Supporting Information

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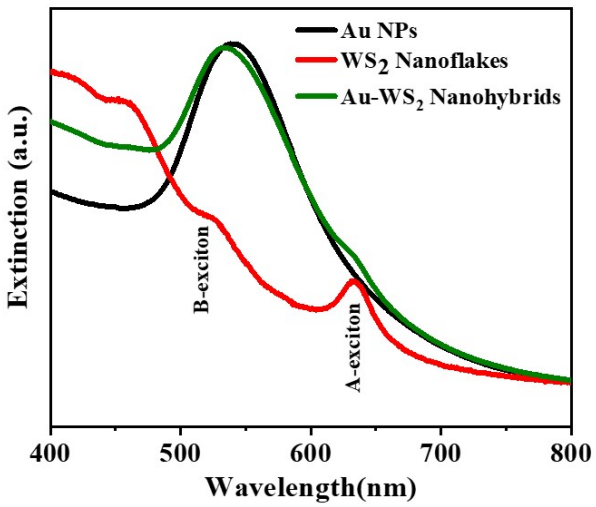

Figure S1. The extinction spectra of Au NPs, WS_2 nanoflakes and Au-WS_2 nanohybrids.

Enhancement factor calculation

The EF was calculated for all Raman modes of 10^{-9} M R6G concentration. I_{SERS} was taken as the intensity value of the SERS signal for mentioned Raman mode when 2 μL of 10^{-6} M R6G concentration drop casted on optimized SERS-active substrate.

$$EF = \frac{I_{SERS} \times N_{RAMAN}}{I_{RAMAN} \times N_{SERS}} \quad (1)$$

$$EF = \frac{I_{SERS} \times h\rho\pi r^2}{I_{RAMAN} \times McV} \quad (2)$$

$$h = \frac{2\lambda}{(N.A.)^2} \quad (3)$$

M and ρ of R6G are 479.02 g/mol and 1.26 g/cm^3 respectively. h is the depth of laser penetration and N.A. is the numerical aperture of the objective lens. enhancement factor calculations corresponding to the 1512 cm^{-1} peak is shown below. All the parameters are given in the main draft. The EF calculations correspond to all the peaks shown in Table 1 in the main draft.

$$h = \frac{2 \times 785\ nm}{(0.5)^2} = 6.28\ \mu m$$

$$EF = \frac{\frac{9043}{20\ mW \times 20\ s \times 3} \times 6.28\ \mu m \times 1.26 \frac{g}{cm^3} \times \pi \times 2^2\ mm^2}{\frac{50}{20\ mW \times 20\ s \times 3} \times 479.02\ \frac{g}{mol} \times 10^{-9} \frac{mol}{L} \times 2\ \mu L}$$

$EF = 1.80 \times 10^9$

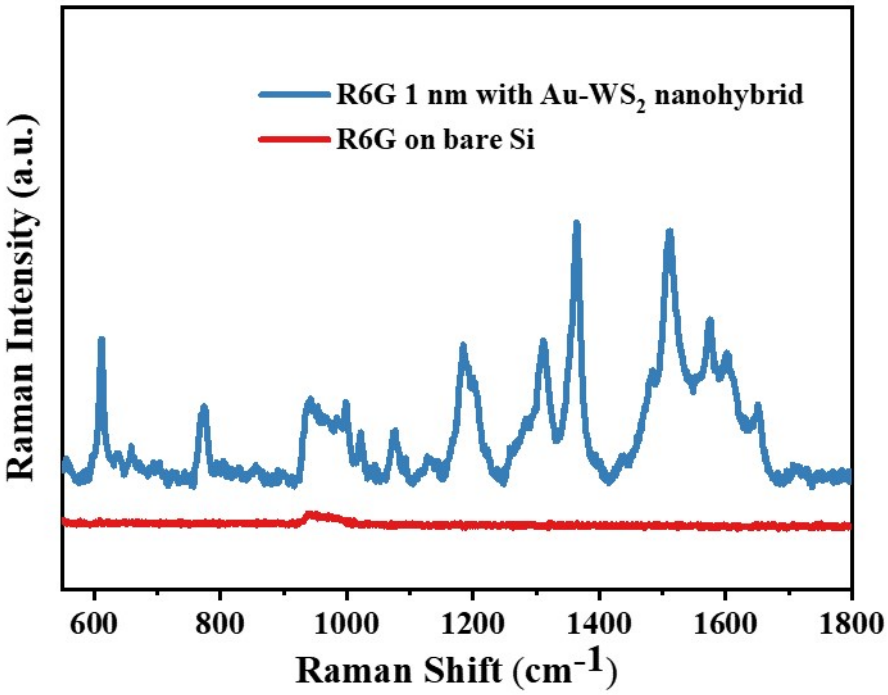

Figure S2. *Raman Spectra of R6G on bare Si substrate and with Au-WS_2 nanohybrid.*