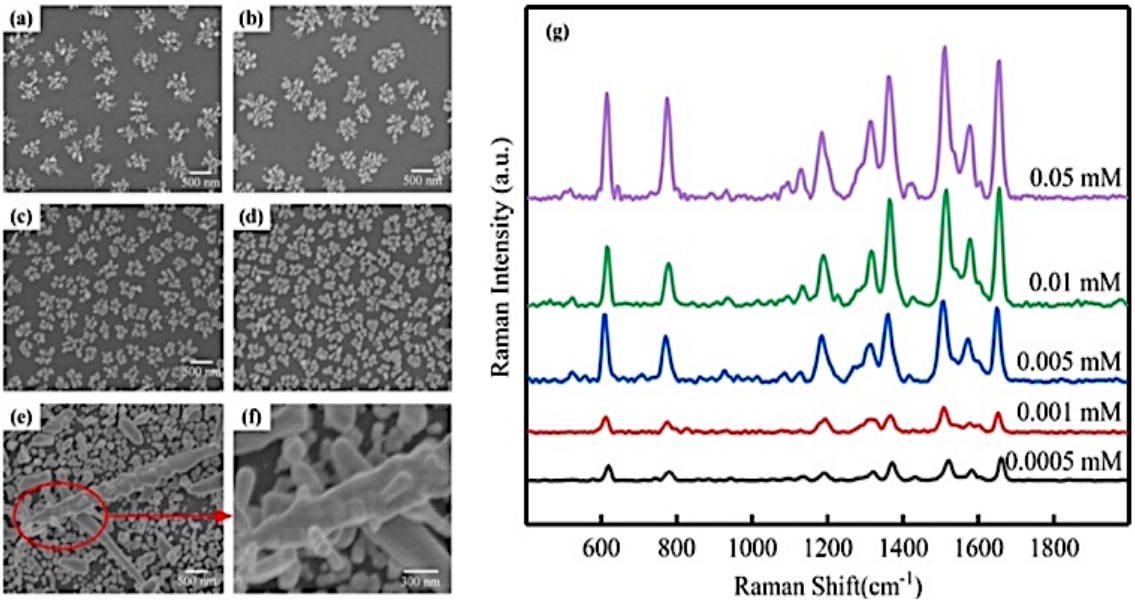

Fig. S1 SEM images of Ag nanoflowers prepared on Si/ TiO_2 substrates with different $AgNO_3$ concentrations and SERS spectra of R6G absorbed on Si/TiO_2/Ag substrates. (a)~(e) are the SEM images of Ag nanoflowers with the $AgNO_3$ concentrations of 0.0005 mM, 0.001 mM, 0.005 mM, 0.01 mM, 0.05 mM sequentially. (f) is the magnification image of the selected in (e). (g) is the SERS spectra of 10^{-5} M R6G absorbed on the corresponding substrates.

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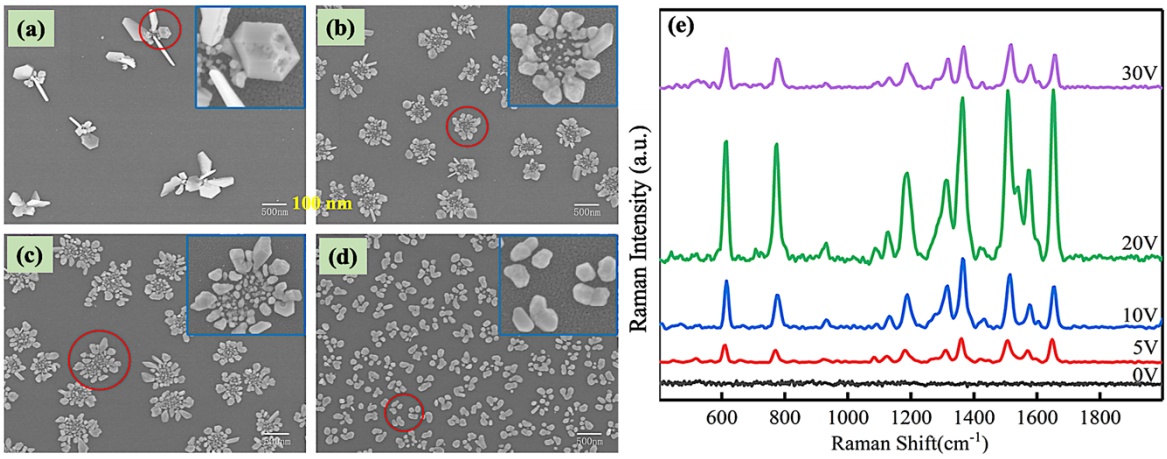

Fig. S2 SEM images of Ag nanoflowers deposited on TiO_2 thin film substrate with different applied voltages (a~d represent 5V, 10V, 20V and 30V, respectively) and the corresponding SERS spectra of R6G absorbed on it (e).

