Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Porous silver coating fiber for rapidly screening organotin compounds by solid phase microextraction coupled with surface enhanced Raman spectroscopy

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Table S1 Assignment of SERS characteristic bands for OTCs

Assignment	***TMT***	***TBT***	***TPhT***
v_s(Sn-Cl)			*417 cm^{-1}*
v_s(SnC3)	*507 cm^{-1}*	*501 cm^{-1}*	
v_{as}(SnC3)	*554 cm^{-1}*		
v (Sn-C)			*659 cm^{-1}*
a meta substituent of phenyl ring			*687 cm^{-1}*
v_{s+as}(phenyl ring breathing)			*999 cm^{-1}*
v(C-phenyl)			*1023 cm^{-1}*
δ(CH3)	*1193 cm^{-1}*	*1042 cm^{-1} 1147 cm^{-1} 1177*	*1071 cm^{-1} 1183 cm^{-1}*
v (C-C)		*1410 cm^{-1} 1440 cm^{-1}*	*1474 cm^{-1}*
v (C=C)			*1573 cm^{-1}*

Table S2 Adsorption equilibrium constant (k_e) at a different temperature

	k_e（L·μmol^{-1}）		
	25℃	35℃	45℃
TMT	1.60	1.07	0.61
TBT	30.47	8.47	4.96
TPhT	21.02	16.62	11.07

Table S3 Comparison of the analytical performance of with ICP-MS methods for determination of OTCs in textile matrix

	SPME-SERS			ICP-MS		
	C_W (μg/L)	Recovery	RSD	C_W (μg/L)	Recovery	RSD
TMT	202.2	101.4%	7.5%	212.9	106.8%	2.3%
TBT	32.1	98.5%	4.7%	35.6	109.5%	1.7%
TPhT	12.5	97.9%	5.2%	12.4	96.7%	1.4%

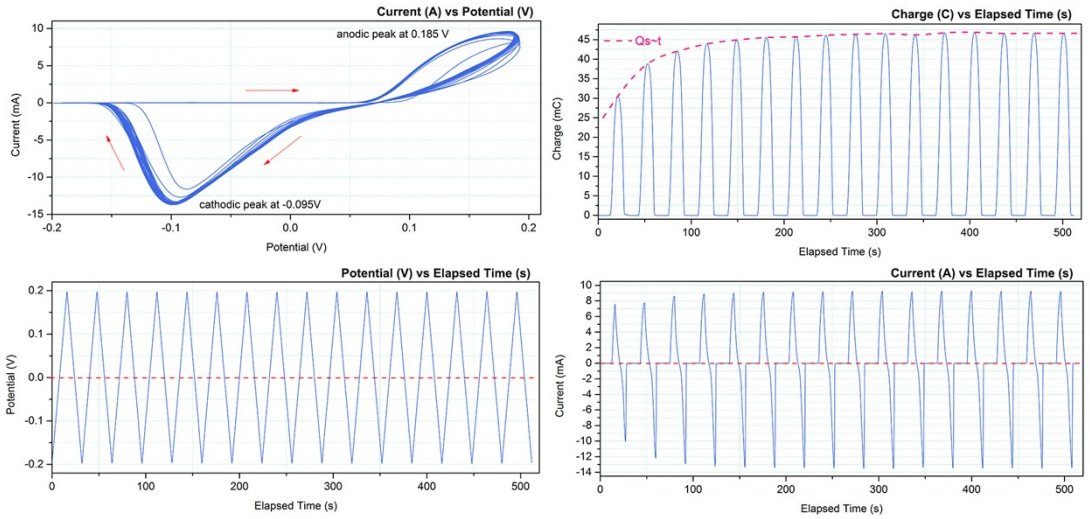

Fig. S1 Cyclic voltammogram of Ag silver wires in 0.1 M HCl scanning from -0.2 V to +0.2V at rate of 25 mV/s for 15 cycles, the silver wires, silver bucket, SCE were employed as the working, counter and reference electrodes, respectively.

