



## Supplementary Materials

# Preparation of Fe<sub>3</sub>O<sub>4</sub>-Ag Nanocomposites with Silver Petals for SERS Application

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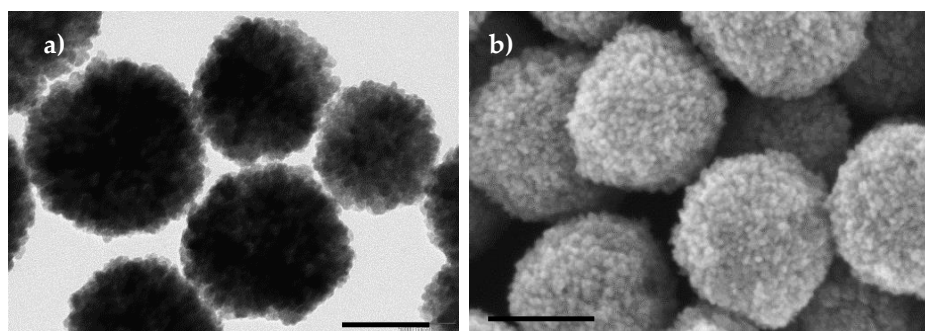
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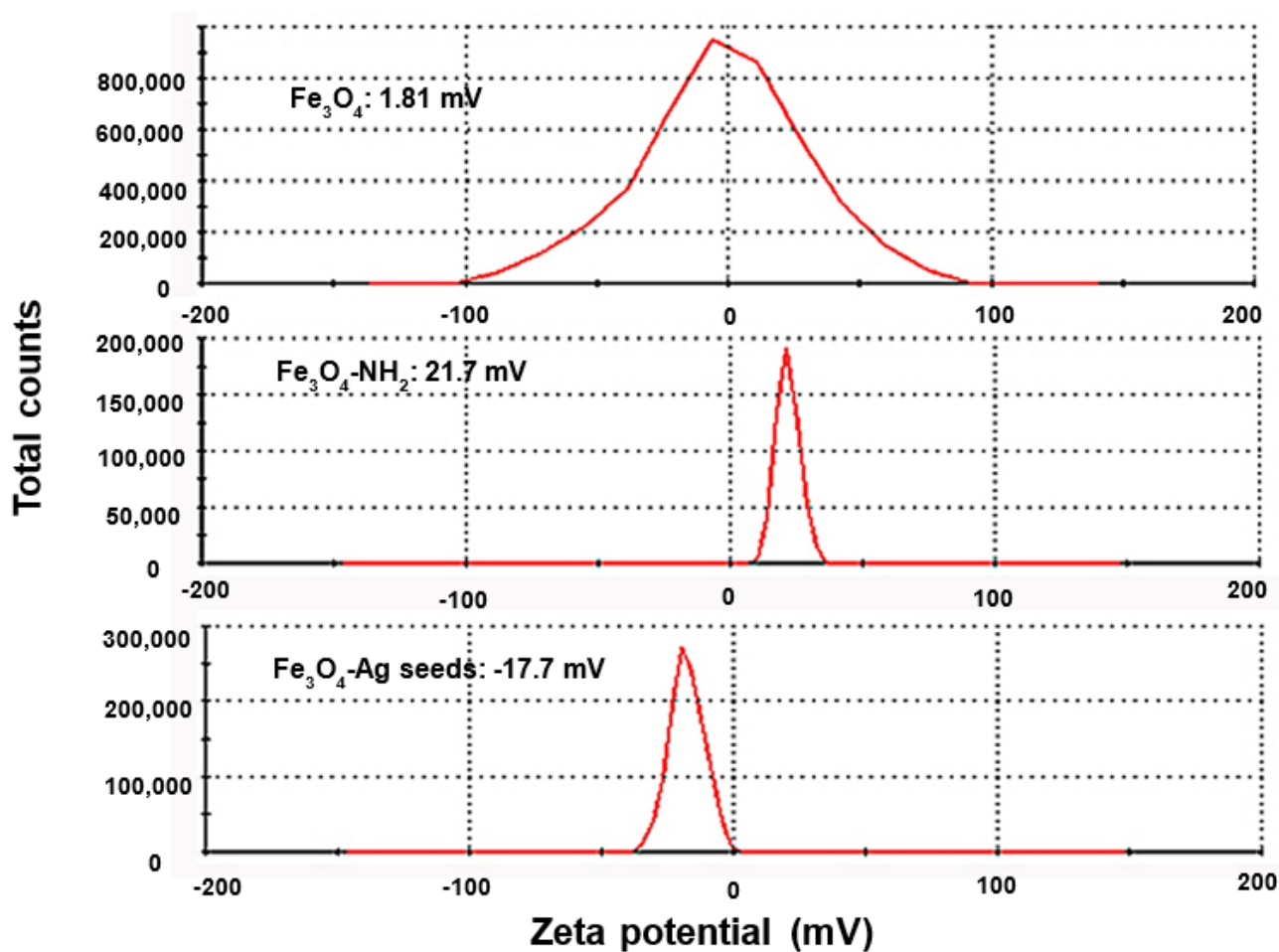
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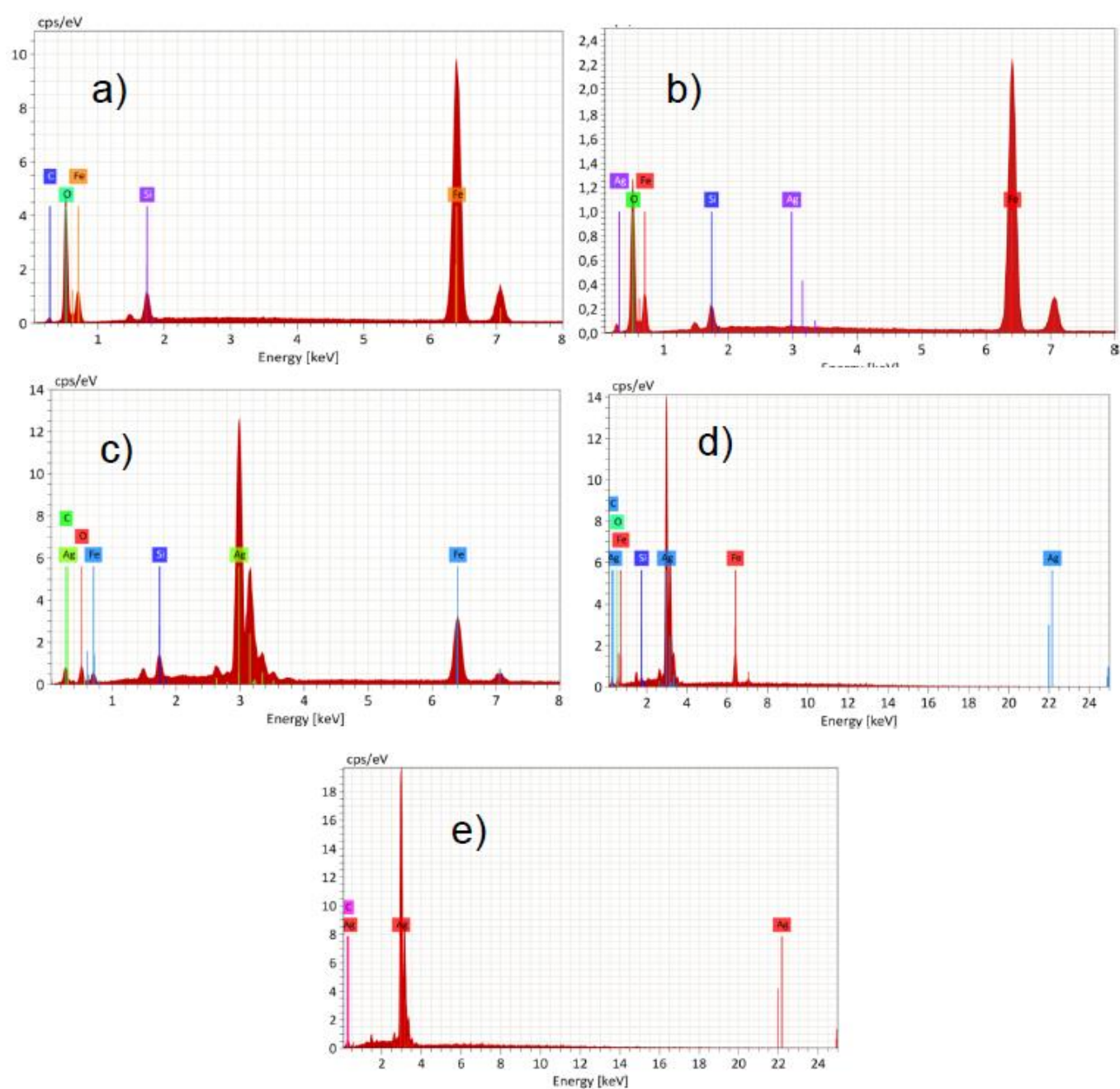
**Figure S1.** Representative TEM (a) and SEM (b) images of Fe<sub>3</sub>O<sub>4</sub> particles. The scale bar is of 100 nm in all the micrographs.



