Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Hydrophobic hBN-Coated Surface-Enhanced Raman Scattering Sponge Sensor for Simultaneous Separation and Detection of Organic Pollutants

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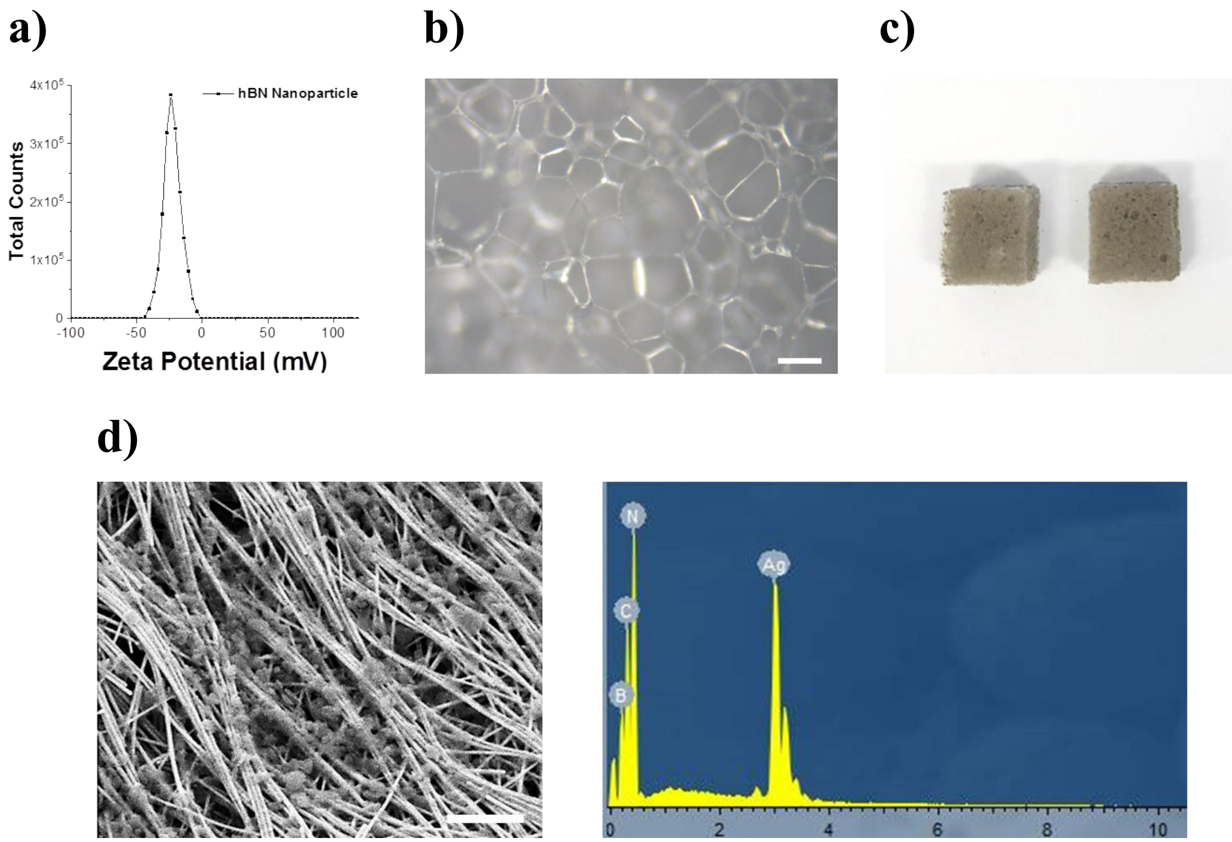


Fig. S1 (a) Zeta potential of hBN nanoparticles, (b) optical microscopy image of hBN/AgNWs/Sponge fiber (scale bar: 50 μm), (c) photograph of interior sponge, (d) EDS analysis of hBN/AgNWs/Sponge (scale bar: 1 μm).