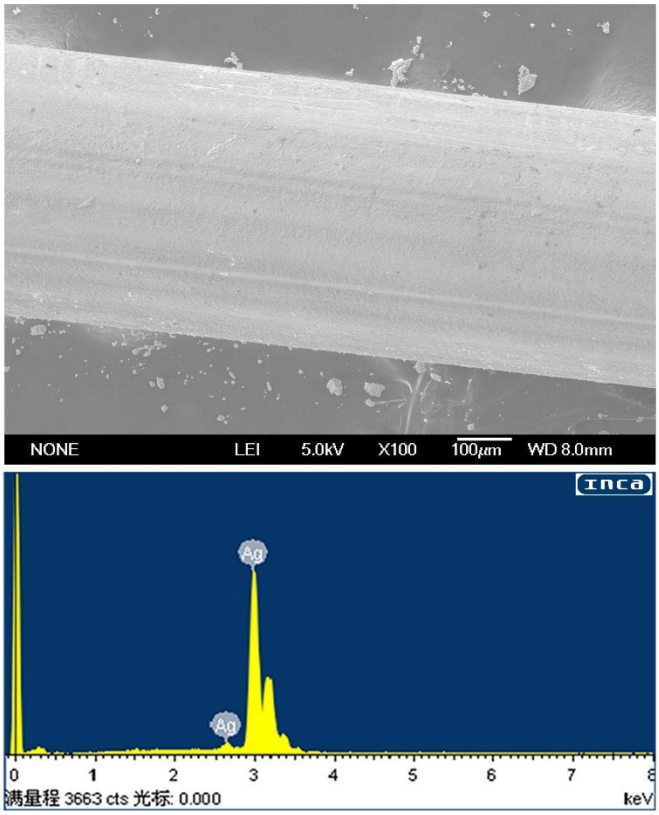

Fig. S2 The selected region for analysis and the corresponding EDS spectrum

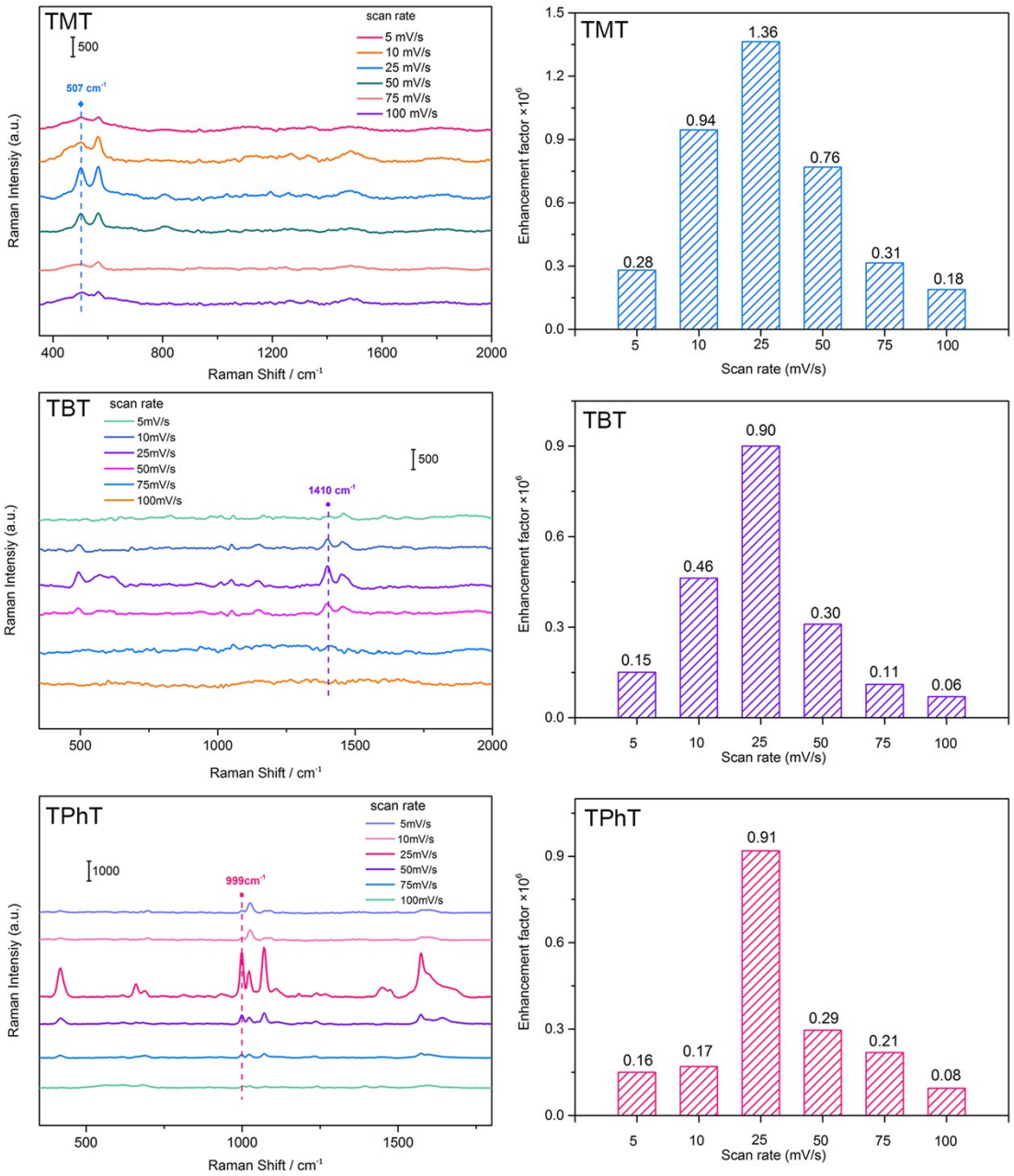

Fig. S3 SERS spectra of OTCs on porous Ag fiber prepared at different at different scan rate and corresponding enhancement factor.

The enhancement factor (EF) of porous Ag layer was calculated as following:

$$EF = \frac{I_{SERS}}{I_{Raman}} \times \frac{C_{Raman}}{C_{SERS}}$$

I_{SERS} is the characteristic band intensity of molecule on porous Ag, I_{Raman} is