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Supporting Information For

Speediness and surfactant-free in situ synthesis of Nickel/Ag nanocomposites for the reproducible SERS substrates

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The SEM images (Figure S1B, C) showed that the content of $NiCl_2$ and magnetism filed played the important role to the morphology of Ni NWs. When the concentration of Ni^{2+} decreased, the Ni NWs became the prickly nanostructure. When the external magnetic field increased, the length of the Ni NWs became longer and the prick of the Ni NWs became more. The prickly and the ordered nanostructures were good for the SERS measure. It could form the tip-enhanced Raman spectroscopy which is attributed to the electromagnetic enhancement mechanism.[1,2] In the process of SERS measurement, the ordered structure could be assembled in favour of the SERS test. 0.01mL of 10^{-5} M R6G solution was dropped on the nanocompositions for the SERS test to verify our conjecture. As shown in the SERS date (Figure 1S I-L), all of the nanostructures have the SERS spectra, and the ordered and assembled Ni/Ag nanocomposition had the strong spectra of R6G. So in the following experiment, the prickly and assembled nanocomposites were used as the SERS substrates.

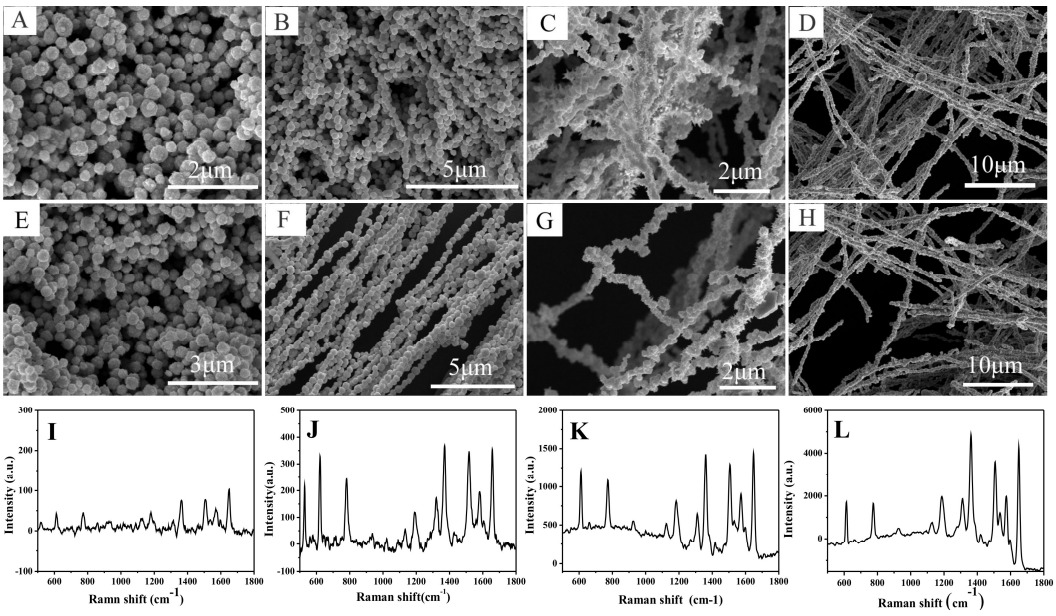

Figure S1 SEM images of (A-D) the different morphologic Ni NWs: A) synthesized in the absence of the magnetism filed. Conditions: $NiCl_2$ 5mL N_2H_4 1mL non-magnetism B) synthesized in the moderate intensity magnetism. Condition: $NiCl_2$ 5mL N_2H_4 1mL. C) synthesized in the moderate in the moderate intensity magnetism. Condition: $NiCl_2$ 0.5mL N_2H_4 1mL D) synthesized in the strong-magnetism. Condition: $NiCl_2$ 0.5mL N_2H_4 1mL (E-H) Ni/Ag nanocomposites synthesized from the precursor (A-D) by adding 10mL $AgNO_3$(1M). I-L are the SERS data obtain from the different morphologic nanocomposites.

