## Graphene Oxide Wrapped Individual Silver Nanocomposites with Improved Stability for Surface-enhanced Raman Scattering

Nan Gao, Ting Yang, Tao Liu, Yu Zou and Jiang Jiang $^{\ast}$ 

CAS Key Laboratory of Nano-Bio Interface, *i*-Lab and Division of Nanobiomedicine, Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences, Suzhou, China 215123

## **Supporting Information**

Figure S1. TEM image of SiO<sub>2</sub>@Ag seeds obtained without adding PVP as stabilizer.



Figure S2. Zeta potentials of SiO<sub>2</sub>@Ag, SiO<sub>2</sub>@Ag-PDDA, GO, and SiO<sub>2</sub>@Ag@GO.



**Figure S3.** Raman spectrum of 4-ATP of 1M concentration on Si substrate. The excitation wavelength was 532 nm and the integration time was 2 s.



Figure S4. Raman spectra of SiO<sub>2</sub>@Ag and SiO<sub>2</sub>@Ag@GO on Si substrate.



**Figure S5.** (A) UV-vis absorption spectra of unabsorbed 4-ATP after incubating SiO<sub>2</sub>@Ag and SiO<sub>2</sub>@Ag@GO with 10<sup>-4</sup> M 4-ATP solutions for 12 h and removing SiO<sub>2</sub>@Ag NPs and SiO<sub>2</sub>@Ag@GO NCs by centrifugation. (B) The corresponding Raman spectra of 4-ATP on SiO<sub>2</sub>@Ag and SiO<sub>2</sub>@Ag@GO.



Figure S6. (A) UV-vis absorption spectra of 4-ATP at different concentrations ranging from 5



 $\mu M$  to 100  $\mu M,$  and (B) the corresponding calibration curve.

**Figure S7.** SERS spectra of different concentrations ( $10^{-4}$  M,  $10^{-5}$  M,  $10^{-6}$  M and  $10^{-7}$  M) of 4-ATP absorbed on SiO<sub>2</sub>@GO substrates. The excitation wavelength is 532 nm and the integration

time is 5 s.



Figure S8. SERS spectra of 10<sup>-4</sup> M of CV and RhB absorbed on SiO<sub>2</sub>@Ag@GO substrates. The



excitation wavelength is 532 nm and the integration time is 5 s.

Figure S9. Raman spectra of SiO<sub>2</sub>@Ag@GO on Si substrate at different concentrations of GO.

The excitation wavelength is 532 nm and the integration time is 5 s.



**Figure S10.** SERS spectra of SiO<sub>2</sub>@Ag (A) and SiO<sub>2</sub>@Ag@GO (B) from 10 random points chosen from different batches of SERS substrates. (C) Raman intensities of 4-ATP at 1076 cm<sup>-1</sup> on SiO<sub>2</sub>@Ag and SiO<sub>2</sub>@Ag@GO substrates are significantly different (two sample t-test, p<0.05). The excitation wavelength is 532 nm and the integration time is 5 s.

