## Supporting Information

## Sensitively monitoring photodegradation of organic dye molecules by

## surface-enhanced Raman scattering

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Figure S1. Reaction kinetics study of photocatalytic degradation of CV over Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>@TiO<sub>2</sub>@Ag by SERS: the ln ( $-(\partial(I_t/I_0))/(\partial t)(1/\eta)$ ) versus ln( $I_t/I_0$ ) plot in which the slope of the linearly fitted line corresponds to the reaction order with respect to CV (*n*), indicating first-order kinetics.



Figure S2. Reaction rate constants study of photocatalytic degradation of CV over  $Fe_3O_4@SiO_2@TiO_2@Ag$  by SERS: Time-dependent of SERS spectra of the CV solution on  $Fe_3O_4@SiO_2@TiO_2@Ag$  (left) and plots of the Raman intensity at 1172 cm<sup>-1</sup> versus reaction time ((I<sub>t</sub> / I<sub>0</sub>) ~ t plot) for the photocatalytic degradation of CV (right) in the presence of  $Fe_3O_4@SiO_2@TiO_2@Ag$  composite.



Figure S3. (A) Time-dependent UV-vis absorbance spectra of CV solution in the presence of  $Fe_3O_4@SiO_2@TiO_2@Ag$  composites after exposure to UV light for different durations. (B) Photodegradation rates of CV in the absence of catalysts (a), in the presence of  $Fe_3O_4@SiO_2@TiO_2$  (b) and the  $Fe_3O_4@SiO_2@TiO_2@Ag$  composites (c). The initial concentrations of CV solution was  $1.0 \times 10^{-5}$  M.