

Supporting Information

3D Fe₃O₄@Au@Ag Nanoflowers Assembled Magnetoplasmonic Chains for in situ SERS Monitoring of Plasmon-assisted Catalytic Reaction

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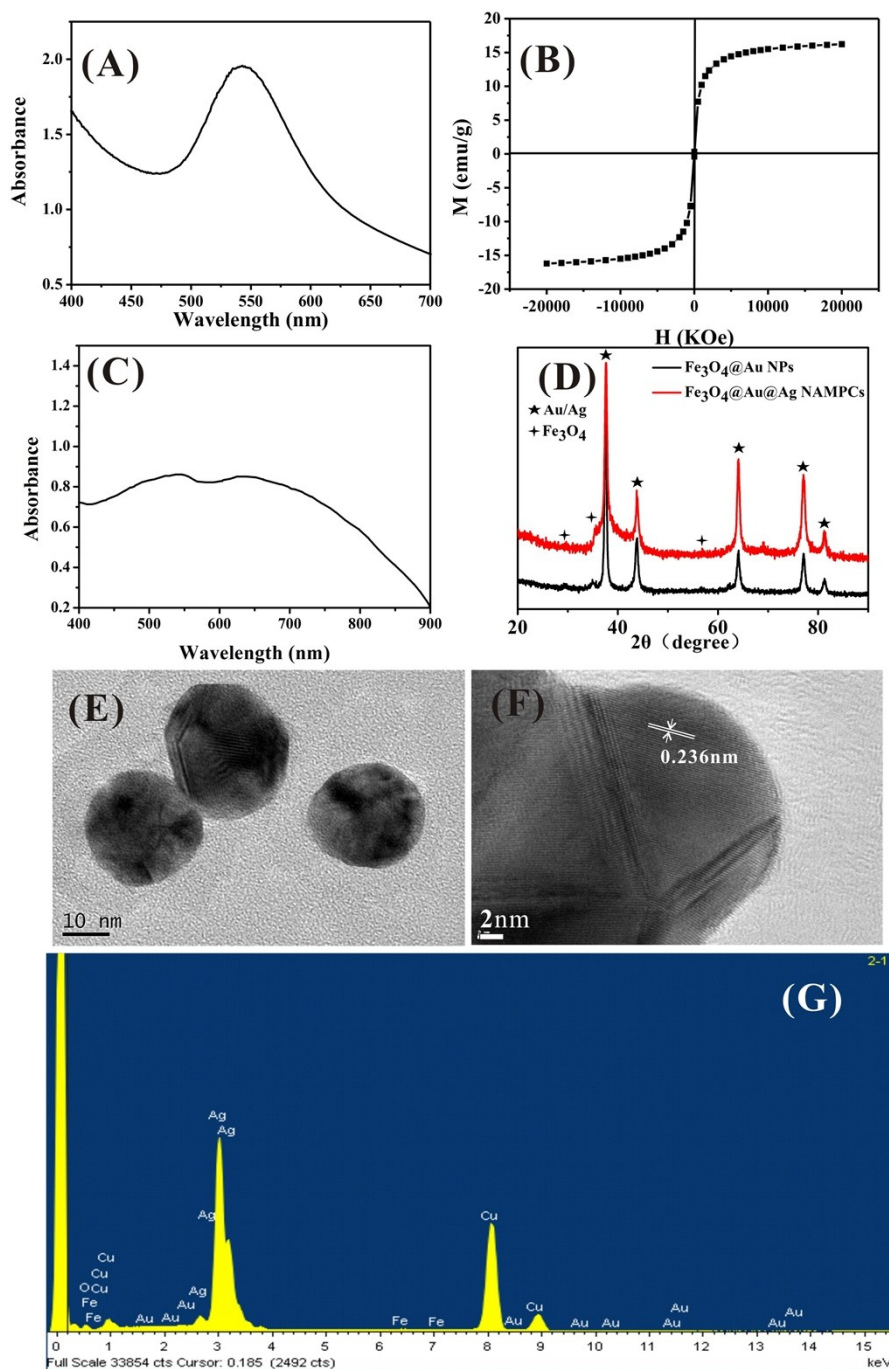


Fig. S1 (A) UV-Vis spectrum of $\text{Fe}_3\text{O}_4@Au$ NPs; (B) magnetization curve of $\text{Fe}_3\text{O}_4@Au$ NPs at room temperature; (C) UV-Vis spectrum of $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs; (D) XRD patterns of as-prepared $\text{Fe}_3\text{O}_4@Au$ NPs and $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs; the TEM image (E) and HRTEM image (F) of $\text{Fe}_3\text{O}_4@Au$ NPs; (G) EDAX spectrum of the $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs.