the Raman intensity of solid powder, C_{Raman} is the concentration of OTCs solution. C_{Raman} is the activity of solid powder, the value is 1 in this condition. The characteristic bands were selected at 554 cm^{-1}, 1410 cm^{-1}, 999 cm^{-1} for TMT, TBT and TPhT, respectively.

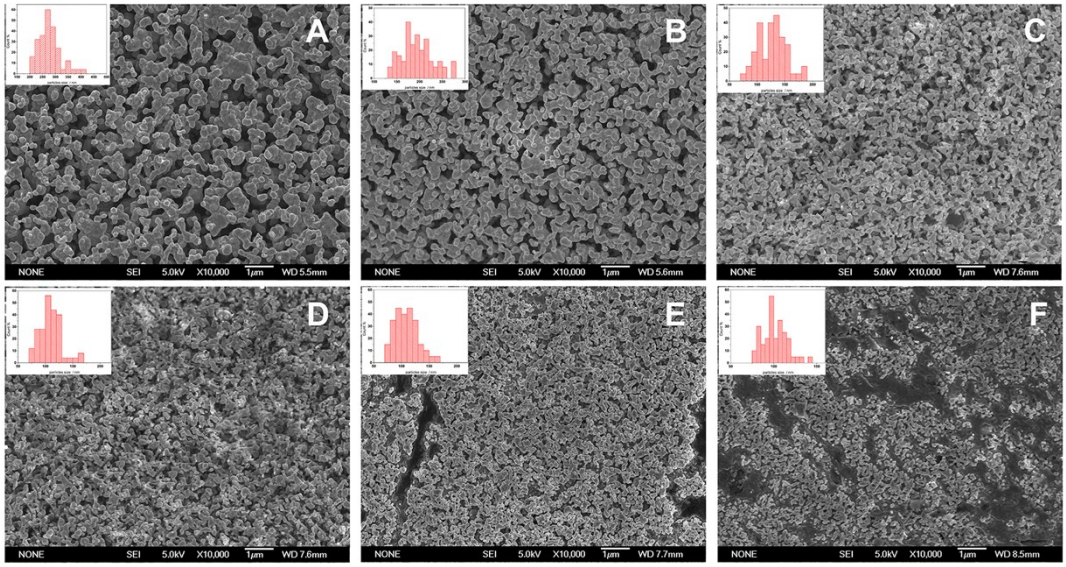

Fig. S4 SEM images of porous Ag layer pprepared at different scan rate: (A) 5 mV/s, (B) 10 mV/s, (C) 25 mV/s, (D) 50 mV/s, (E) 75 mV/s, (F) 100 mV/s, the insert plot was the histogram of particles size.

