

Supporting Information

Highly efficient core-shell Ag@carbon dots modified TiO₂ nanofibers for photocatalytic degradation of organic pollutants and their SERS monitoring

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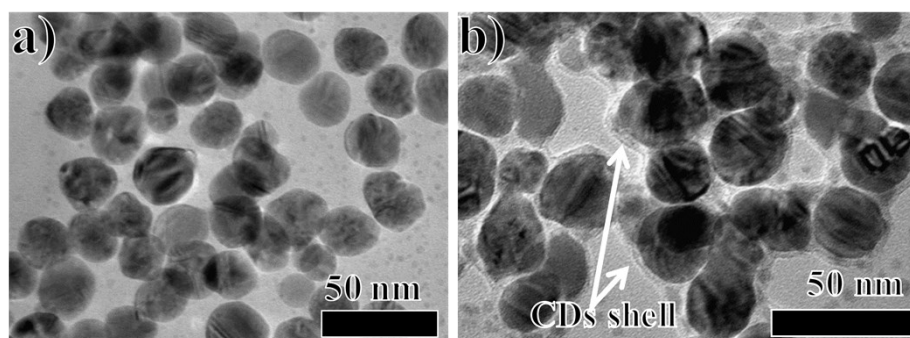


Fig. S1 (a) HRTEM images of Ag NPs and (b) core-shell structured Ag@CDs NPs with the similar size.

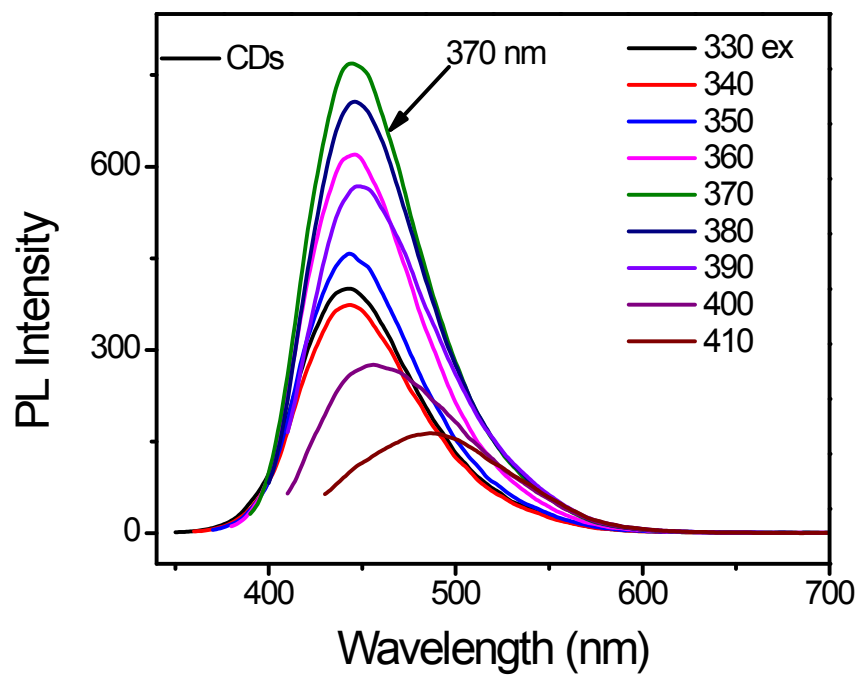


Fig. S2 Excitation-dependent PL of CDs aqueous solution.