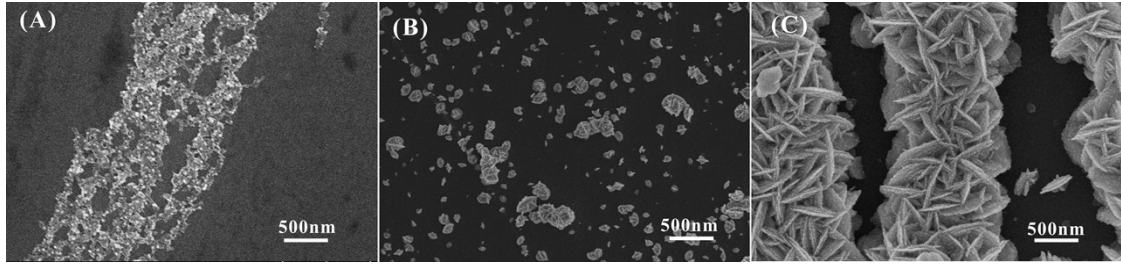


Fig. S2 SEM images of (A) MPNCs, (B) irregular $\text{Fe}_3\text{O}_4@Au-Ag$ nanoparticles and (C) the $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs.

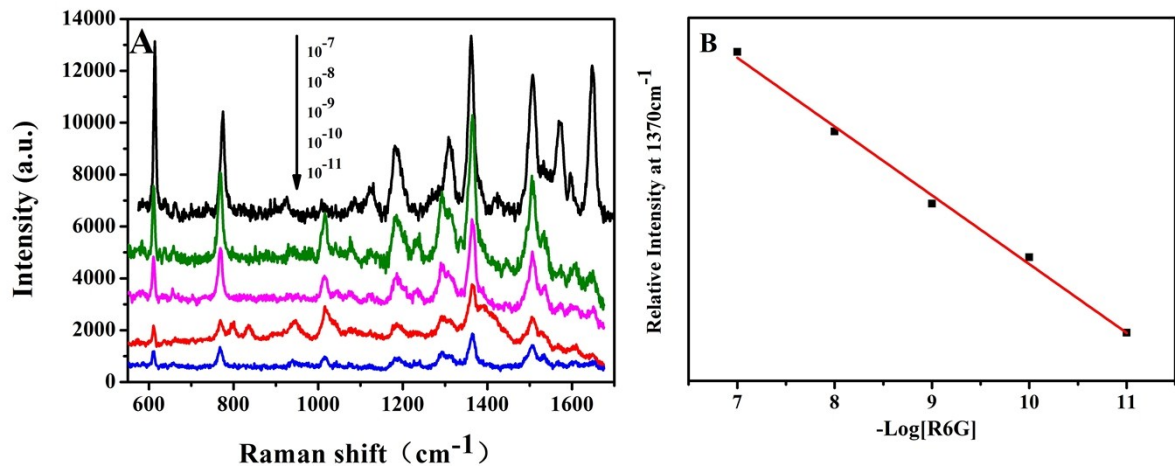


Fig. S3 (A) SERS spectra for the $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs probed with the various concentrations of R6G; B) Logarithmic plot of $[R6G]$ versus SERS intensity together with linear fitting.

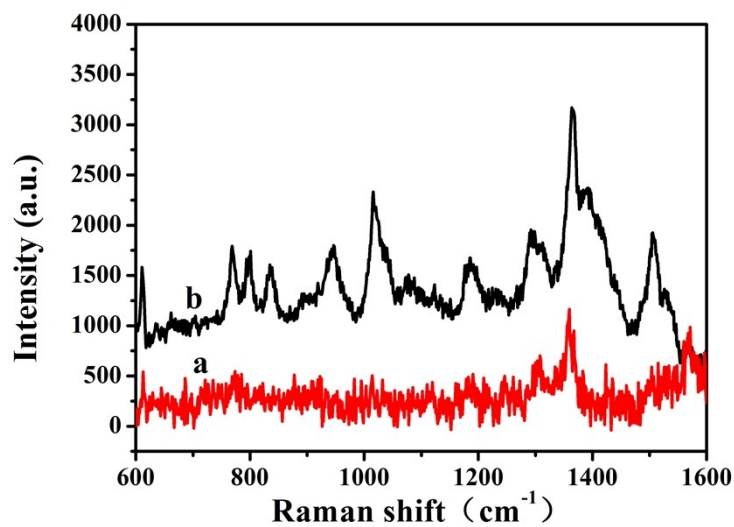


Fig. S4 Raman spectrum of 0.1M R6G (curve a) and SERS spectra of 10^{-10} M R6G (curve b) obtained from assembled $\text{Fe}_3\text{O}_4@Au@Ag$ NAMPCs.