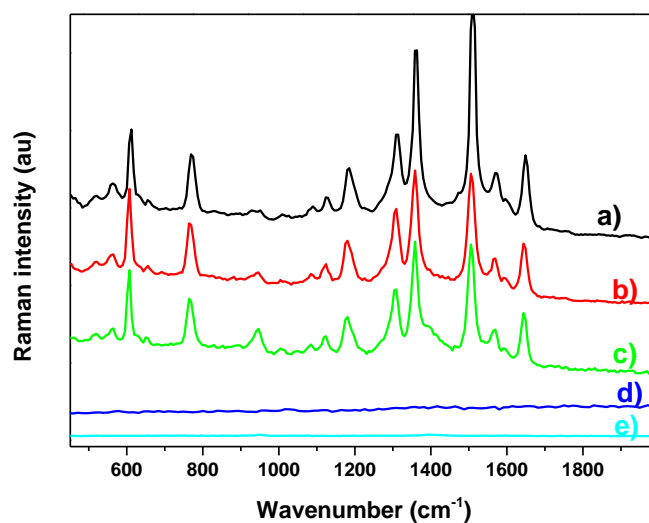
**Figure S2.** Zeta potential distribution of the  $\text{Fe}_3\text{O}_4\text{-Ag}$  seeds compared to that of  $\text{Fe}_3\text{O}_4$  particles coated with APTES and when dispersed in deionized water.