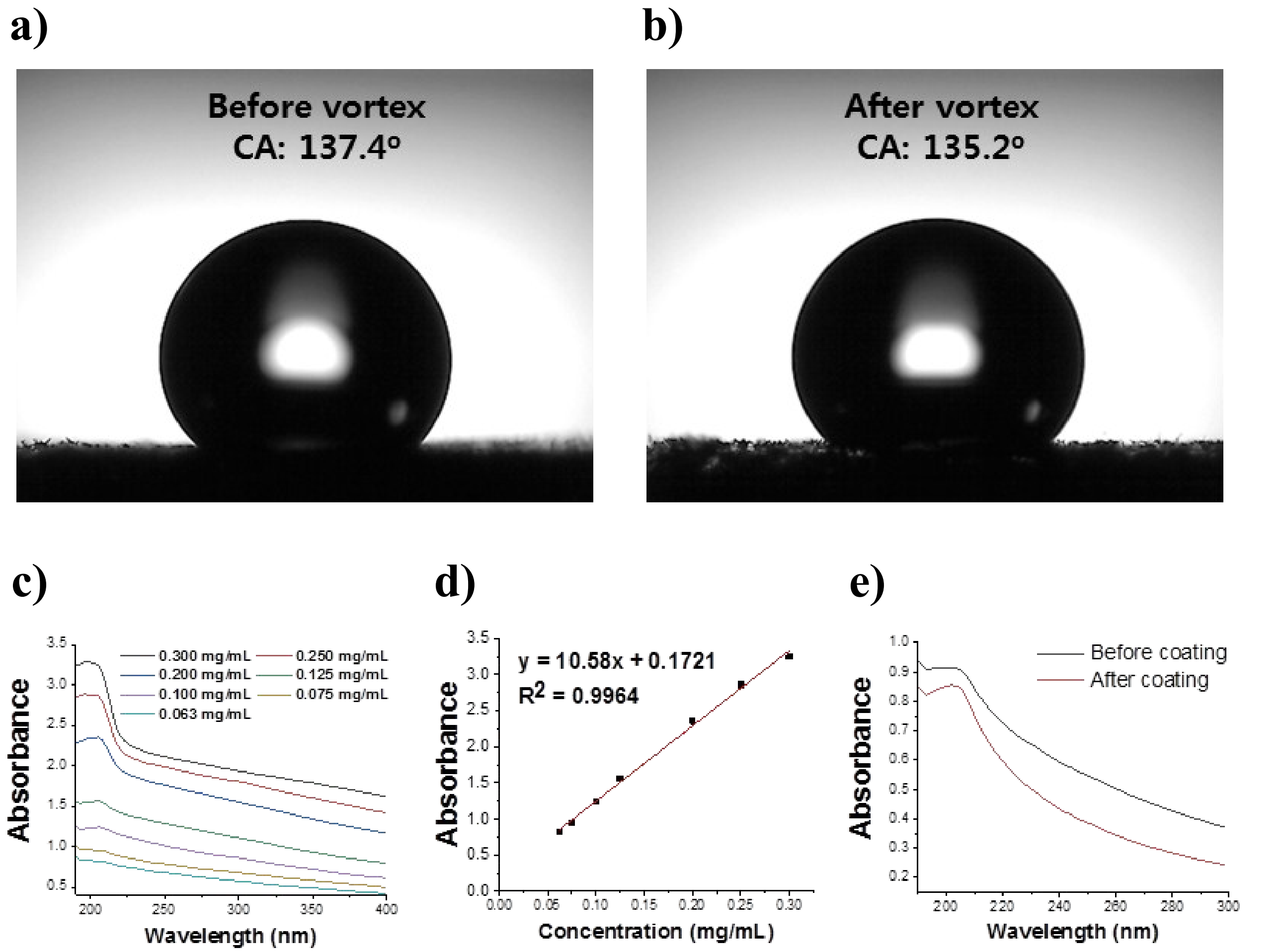


Fig. S2 Contact angle comparison (a) before and (b) after the vortex mixing of hBN/AgNWs/Sponge in DI water for 1 min, (c) UV-vis absorbance spectra of hBN nanoparticle solution at various concentrations, (d) standard curve at 205 nm, (e) hBN nanoparticle absorbance before and after the coating on AgNWs/Sponge.

