Supporting Information

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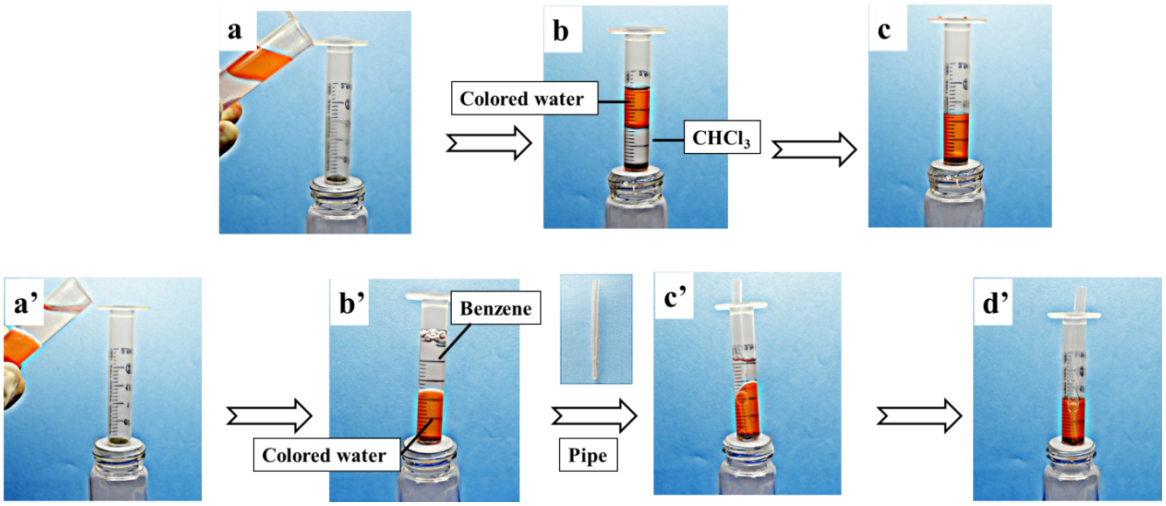

Figure S1. Oil-water separation of the 3D Au NPs/nickel foam. The as-prepared 3D Au NPs/nickel foam was placed in the bottom of the syringe. (a)-(c) chloroform/water separation experiment (water at the top of the syringe); (a')-(c') benzene/water separation experiment (water at the bottom of the syringe).

