

Supporting Information

Recyclable Au-TiO₂ nanocomposite SERS-active substrates contributed by synergistic charge-transfer effect

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Preparation of 4-MBA modified Au NPs assembly

The colloidal Au NPs were prepared by using a method of reduction of chloroauric acid with sodium citrate according to the literature.¹ 100 mL of 0.01% chloroauric acid aqueous solution was heated to the boiling state under magnetic stirring, and then 4 mL of 1% sodium citrate aqueous solution was injected quickly, which resulted in a change in solution color from pale yellow to amaranth. Then, the transparent sol was maintained at the boiling state for 15 min under reflux. Finally, the colloidal Au NPs were cooled to room temperature for further use.

Au NPs assembly substrate was prepared as follows: firstly, glass slide rinsed clean with solvents (chloroform, acetone, ethanol, and H₂O) was placed in the blended solution of sulfuric acid and hydrogen peroxide (98% H₂SO₄:30% H₂O₂=7:3, v/v), which was heated to the boiling state for 1 h. After natural cooling, glass slide was rinsed with deionized water once more. In this way, the hydroxylated glass slide was obtained. Secondly, the hydroxylated glass slide was dipped in 0.5wt% poly(diallyldimethylammonium chloride) (PDDA) aqueous solution for 1 h, then rinsed with deionized water and dried by nitrogen. Finally, these PDDA-derivatized glass slides were immersed in the as-prepared colloidal Au NPs solution for 6 h. Then, Au NPs assembly substrates were taken out, rinsed with deionized water and dried by nitrogen.

Au NPs assembly substrate was immersed in 4-MBA ethanol solution (1×10^{-3} M) for 6 h. Then, the assembly modified by 4-MBA was taken out, rinsed with deionized water and dried by nitrogen for subsequent Raman measurement.

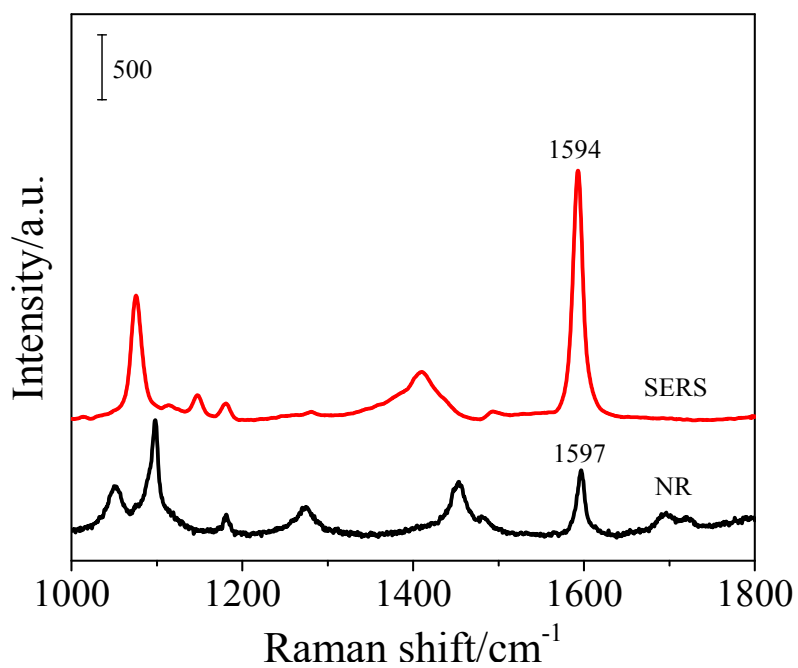


Fig. S1 Normal Raman spectrum (NR) of 0.3 M of 4-MBA ethanol solution and SERS spectrum of 4-MBA adsorbed on Au-TiO₂ from 1×10⁻³ M of 4-MBA ethanol solution.

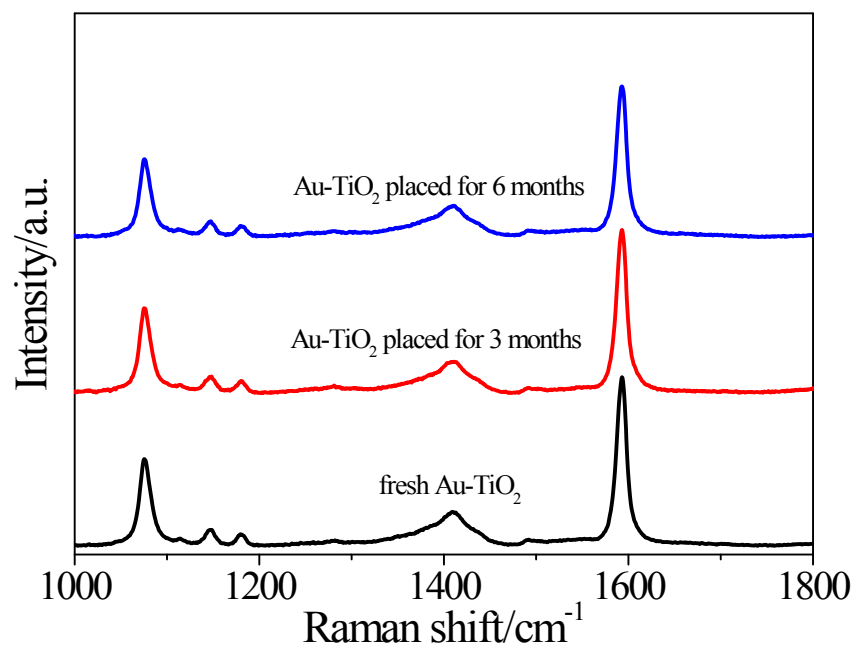


Fig. S2 SERS spectra of 4-MBA adsorbed on Au-TiO₂ substrates placed for different times.

References

- 1 L. B. Yang, W. D. Ruan, X. Jiang, B. Zhao, W. Q. Xu, J. R. Lombardi, *J. Phys. Chem. C*, 2009, **113**, 117-120.