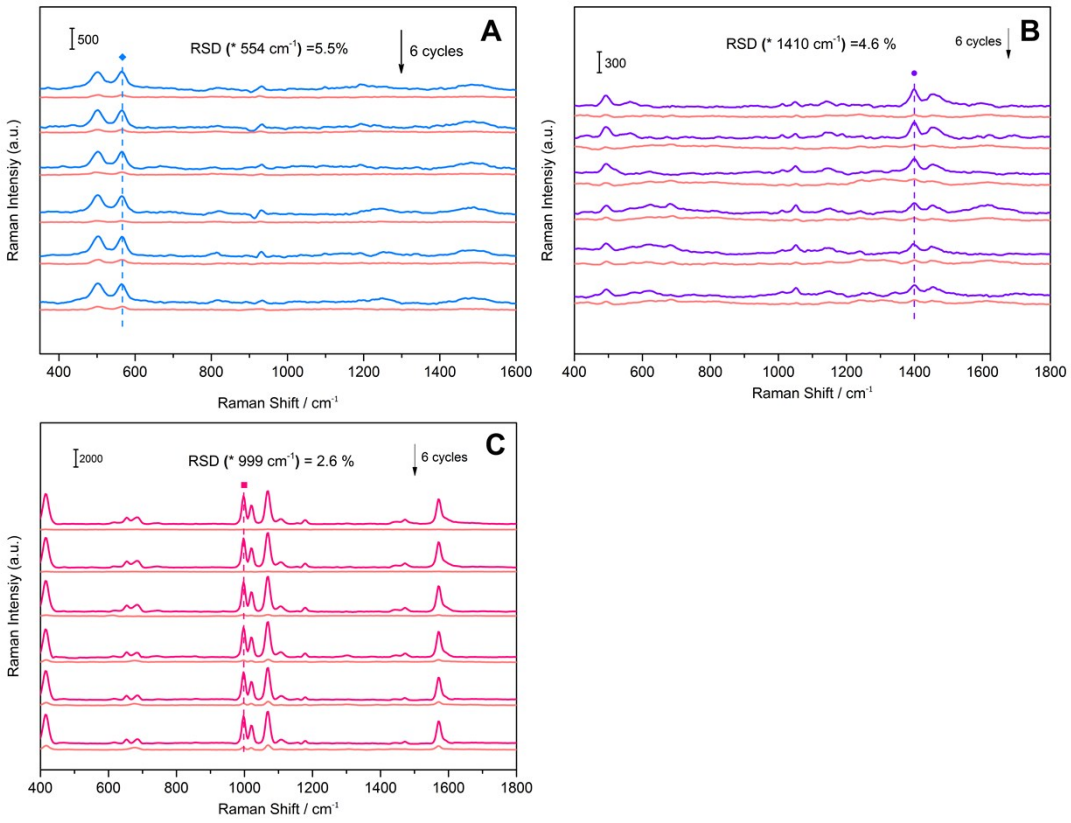

Fig. S5 The reproducibility of porous Ag fibers in six cycles for (A) TMT, (B) TBT and (C) TPhT, the dark color described the SERS after extraction, the light color described that after elution. The extraction was performed in solution for 100 min to reach equilibrium, the elution was performed by ultrasonic cleaning the porous Ag fiber for 1min in menthol.

