

Supporting information

Two-dimensional MXene modified AgNRs as surface-enhanced Raman scattering substrate for sensitive determination of polychlorinated biphenyls

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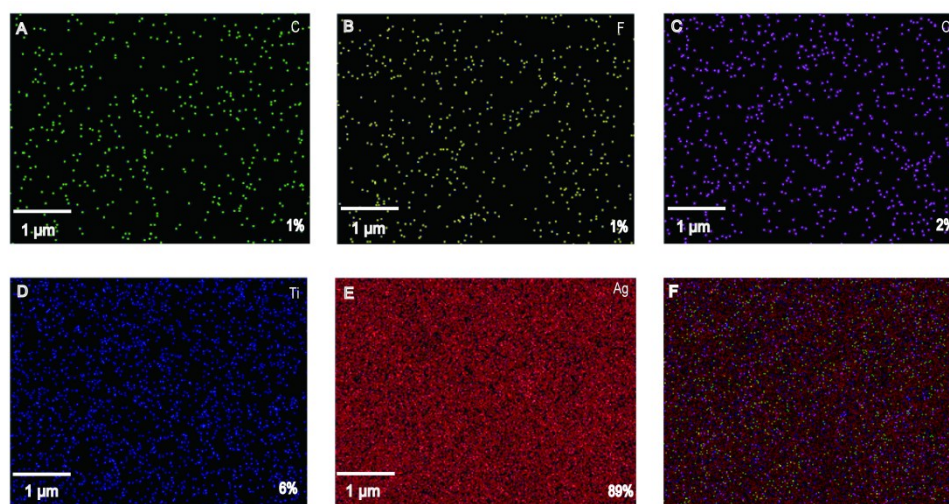


Fig. S1. (A-F) The elemental maps of C, F, O, Ti, Ag obtained from the AgNR/MXene substrate.

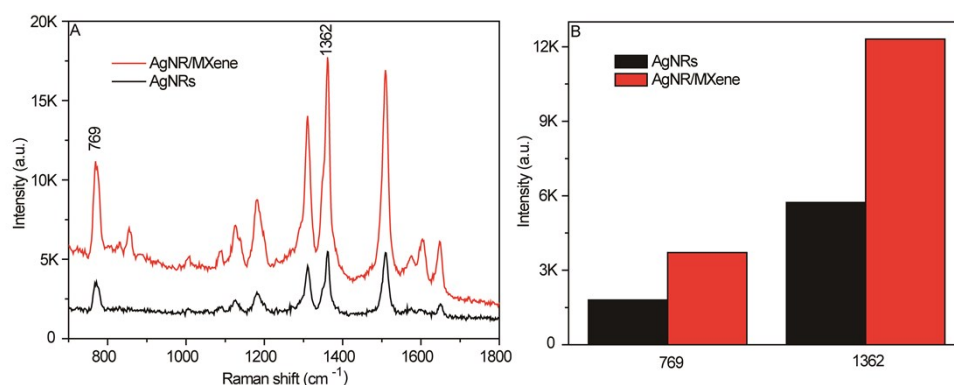


Fig. S2. (A) SERS spectra of R6G (1.0×10^{-5} M) obtained from the AgNR substrates and AgNR/MXene substrates; (B) Intensity distribution of the bands at 769 cm^{-1} and 1362 cm^{-1} obtained from the above SERS signals.

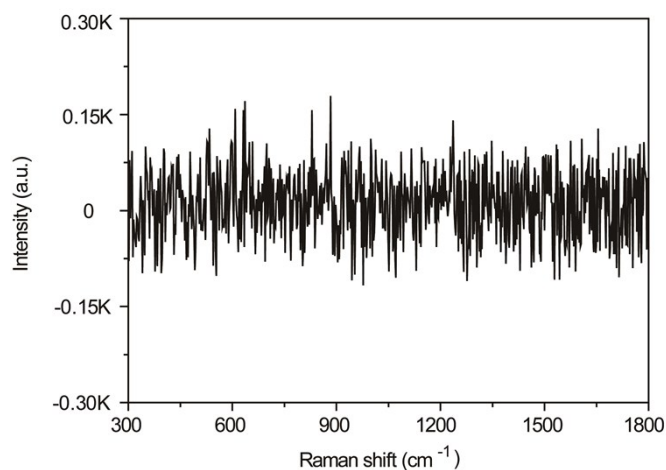


Fig. S3. SERS spectra of AgNR/MXene.