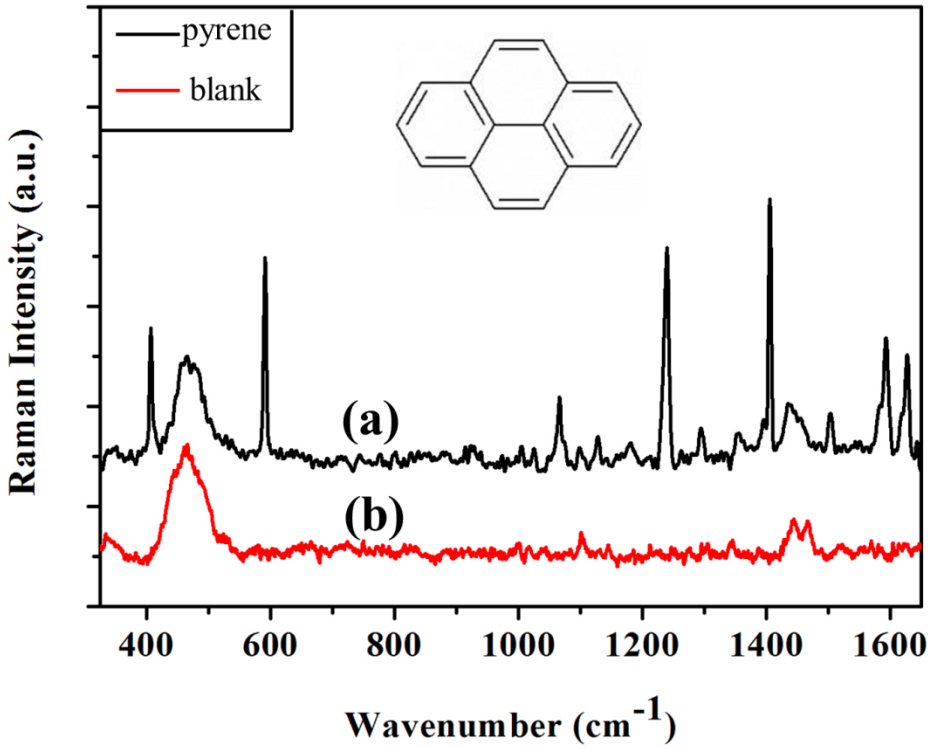

Figure S2. (a) A SERS spectrum of 10^{-3} M pyrene on the 1-octadecanethiol modified 3D Au NPs/nickel foam substrate and (b) a Raman spectrum of 1-octadecanethiol modified 3D Au NPs/nickel foam substrate.

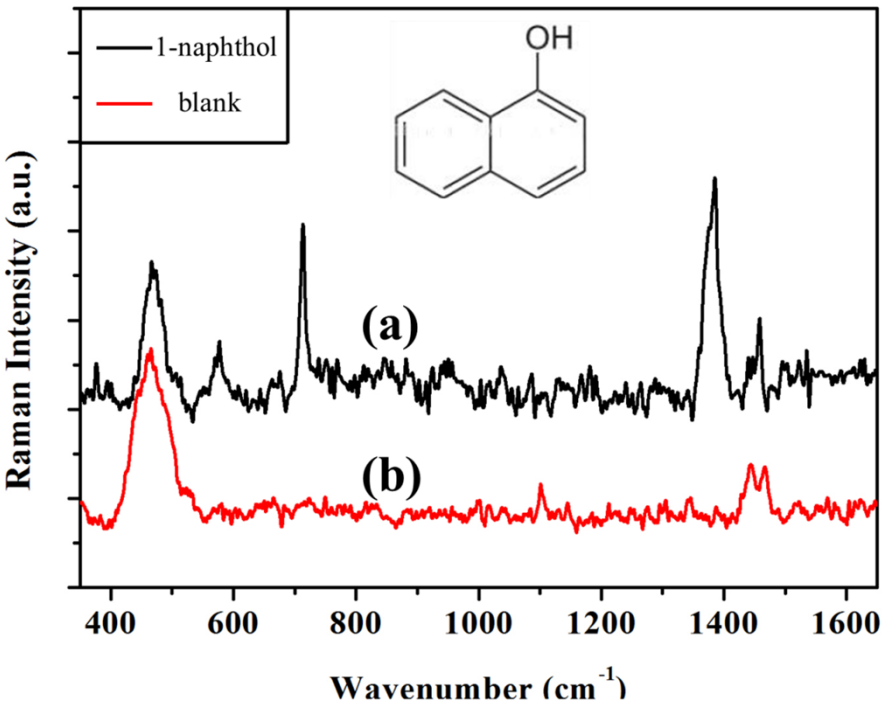

Figure S3. (a) A SERS spectrum of 10^{-3} M 1-naphthol on the 1-octadecanethiol modified 3D Au NPs/nickel foam substrate and (b) a Raman spectrum of 1-octadecanethiol modified 3D Au NPs/nickel foam substrate.

