SUPPORTING INFORMATION

Ultra-thin Au tip structure: a novel SERS substrate for in situ observation of p-aminothiophenol surface-catalytic reaction

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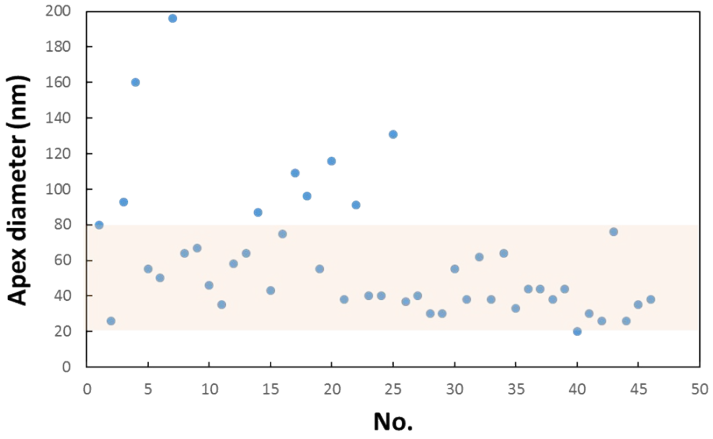

Figure S1. Distribution diagram of the apex diameters of the Au NTNPs prepared in the experiment, in which 79% Au NTNPs (plots with yellow background) are with apex diameter between 30 nm to 80 nm.

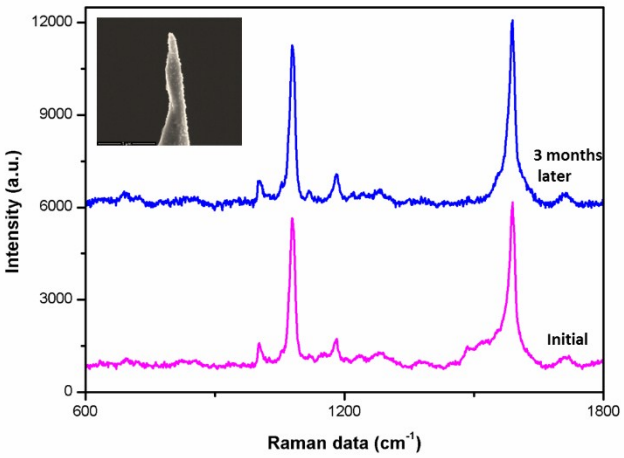

Figure S2. SERS spectrum of the same Au NTNP at (a) initial time and (b) 3 months later by using 10^{-3} mol/L 4-MBA solution as probe molecule. The inset is the SEM of the Au NTNP with the apex diameter about 80 nm.

S3 Text. In order to exclude the dissolved oxygen effect on PATP, we have performed another comparison experiment. According to the reference [T. Firkala, et al, J Colloid Interface Sci. 410 (2013) 59-66], We immersed the Au NTNPs in a freshly-prepared PATP ethanol solution in dark environment. Then the SERS experiments were carried on and the obtained spectra are shown in Fig.S3. As shown in Fig. S3(a), in the beginning 10 s of the catalytic reaction, no new bands of DMAB molecules occurs. With the increasing of illumination time, bands at 1143cm^{-1}, 1389cm^{-1}, 1434cm^{-1} could be clearly recognized in Fig. 3(b) (c) (d) (e). This changing process indicates that the PATP catalyzed reaction takes place just when laser exposed on the Au NTNPs, instead of being oxidized by the dissolved oxygen in PATP ethanol solution. Similar phenomenon could be seen in Fig.8, the power-dependent Raman spectrum on Au NTNP, that new peaks did not occur with lower laser power (0.14mW), which illustrates that the PATP molecules had not been oxidized in the solution prepared earlier in our work.

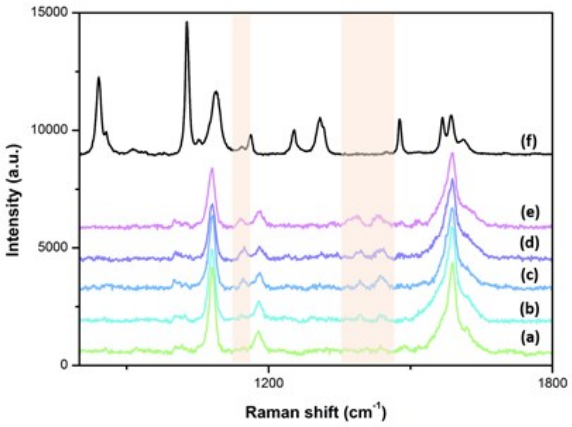

Figure S3. SERS spectrum of 10^{-3} mol/L PATP absorbed on Au NTNP substrate immediately after the preparation of the PATP ethanol solution with laser exposure after (a) 10s (b) 40s (b) 50s (b) 70s (b) 80s; (f) Normal Raman spectrum of PATP powder.