Electronic Supplementary Material (ESI) for RSC Advances

Supplementary Material

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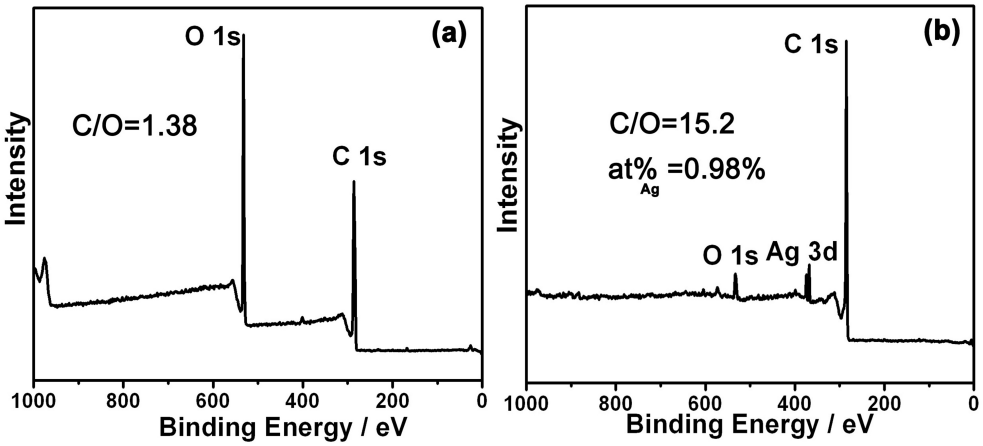

Fig. S1 XPS spectra of (a) GO, and (b) Ag NPs-GE nanocomposites

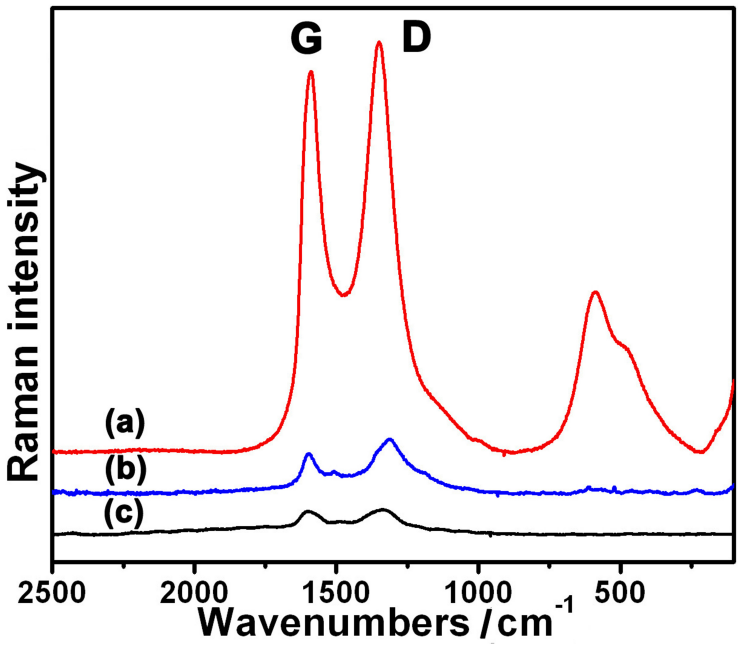

Fig. S2 Raman spectra of Ag NPs-GE substrate measured at 532 nm (a) and 780 nm (b), respectively. (c) Raman spectra of GO sheets measured at 532 nm.

The approximate calculation of EF. The EF can be estimated as follows: EF = $(I_{SERS}/I_{bulk})/(N_{ads}/N_{bulk})$. In calculating N_{bulk} (irradiated solution volume multiplied by the concentration of analyzed molecule (0.02 M, 0.2 M of R6G solution for different laser wavelengths of 532 nm, 780 nm, respectively)) the volume of the laser waist is approximately to a cylinder with a radius of 25 μm and a depth in the sample of 2 μm. The calculated volume is ca. 3.9×10^{-14} m^3. Thus, the estimated value for N_{bulk} is ca. 4.7×10^{10}, 4.7×10^{11} for laser wavelengths 532 nm, 780 nm respectively. N_{ads} is the number of molecules constituting the first monolayer adsorbed on the grating under the laser spot area of 2.1 μm^2. In the calculation, the surface area of one R6G molecule of 2×10^{-18} m^2/molecule was used. Thus, the estimated maximum value for N_{ads} is ca. 1.05×10^6. The I_{SERS}/I_{bulk} can be obtained from the SERS spectra. Thus, the EF value can be calculated. This hypothesis represents a theoretical maximum number of R6G

molecules absorbed on the surface of Ag NPs and is surely an overestimate, thus the EF reported here is likely an underestimate rather than an overestimate of the actual EF value.

Table S1 XPS data of C1s of GO sheets and Ag NPs-GE composites. The results of the four main peaks are tabulated below as binding energies and area percentages relative to C-C bonds (in parentheses).

Samples name	Fitting of the C1s peak (eV) (Relative area percentages (%))			
	C-C	C-OH	C-O-C	HOC=O
GO/Ag NPs	284.71(100)	285.73(22)	286.78(180)	288.52(14)
RGO/Ag NPs	284.47(100)	/	286.10 (20)	/

Table S2 Raman wavenumbers (cm^{-1}) and band assignments for R6G

R6G solution	**SERS(R6G/Ag NPs-GE)**	**Assignment[a]**
	235	Ag-N stretching
614	611	C-C-C ring in-plane vibration
776	771	C-H out-of-plane bend
937	922	
1096	1088	
1131	1131	C-H in-pland bend
1187	1188	
1312	1310	N−H in-plane bend
1365	1363	C−C stretching
1419	1411	
1446		
1509	1504	C−C stretching
	1532	
1575	1573	C−C stretching
1600	1595	
1652	1649	C−C stretching