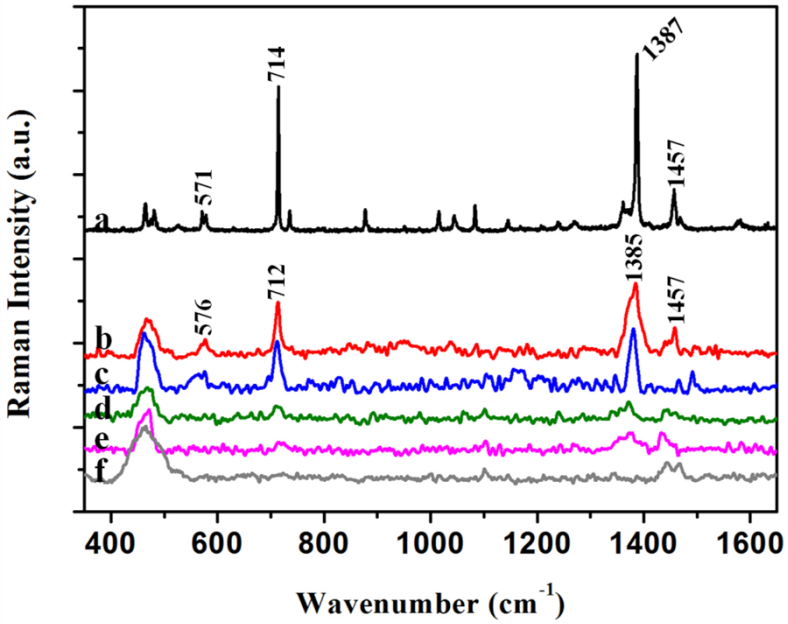

Figure S4. (a) A Raman spectrum of 1-naphthol solid powder, (b)-(e) SERS spectra of 1-naphthol with different concentrations by using the modified substrates: 10^{-3}, 10^{-4}, 10^{-5} and 10^{-6} M , (f) A Raman spectrum of the modified substrate without 1-naphthol.

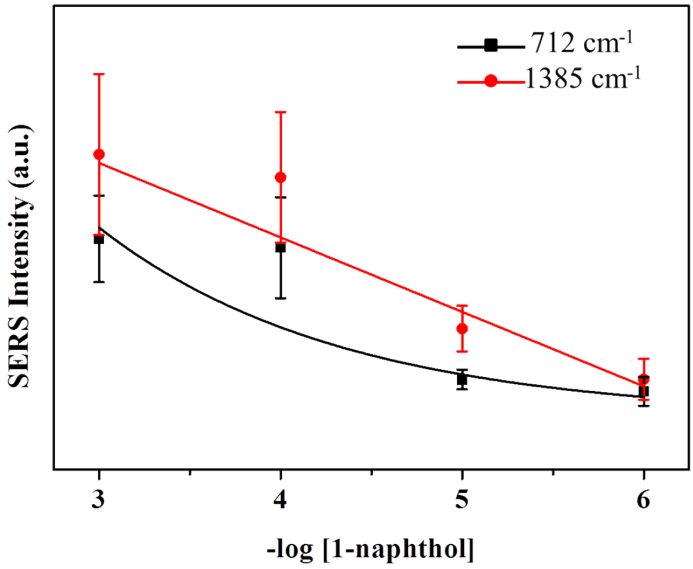

Figure S5. SERS intensity at 1385 and 712 cm^{-1} versus the concentration of pyrene on the 1-octadecanethiol modified 3D Au NPs/nickel foam substrate. Each error bar means the standard deviation at five different detected positions randomly.

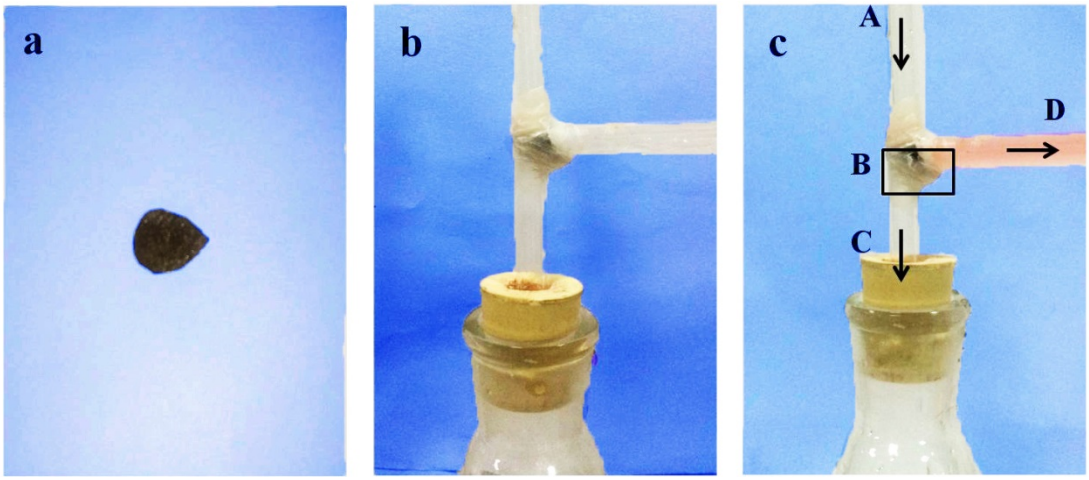

Figure S6. (a) The photograph of the 3D hydrophobic SERS substrate. (b) The simple oil-water separation device of the 3D hydrophobic SERS substrate. (c) The process of the adsorption of PAHs using the simple oil-water separation device for the detection of PAHs. A stands for the entrance of the analytes; B stands for the position of the 3D hydrophobic SERS substrate; C stand for the exit of organic solvents; D stands for the exit of aqueous solution with salt or contaminant.