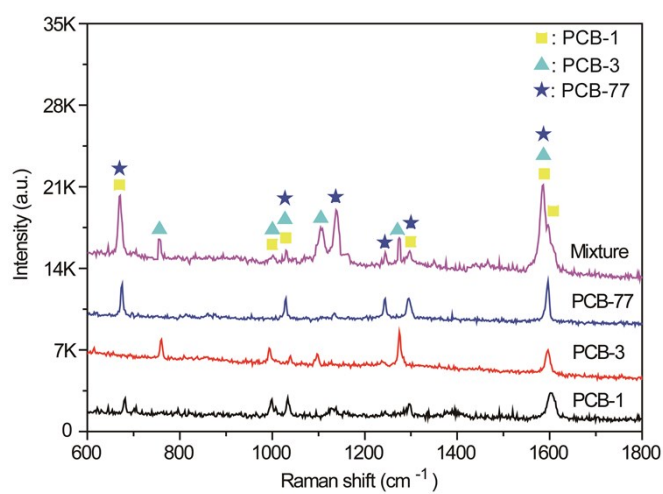


Fig. S4. SERS spectra of PCB-1, PCB-3, PCB-77 and the mixture of PCB-1, PCB-3 and PCB-77.

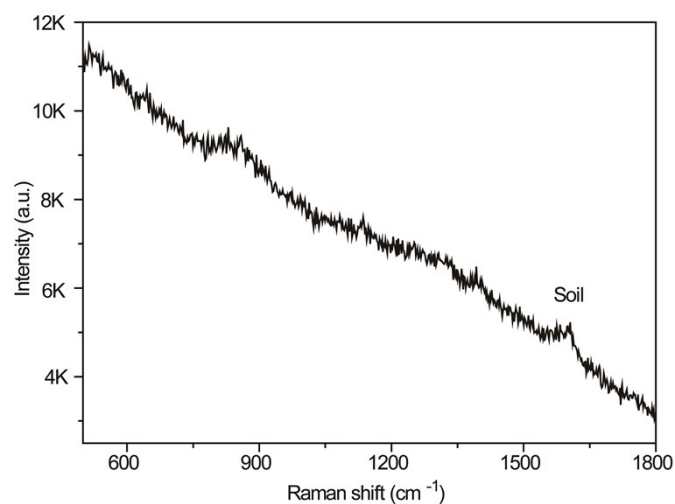


Fig. S5. SERS spectra of soil without any treatment.

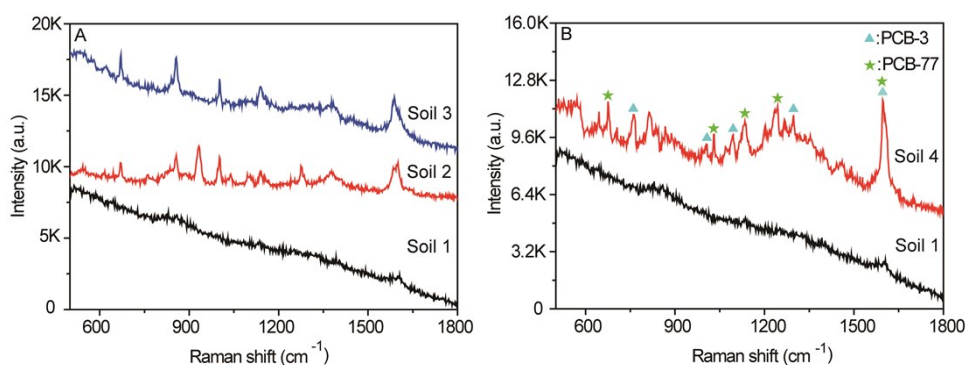


Fig. S6. (A) Raman spectra of PCBs obtained from single-component soil sample: soil 1 original sample; spiked with 1.0×10^{-6} M of PCB-3 to the soil 1 (soil 2); spiked with 1.0×10^{-6} M of PCB-77 to the soil 1 (soil 3). (B) Raman spectra of PCBs obtained from multi-component soil sample: spiked with 1.0×10^{-6} M of PCB-3 and PCB-77 mixture to the soil 1 (soil 4).

Table S1. Comparison of the AgNR/MXene-based SERS with other methods for detection PCBs.

Methods	High sensitivity	Low cost	Fast detection	References
Gas chromatography	√	×	×	1

gas Chromatography-mass spectrometry	√	×	×	2,3
Enzyme-linked immunoassay	√	×	√	4,5
Our method (AgNR/MXene)	√	√	√	

Table S2. Comparison of the AgNR/MXene substrates with other SERS substrates for detection of PCBs.

Methods	Polychlorinated Biphenyls	LOD	Reference
GO wrapped flower-like Ag microparticles (Ag@GO)	PCB-3 PCB-77	1.0×10^{-4} M	6
AgNPs @ PAN-nanohump	PCB-77	1.0×10^{-5} M	7
AgNPs-decorated Au-fractal patterns	PCB-77	1.0×10^{-6} M	8
Ag nanosheet-assembled micro-hemispheres modified with HS-β-CD	PCB-77	1.0×10^{-7} M	9

	PCB-3		
β-CD coated SiO ₂ @Au@Ag core-shell nanoparticles	PCB-77	1.0 × 10 ⁻⁷ M	10
	PCB-29		
Our method	PCB-3	1.0 × 10 ⁻⁸ M	
(AgNR/MXene)	PCB-77	1.0 × 10 ⁻⁹ M	

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