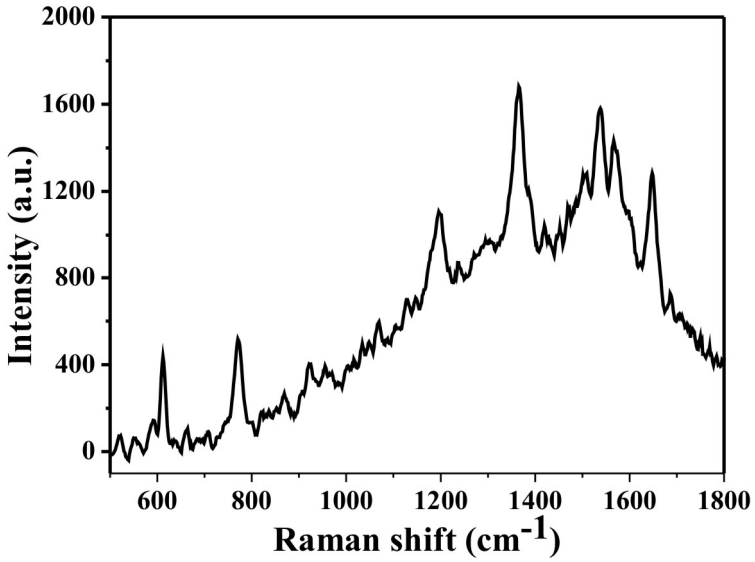

Figure S2. The Raman spectrum of 0.05M R6G solution.

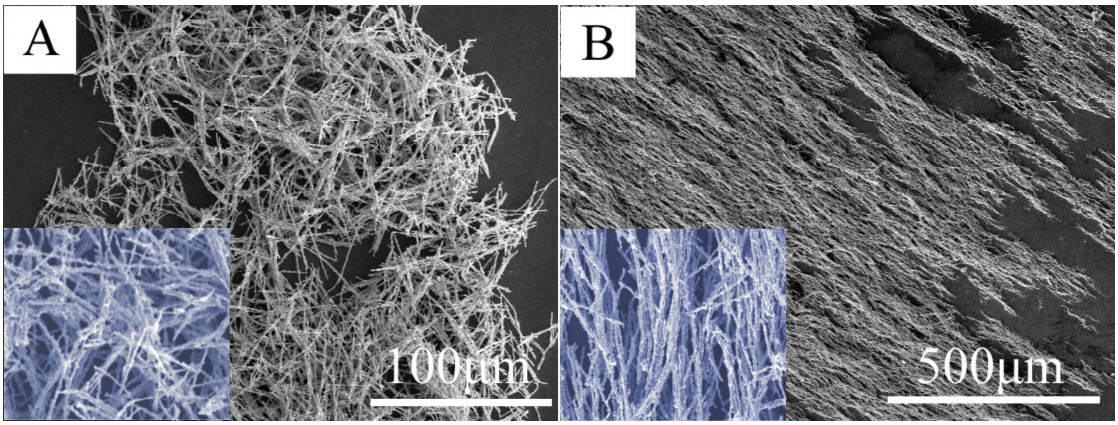

Figure S3. Large-area SEM images of SERS substrates: A) the discrete SERS substrate, B) the assembled SERS substrate. The inset is the enlargement SEM images. As shown, more ordered nanocomposite was obtained afte the external magnetic field.