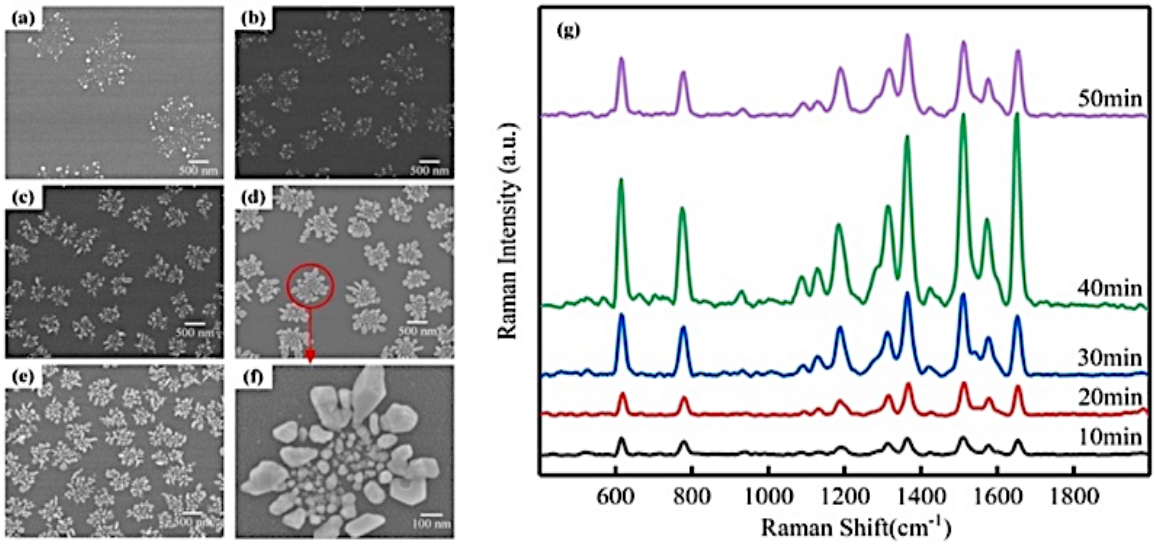

Fig. S3 SEM images of Ag nanoflowers on TiO_2 substrates prepared with different reaction times (a-f) and the corresponding SERS spectra of the 10^{-5}M R6G (g).

The band gap energy (*Eg*) of TiO_2 is determined based on UV-Vis Spectra (UV-2450, Shimadzu). According to the formula: $\left(\frac{Ah\nu}{K}\right)^{1/2} = h\nu - E_g$, the E_g of TiO_2 is about 3.22 eV, as seen from the following Fig. S4.

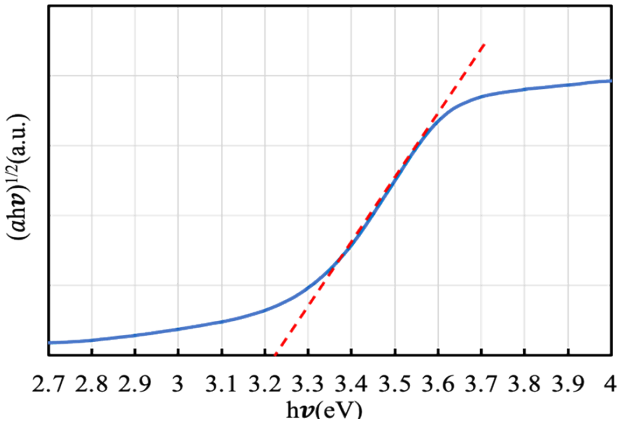

Fig.S4 Energy gap of TiO_2 based on UV -Vis spectra

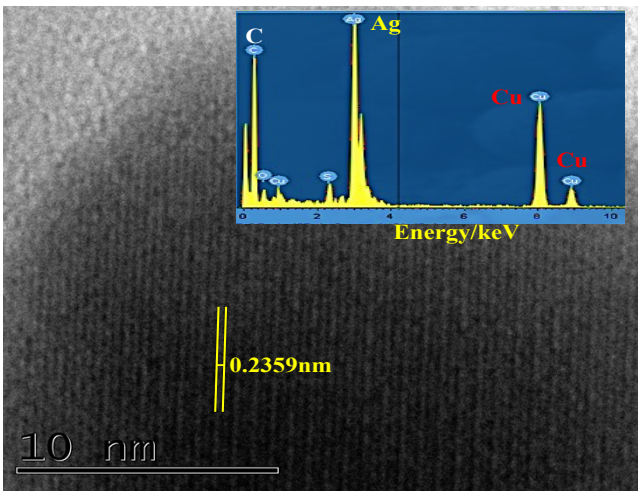

Fig. S5 the HR-TEM image of Ag and the inserted EDS result

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The EF calculated formula is as follows:
EF = (I_{SERS}/N_{SERS}) / (I_{Normal}/N_{Normal})
Here, I_{SERS} and I_{Normal} is the Raman intensity of SERS and normal Raman spectrum of R6G, respectively. The N_{SERS} and N_{Normal} is the concentration of R6G, respectively. In our experiment, the SERS peak at 1649 cm^{-1} is selected and the EF is estimated to be about 1.23×10^{12}.

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