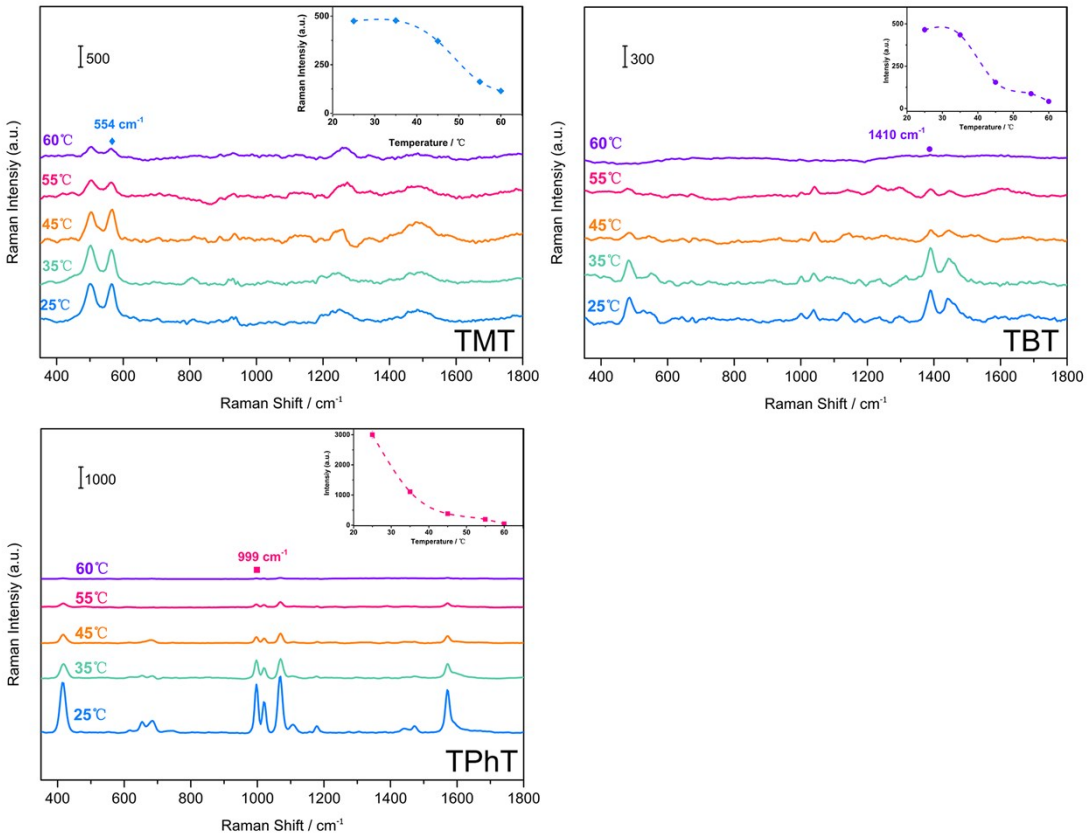

Fig. S6 SERS spectra of OTCs on porous Ag fiber extracted in different temperature, the insert plot is the curve of characteristic bands intensity vs. temperature.