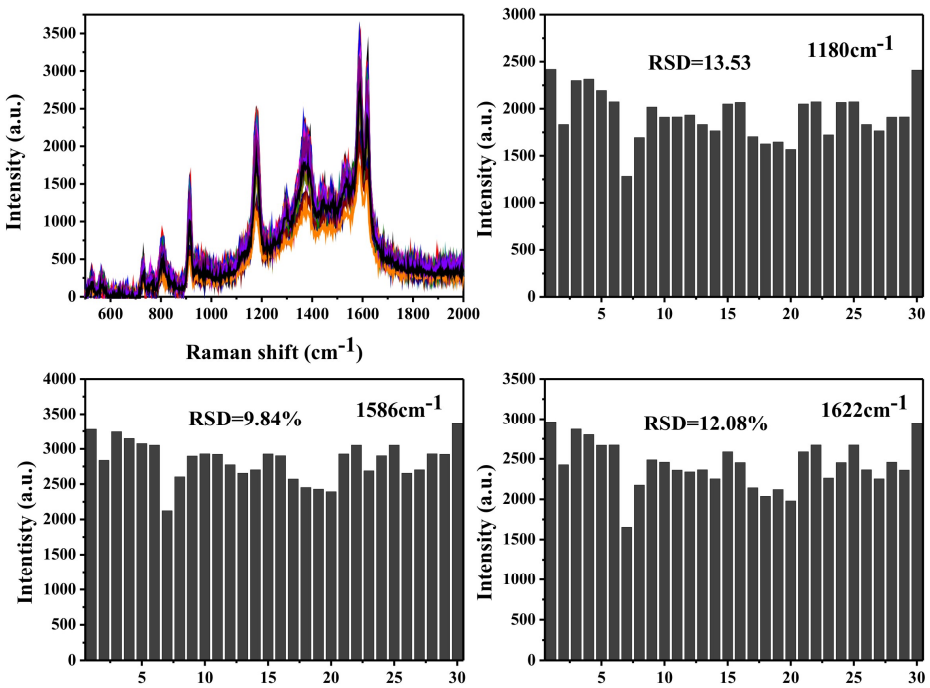

Figure S4. A series of SERS spectra of SERS spectra of Crystal violet 10^{-5}M molecules collected on randomly selected 30 spots of the SERS substrates and the intensities of the main Raman peaks of Crystal violet (at 10^{-5}M).

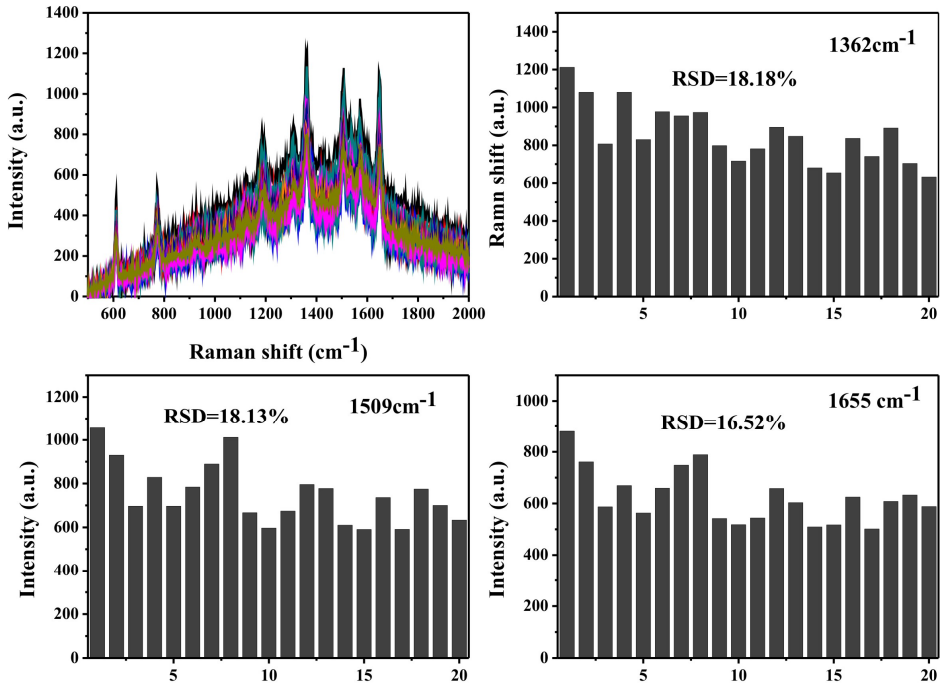

Figure S5. Series of SERS spectra of R6G molecules collected 20 different batches of SERS substrates and the intensities of the main Raman vibrations of R6G.

