Supporting Information

Fast one-step silicon-hydrogen bond assembly of silver nanoparticles as excellent surface-enhanced Raman scattering substrates

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1. Chemicals and characterization

All chemical reagents were of analytical grade, which were purchased from Shanghai Chemical Company and used without further purification. The water used was doubly distilled water. Si wafers (p type, 0.01-0.05 Ω·cm) were purchased from Hefei Kejing Materials Technology Co., Ltd (China).

The as-prepared products were characterized via X-ray powder diffraction (XRD), which was carried out on a Philips X'pert PRO MPD diffractometer with Cu Kα radiation (λ = 0.15406 nm). The morphology of the samples was characterized by scanning electron microscopy (SEM) with a FEI Quanta 200F SEM spectrometer. AFM measurement was conducted on a Multimode V system (Veeco, Bruker).

Raman spectra were collected on an HR 800 Raman spectroscopy (J Y, France) equipped with a synapse CCD detector and a confocal Olympus microscope. SERS experiments were conducted in the line-mapping mode and 1 μm increment using R6G methanol solution as model molecules. The spectrograph used 600 g/mm

gratings. SERS spectra were collected at 100 × objective (Olympus) with a numerical aperture of 0.90 and the accumulation time of 1 s. In addition, the filter in the SERS spectra was D0.6. In order to reduce the influence of surface-enhanced resonance Raman scattering, a 633 nm He-Ne laser was employed in all the Raman detections.

2. XRD pattern of Ag NPs assembled on Si wafer

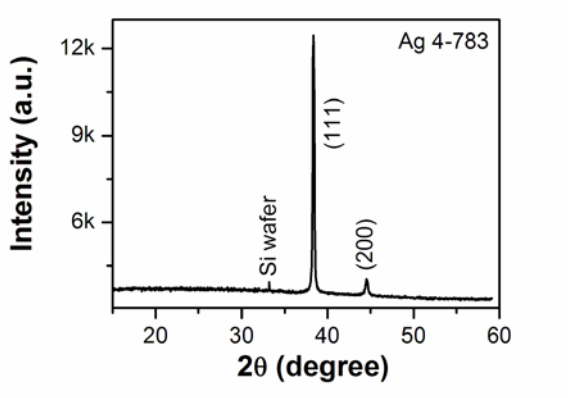

Figure S1. The XRD pattern of Ag NPs on Si wafer: In addition to the diffraction peak of Si, the others may be indexed as (111) and (200) crystal planes of silver.

3. The SEM image of Ag NPs on Si wafer

Figure S2 shows the uniform Ag NPs grown on Si wafer. The average diameter of Ag nanoparticles (Figure S2a) was 30 nm.

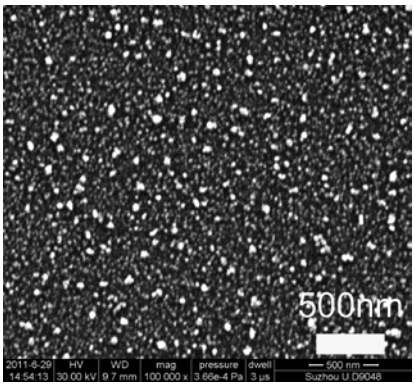

Figure S2. The SEM images of Ag NPs on Si wafer.

4. The normal Raman spectrum of R6G powder

Figure S3 shows the characteristics of the Raman spectrum of R6G powder. The band at 1130 cm^{-1} was assigned to C-H in-plane bending modes. The C-C stretching vibration bending mode is 1178 cm^{-1}. The bands at 1361, 1515, 1572, and 1648 cm^{-1} are assigned to the aromatic C-C stretching modes. [S1]