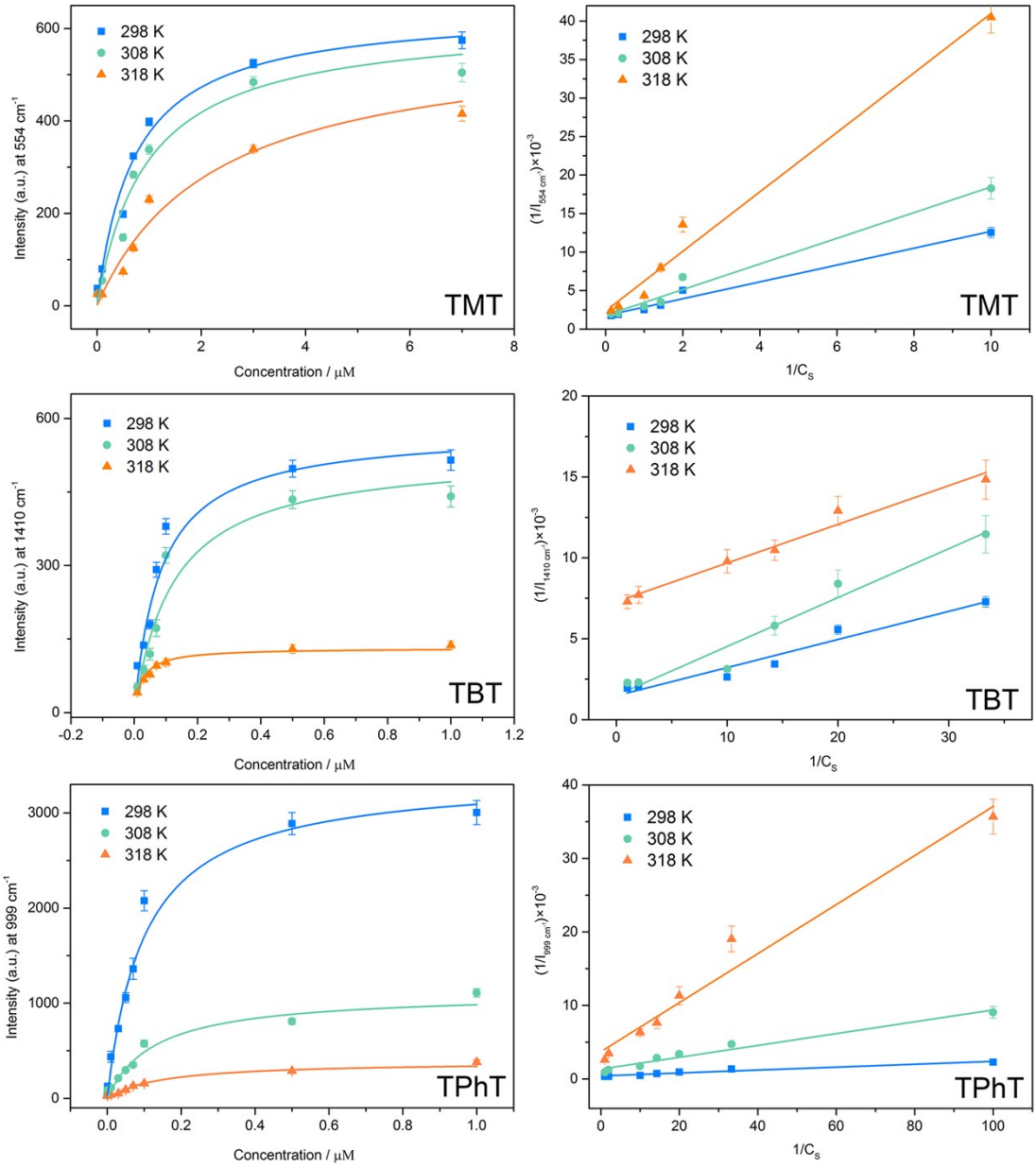

Fig. S7 Adsorption isotherm of OTCs on porous Ag fiber at 209 K (blue), 308 K (cyan) and 318 K (orange). The concentration range: TMT (7.0 μmol/L-10 nmol/L), TBT (1.0 μmol/L-10 nmol/L) and TPhT (1.0 μmol/L-0.1 nmol/L).