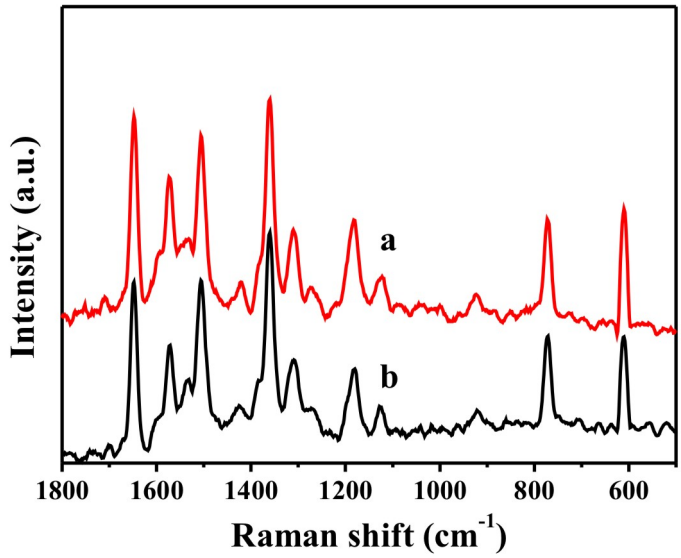

Figure S6. SERS spectra of R6G molecules obtained from a) the freshly prepared substrate and b) the substrate immersed in ethanol for 30 days.

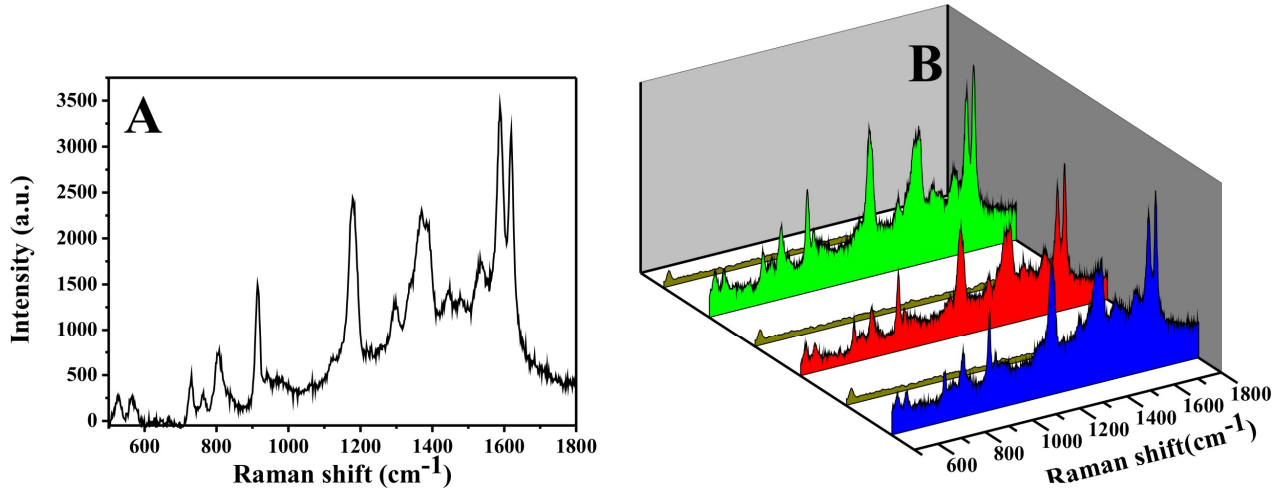

Figure S7. A) SERS spectrum 10^{-6} M Crystal Violet B) Reversible SERS behavior of Crystal violet using the SERS substrate with three cycles.

1. M. Asghari-Khiavi, B. R. Wood, P. Hojati-Talemi, A. Downes, D. McNaughton and A. Mechler, *Journal of Raman Spectroscopy,* 2012**, 43,** 173-180;

2. C. W. Chang, J. D. Liao, Y. Y. Lin and C. C. Weng, *Sensors and Actuators B-Chemical,* 2011**, 153,** 271-276.