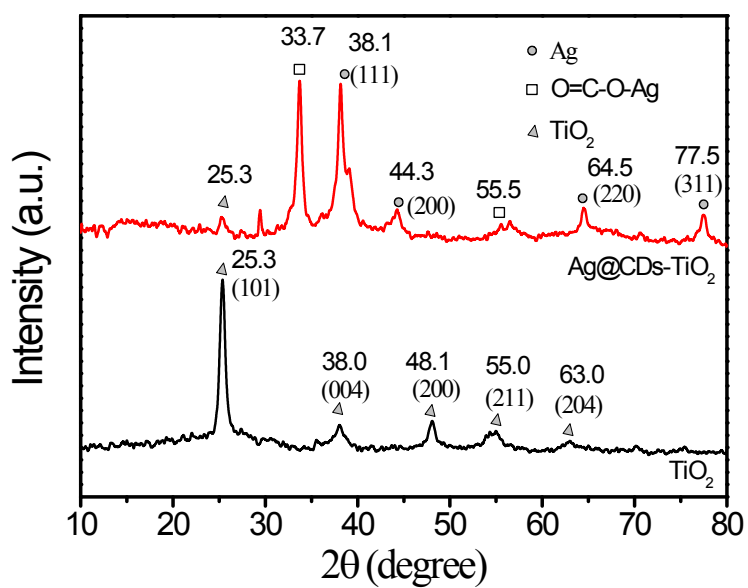


Fig. S3 XRD patterns of TiO₂ NFs and Ag@CDs-TiO₂ hybrid NFs.

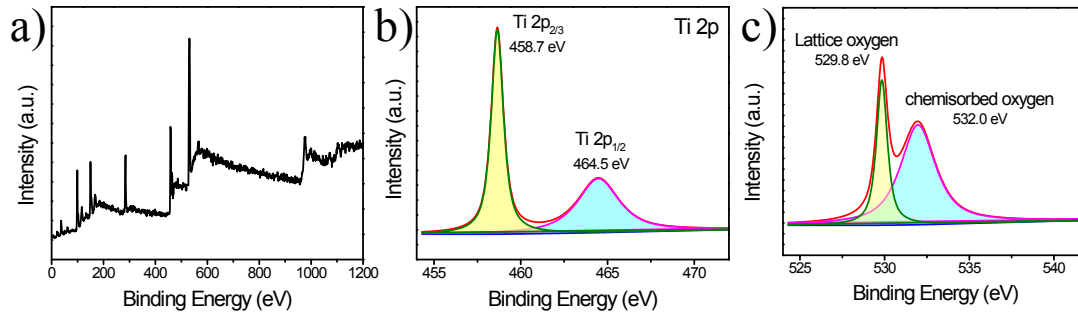


Fig. S4 XPS spectra of TiO₂ NFs: (a) full-range, (b) Ti 2p, (c) O 1s.

Method for the calculation of enhancement factor (EF) of the Ag@CDs-TiO₂

The evaluation of the enhancement factor (EF) of the Ag@CDs-TiO₂ is according to the following equation:¹

$$EF = (I_{\text{SERS}}/N_{\text{SERS}})/(I_0/N_0)$$

where I_{SERS} and I_0 denote the integrated intensity of the equivalent bands ascribed to PATP in SERS and normal Raman spectra, respectively, N_{SERS} and N_0 represent the average number of adsorbed molecules in the detection region for the SERS experiments and normal Raman experiments respectively.

$$N_{\text{SERS}} = A c_{\text{surf}} V N_A / A_0,$$

$$N_0 = c_0 A h N_A,$$

where A is the area of the laser spot (1 μm), c_{surf} is the concentration of the determined PATP molecules, c_0 is the concentration of PATP for the normal Raman measurement, N_A is the Avogadro constant, V is the volume of the adsorbed molecules, A_0 is the area of the modified substrate, h is the effective focused depth which can be calculated based on the confocal feature of the microscope. We suppose that all molecules within the effective focused depth contribute to the whole Raman signal, and neglect the Raman signal from outside of the effective focused depth. The effective focused depth can be calculated to be 19 μm . The SERS spectra and normal Raman were measured under the same laser power, excitation wavenumber, and same acquisition time. Eventually, an EF value of about 2.6×10^6 was obtained for the Ag@CDs-TiO₂ substrate, indicating the Ag@CDs-TiO₂ with high sensitivity.

References:

1. W. Song, W. Ji, S. Vantasin, I. Tanabe, B. Zhao, Y. Ozaki, *J. Mater. Chem. A* 2015, **3**, 13556-13562.