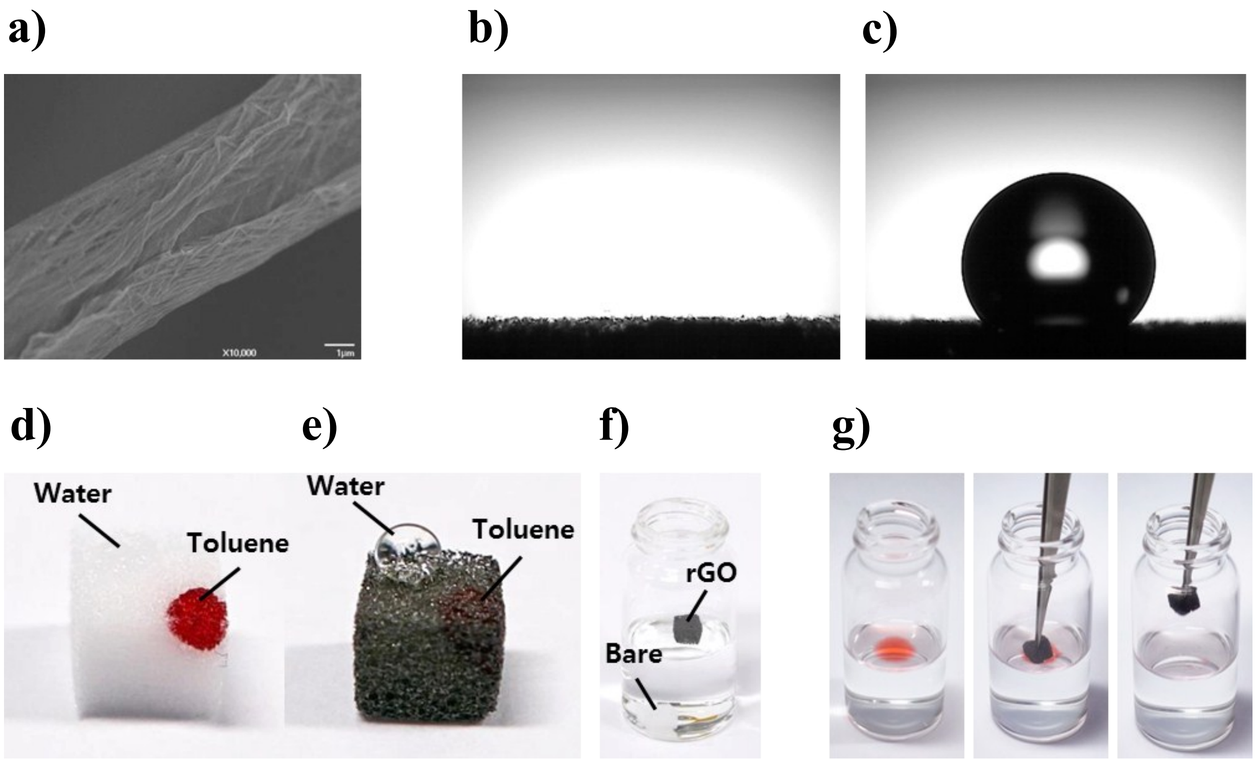


Fig. S3 (a) SEM image of rGO/AgNWs/Sponge, (b) contact angle of bare sponge and (c) rGO/AgNWs/Sponge, (d) photograph of water and toluene absorbed on bare sponge and (e) rGO/AgNWs/Sponge. (f) water immersion test of bare and rGO/AgNWs/Sponge, (g) separation test of rGO/AgNWs/Sponge for sudan 3 stained toluene.