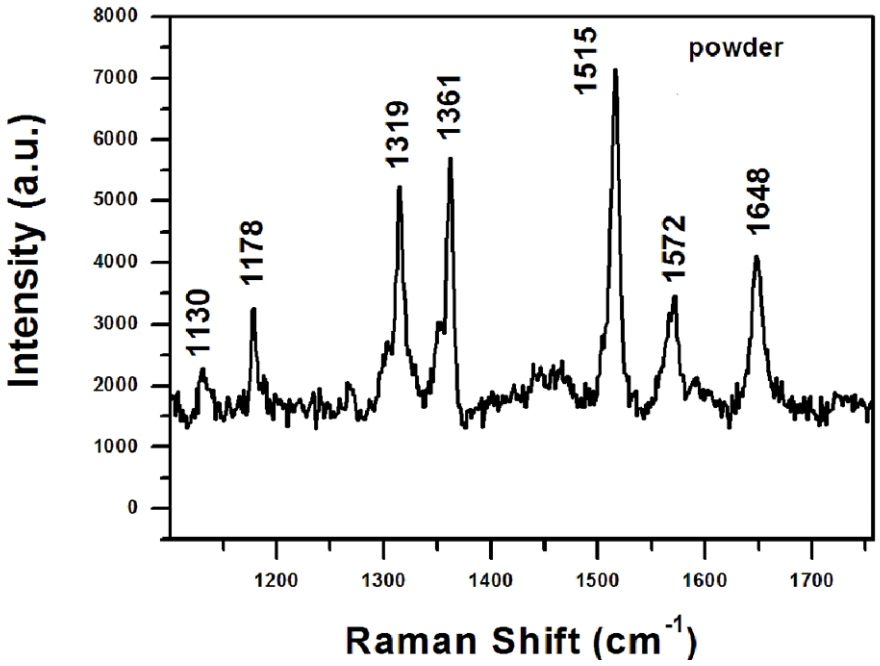

Figure S3. The normal Raman spectrum of R6G powder.

5. The normal Raman spectrum of SDI powder

These Raman peaks are in agreement with the previous report.[S2]

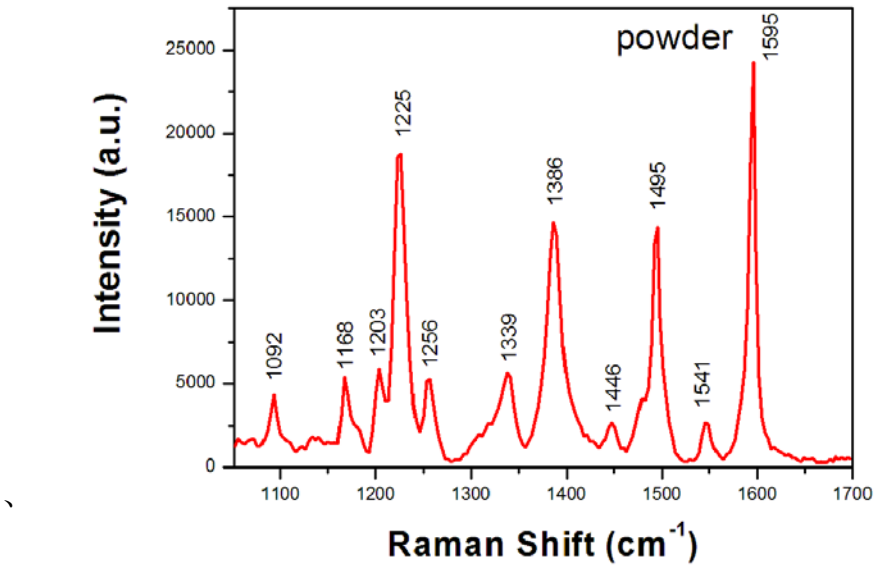

Figure S4. The normal Raman spectrum of SDI powder.

References

(S1) P. Hildebrandt and M. Stockburger, *J. Phys. Chem.*, 1984, **88**, 5935.

(S2) R. H. Que, M. W. Shao, S. J. Zhuo, C. Y. Wen, S. D. Wang and S. T. Lee, *Adv. Func. Mater.*, 2011, **21**, 3337.