Table S1 Reported ensemble averaged enhancement factors (EF) of SERS substrates

| SERS substrate | Molecule | EF | Reference |
|--|----------------|----------------------|---------------------------------|
| α -Fe ₂ O ₃ @Au | 4-ATP | 3.1×10^4 | Tang et al. ¹ |
| Dimer-on-mirror | BPE | 2.2×10^{11} | Hakonen et al. ² |
| Ag Cube Film | R6G | 10^{11} | Lee et al. ³ |
| Ag Clusters | CV | 1.6×10^9 | Chakraborty et al. ⁴ |
| CNT @Ag array | R6G | 10^{10} | Zhang et al. ⁵ |
| gold nanorod@SiO ₂ | Methylene blue | 3×10^{10} | Seo et al. ⁶ |
| Ni@Ag | R6G | 1.525×10^6 | Ding et al. ⁷ |
| Fe ₃ O ₄ @Au nanorod | 4-ATP | 2.13×10^5 | Tang et al. ⁸ |
| Fe ₃ O ₄ @Au@Ag NAMPCs | R6G | 2.2×10^9 | Present study |

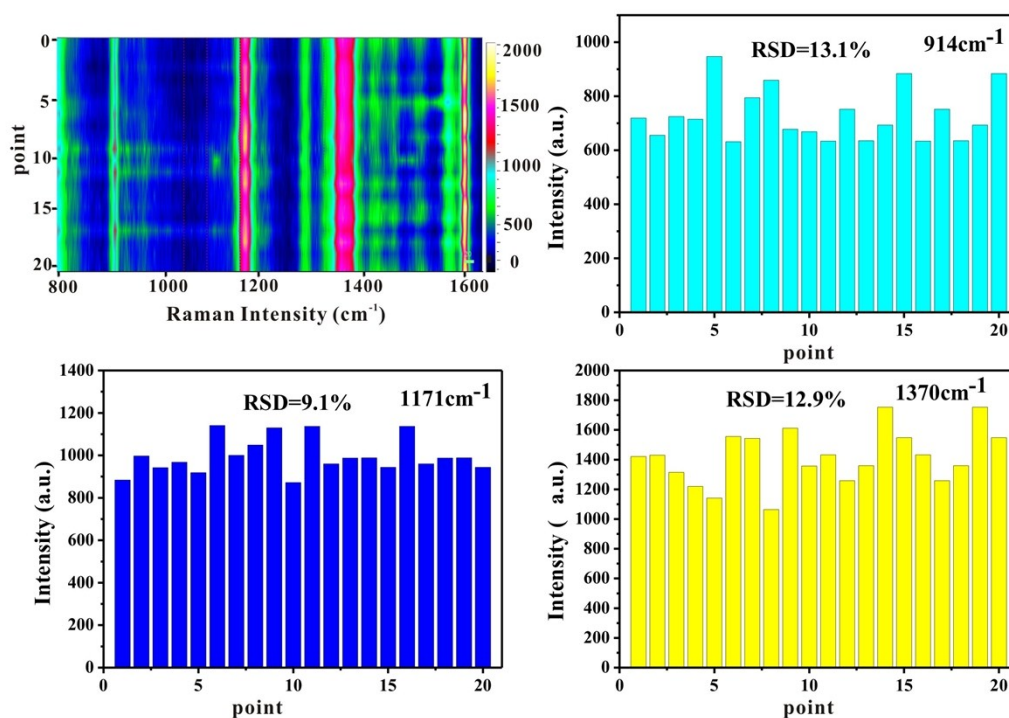


Fig. S5 Series of SERS spectra of CV molecules and its intensities of the main Raman vibrations collected from 20 different batches of Fe₃O₄@Au@Ag NAMPCs.

Notes and references

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