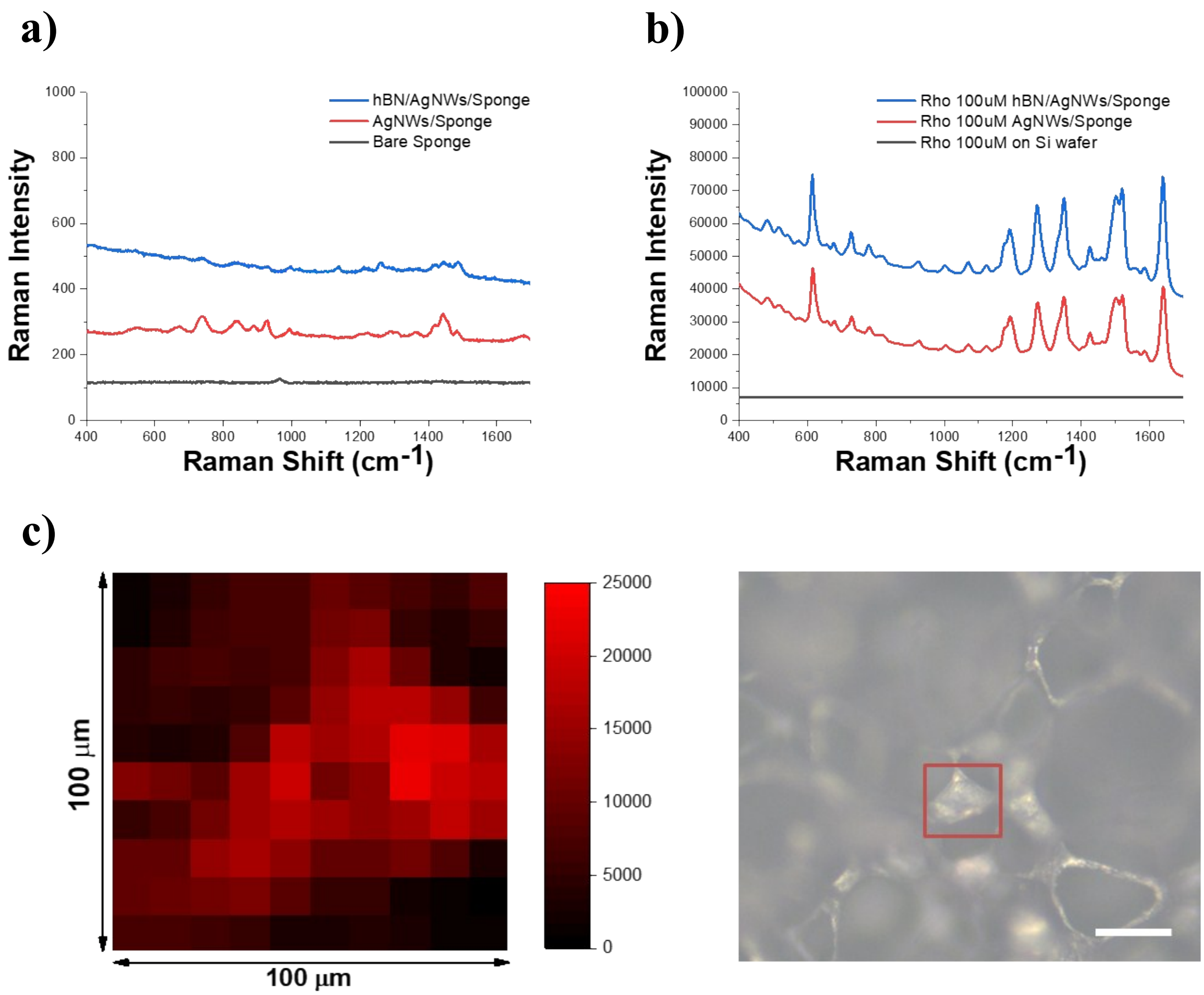


Fig. S4 Raman spectra of (a) hBN/AgNWs/Sponge, AgNWs/Sponge, and bare sponge (b) Rhodamine B solution at a concentration of 100 µM on hBN/AgNWs/Sponge, AgNWs/Sponge and Si wafer. (c) Raman mapping image of Rhod B (100 µM) treated hBN/AgNWs/Sponge fiber and the optical image of the mapping area (scale bar: 100 µm, Raman condition: λ: 633 nm, pw: 1 mW, ex. time: 0.1 s)

a) b)

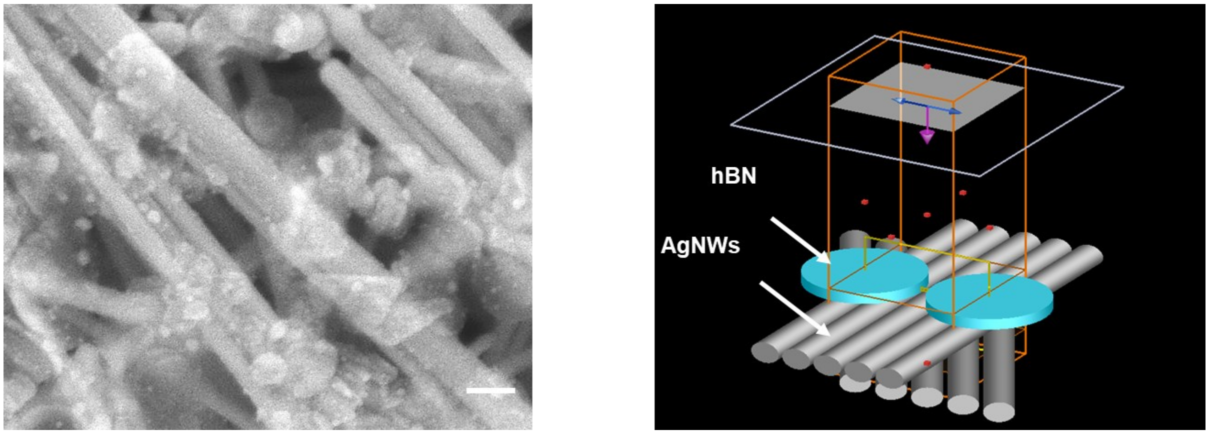


Fig. S5 (a) Magnified SEM image of hBN/AgNWs/Sponge (scale bar: 100 nm) and (b) the model for FDTD simulation.

	Structure	Raman shift (cm^{-1})	Vibrational mode
Benzene		990	Benzene ring breathing
		1177	C-H shear
		1586	C-C-C stretching
Toluene		520	Ring deformation
		780	Ring CH_3 stretching
		1002	C=C stretching
		1028	C=C stretching
		1210	Ring CH_3 stretching
		1601	C=C stretching
Ethylbenzene		487	C-H deformation
		623	C-H bending
		768	C-C-C deformation
		1002	C=C stretching
		1030	C=C stretching
		1200	C-H deformation
		1601	C=C stretching
o-Xylene		500	C-C-C bend
		575	Ring breathing
		728	Ortho ring C-C-C bend
		1047	Ring breathing
		1220	Ring breathing
		1380	CH_3 deformation
		1605	C-H bend & C=C stretching

Fig. S6 Molecular structure of BTEX and their Raman band positions with vibrational mode