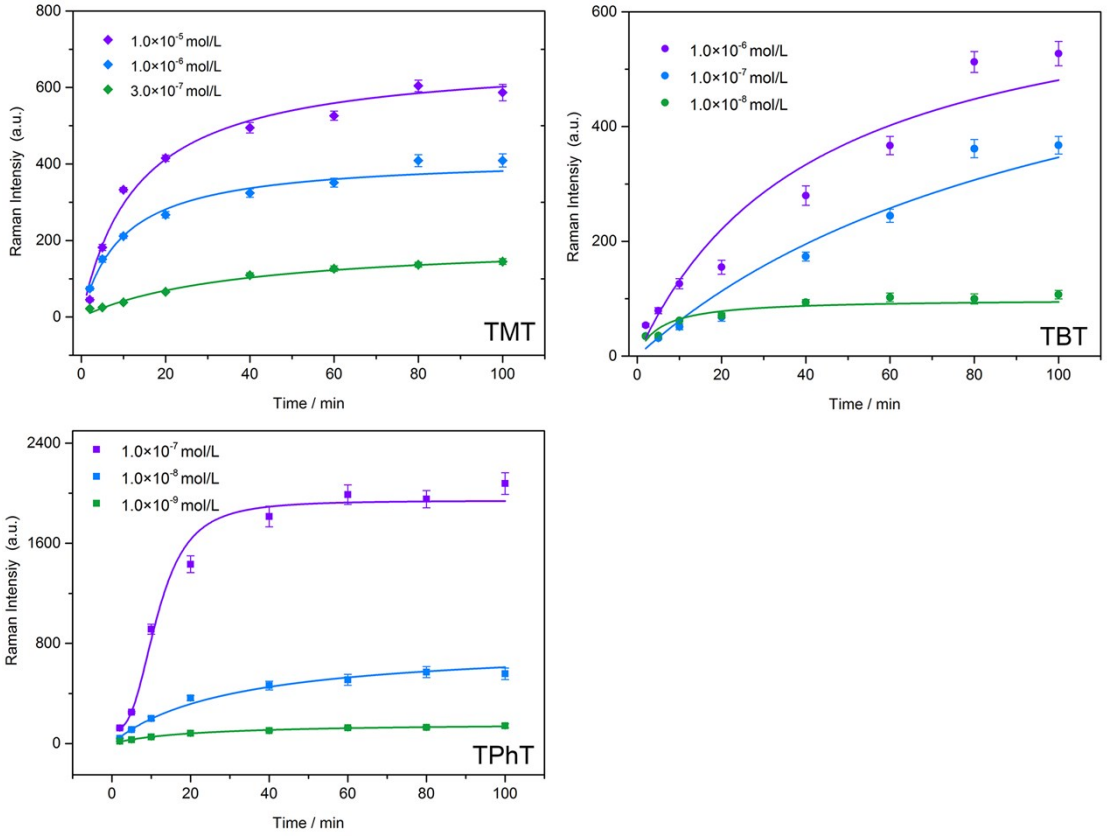

Fig. S8 The kinetic curve of extraction on different concentration

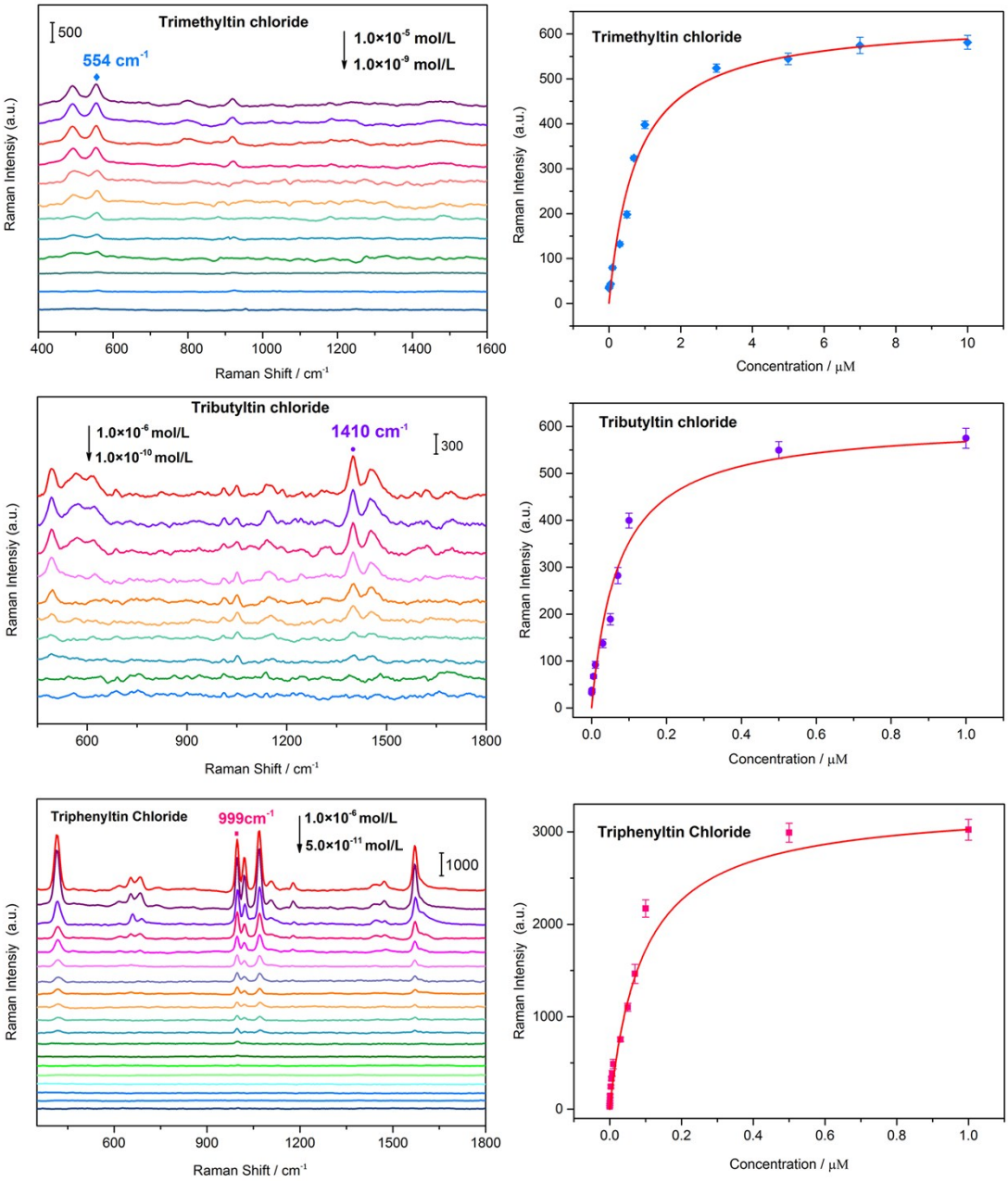

Fig. S9 The SERS spectra and adsorption curve (the intensity of characteristic band vs. the solution concentration) on different concentration, TMT (10.0 μmol/L-10 nmol/L), TBT (1.0 μmol/L-0.1 nmol/L) and TPhT (1.0 μmol/L-0.05 nmol/L), respectively.