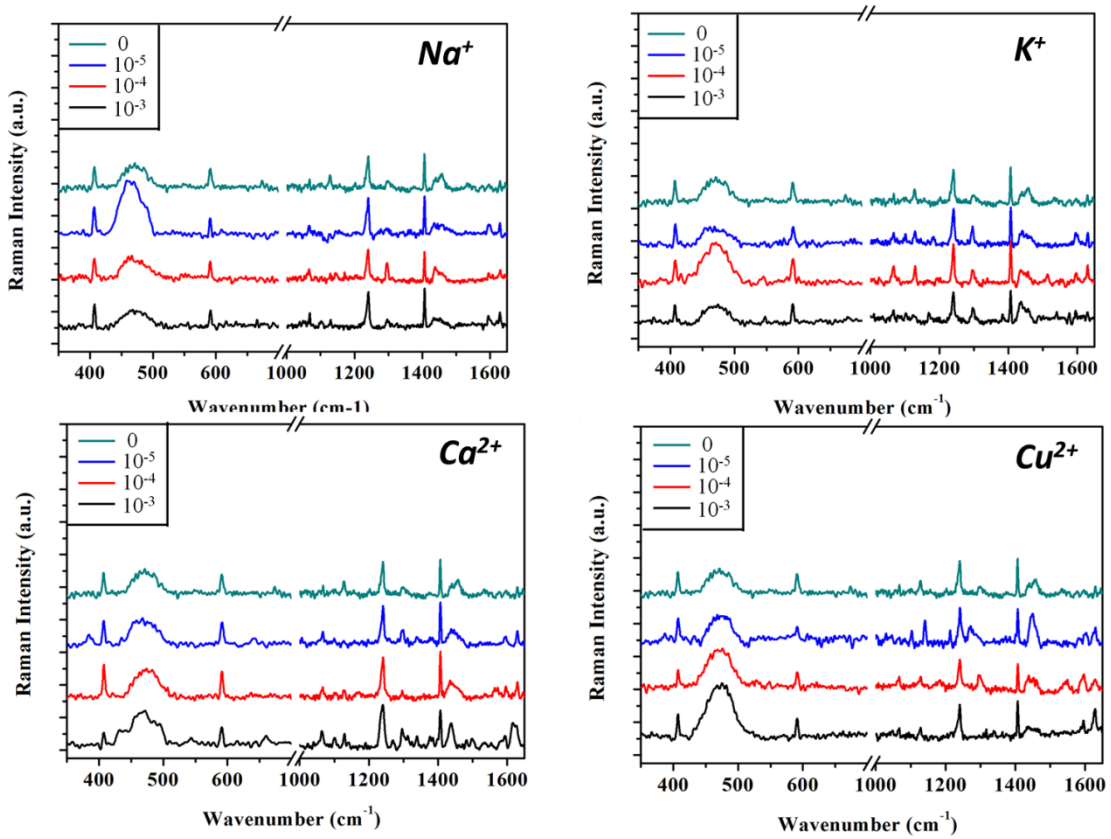

Figure S7. SERS spectra of pyrene molecules in the absence and presence of various kinds of metal ions with concentrations of 10^{-3}, 10^{-4} and 10^{-5} M.