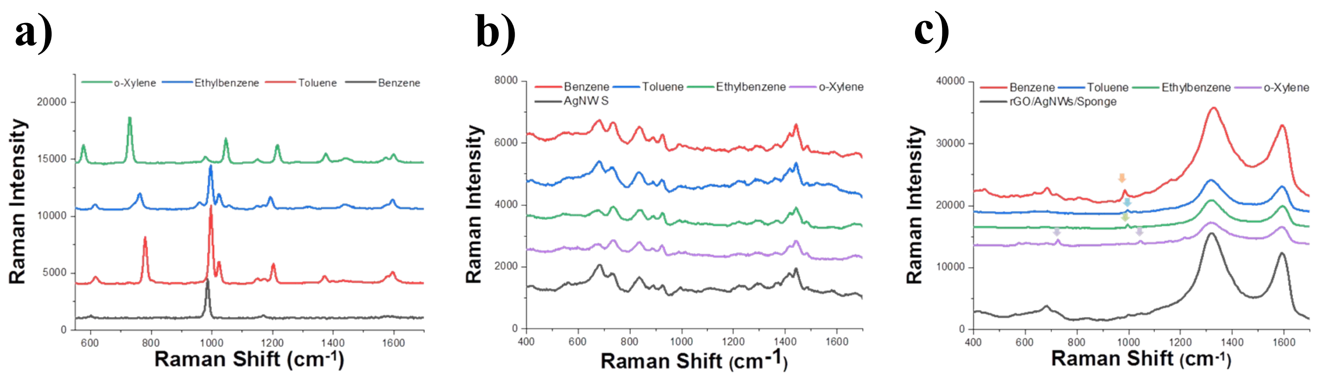


Fig. S7 Raman spectra of (a) bulk BTEX, (b) BTEX spectra after separation from the water using AgNWs/Sponge and (c) rGO/AgNWs/Sponge.

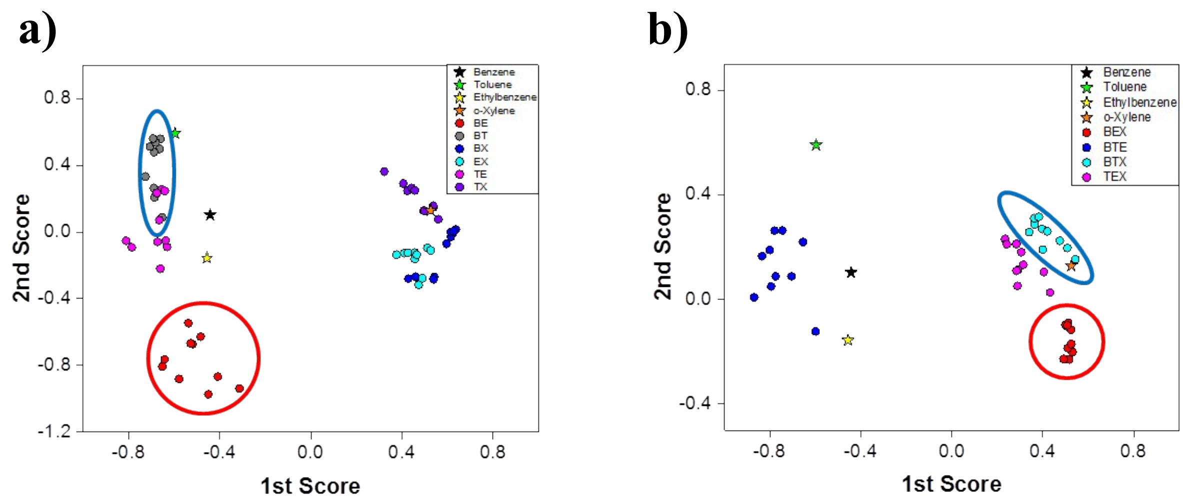
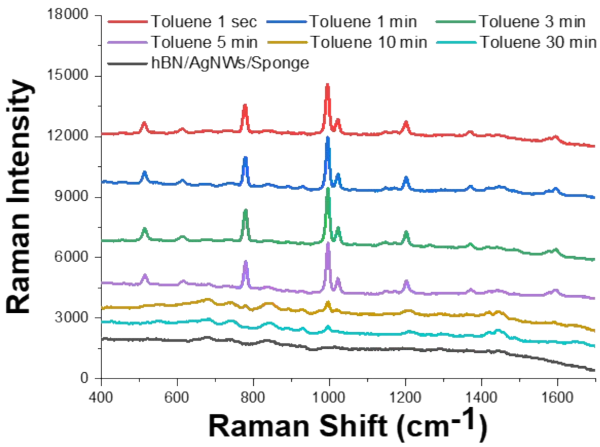