**Table S1.** EDX elemental analysis of  $\text{Fe}_3\text{O}_4$  particles,  $\text{Fe}_3\text{O}_4\text{-Ag}$  seeds,  $\text{Fe}_3\text{O}_4\text{-Ag}$  nanocomposites produced with PVP for a r value of 10 and 2, and without PVP for a r value of 10.

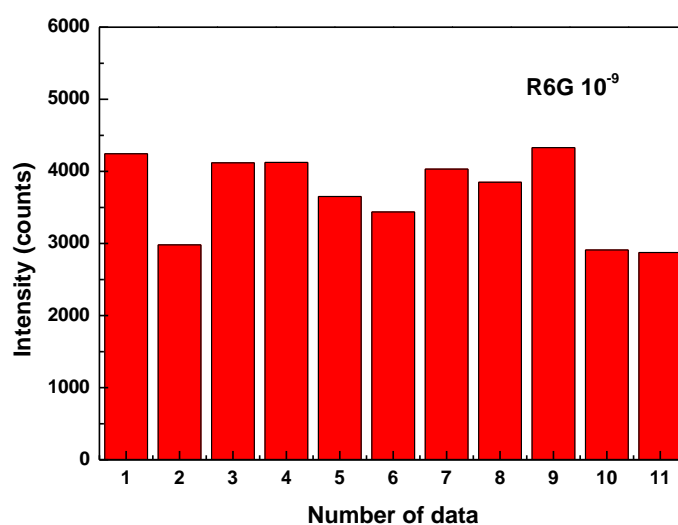
Sample	% Weight		% Atomic	
	Fe	Ag	Fe	Ag
$\text{Fe}_3\text{O}_4$ particles	66.9	0	37.72	0
$\text{Fe}_3\text{O}_4\text{-Ag}$ seeds	64.14	0.24	34.86	0.07
$\text{Fe}_3\text{O}_4\text{-Ag}$ with PVP (r=10)	8.59	76.12	38.57	0.31
$\text{Fe}_3\text{O}_4\text{-Ag}$ with PVP (r=2)	17.83	57.92	21.98	13.07
$\text{Fe}_3\text{O}_4\text{-Ag}$ without PVP (r=10)	0	94.76	0	73.19



**Figure S3.** EDX analysis of: (a)  $\text{Fe}_3\text{O}_4$  particles; (b)  $\text{Fe}_3\text{O}_4$ -Ag seeds; (c–e)  $\text{Fe}_3\text{O}_4$ -Ag nanocomposites produced with PVP for a r value of 10 and 2 and without PVP for a r value of 10, respectively.



**Figure S4.** SERS spectra of R6G at  $10^{-6}$  adsorbed on (a) Fe<sub>3</sub>O<sub>4</sub>-Ag nanocomposites with PVP ( $r = 10$ ), (b) Fe<sub>3</sub>O<sub>4</sub>-Ag nanocomposites with PVP ( $r = 2$ ), (c) Fe<sub>3</sub>O<sub>4</sub>-Ag nanocomposites without PVP ( $r = 10$ ), (d) Fe<sub>3</sub>O<sub>4</sub>-Ag seeds, (e) Fe<sub>3</sub>O<sub>4</sub> particles.



**Figure S5.** SERS intensity of R6G at  $10^{-9}$  adsorbed on Fe<sub>3</sub>O<sub>4</sub>-Ag nanocomposites with PVP ( $r = 10$ ).

**Table S2.** Assignment of Raman bands in spectra of R6G.

Raman Shift (cm <sup>-1</sup> )	Assignment
612	C-C-C ring in-plane bending
774	C-H out-of-plane bending
1185	C-H in-plane bending
1313	Aromatic C-C stretching
1363	Aromatic C-C stretching
1510	Aromatic C-C stretching
1574	Aromatic C-C stretching
1654	Aromatic C-C stretching