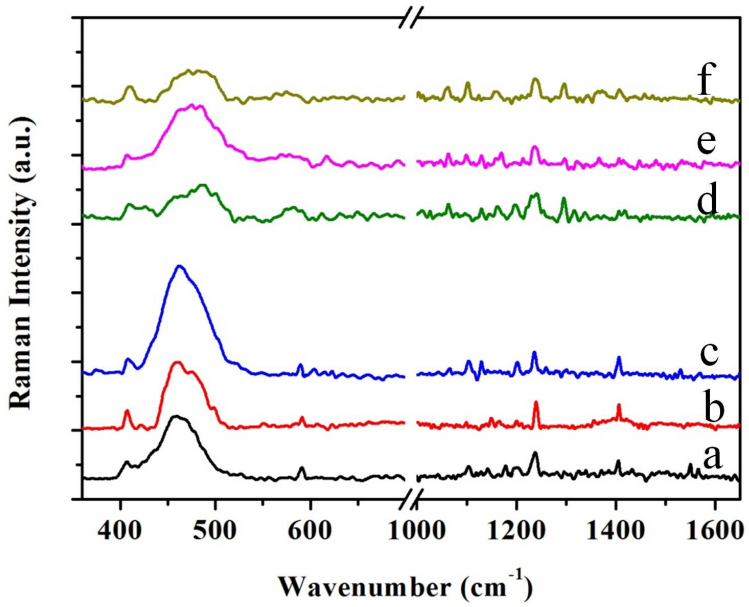

Figure S8. SERS spectra of pyrene molecules in the tap water with concentration of 10^{-5} M. SERS spectra a, b, c and d, e, f show at different positions in sample 1 and sample 2, respectively.

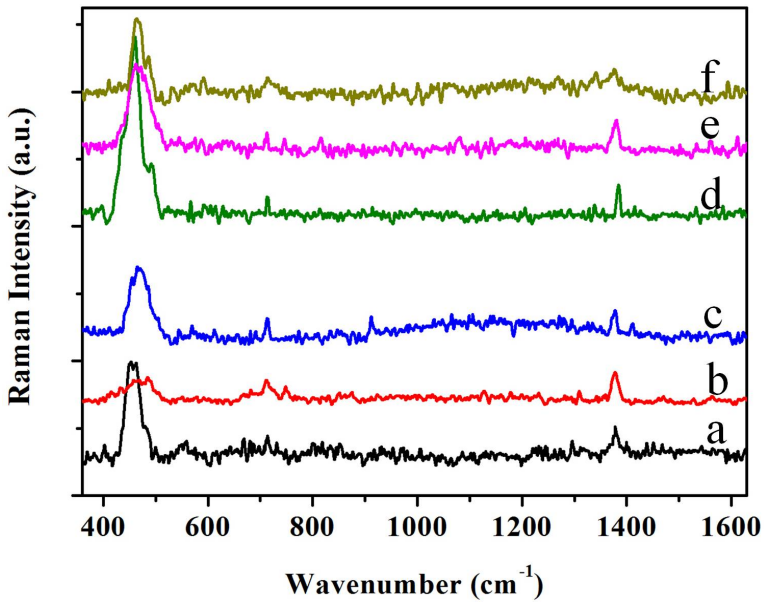

Figure S9. SERS spectra of 1-naphthol molecules in real environment (the tap water) with concentration of 10^{-5} M. SERS spectra a, b, c and d, e, f show at different positions in sample 1 and sample 2, respectively.

Pyrene /10^{-5} M	Wavenumber /cm^{-1}	407	1240	1405
Sample 1	AVG	112.215	161.504	117.412
	RSD	3.10	0.98	2.03
	Recovery percent	109.2%	98.0%	94.4%
Sample 2	AVG	106.552	156.092	92.760
	RSD	3.57	2.61	3.23
	Recovery percent	115.0%	99.2%	101.2%

Table S1. The recovery percent of pyrene (10^{-5} M) in the tap water. The average values and RSD come from three different detected positions randomly in each sample.

1-naphthol /10^{-5} M	Wavenumber/cm^{-1}	712	1385
Sample 1	AVG	75.741	97.826
	RSD	2.97	2.16
	Recovery percent	98.4 %	109.2 %
Sample 2	AVG	77.010	103.571
	RSD	2.44	1.12
	Recovery percent	97.4 %	106.6 %

Table S2. The recovery percent of 1-naphthol (10^{-5} M) in the tap water. The average values and RSD come from three different detected positions randomly in each sample.