Fig. S8 PCA analysis using spectra range of 450 - 900 cm^{-1} for (a) binary mixture and (b) ternary mixtures.

a) 

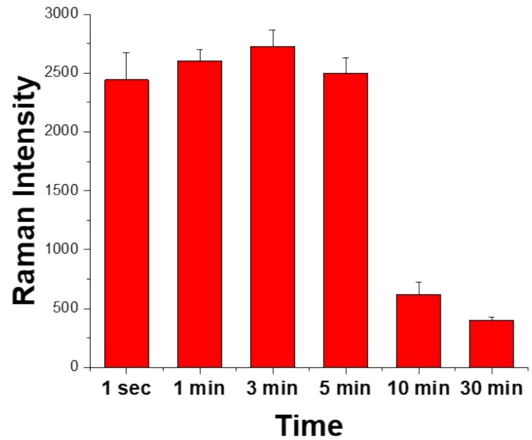
b) 

Fig. S9 (a) Raman spectra of Toluene at various hBN/AgNWs/Sponge immersion time in Toluene containing DI water and (b) the Raman intensity change at 1002 cm^{-1}.

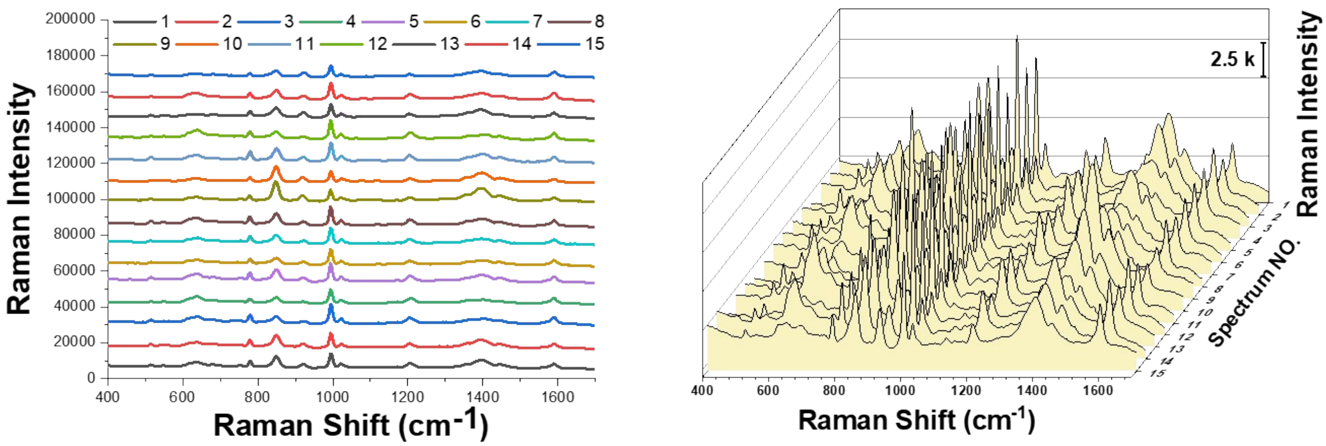


Fig. S10 Original Raman spectra of toluene used for hBN/AgNWs/Sponge reusability test.

Explanation of Video files

1. Sudan 3 stained toluene absorption using bare sponge

2. Sudan 3 stained toluene absorption using hBN/AgNWs/Sponge

Reference for BTEX Raman band information

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