Supplementary Information

One-step Microwave-assisted Synthesis of MoO_{3-x}-Covalent Organic Framework (COF)-based Nanocomposite for Amplified Surface-enhanced Raman Spectroscopy in Environmental Application.

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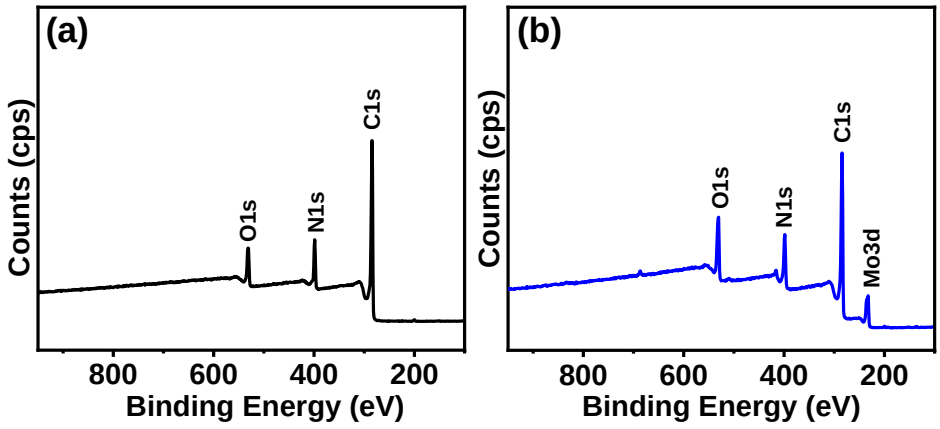

Figure S1. XPS survey scan of (a) TpTTA COF and (b) MoO_{3-x}-TpTTA COF NC.

Table S1. Values provided by CasaXPS Software Related to the Deconvolution of Figure 3d.

Mo^{6+} (%)	Mo^{5+} (%)
80.92	19.07

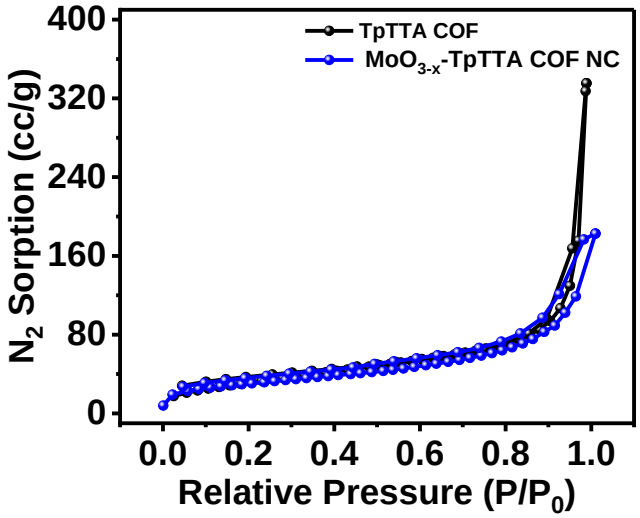

Figure S2. N_2 adsorption-desorption isotherm of TpTTA COF and MoO_{3-x}-TpTTA COF NC.

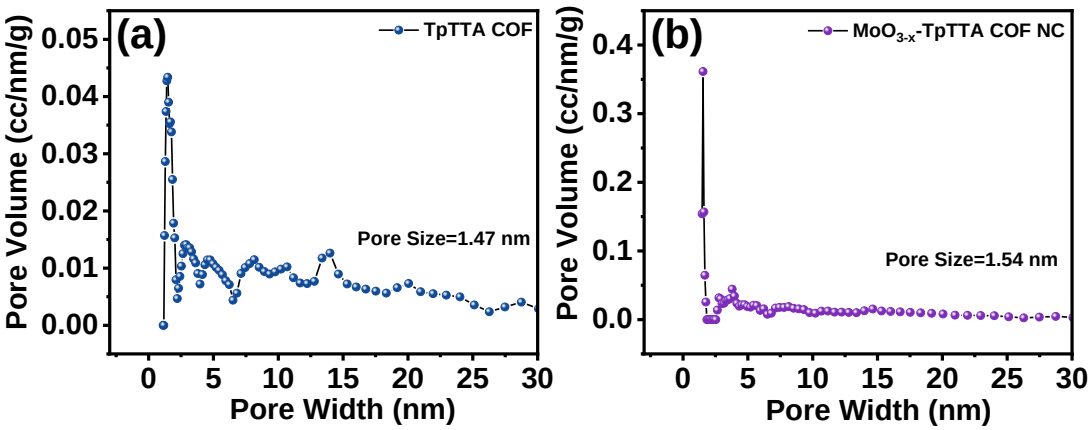

Figure S3. BET pore size distribution of (a) TpTTA COF and (b) MoO_{3-x}-TpTTA COF NC.

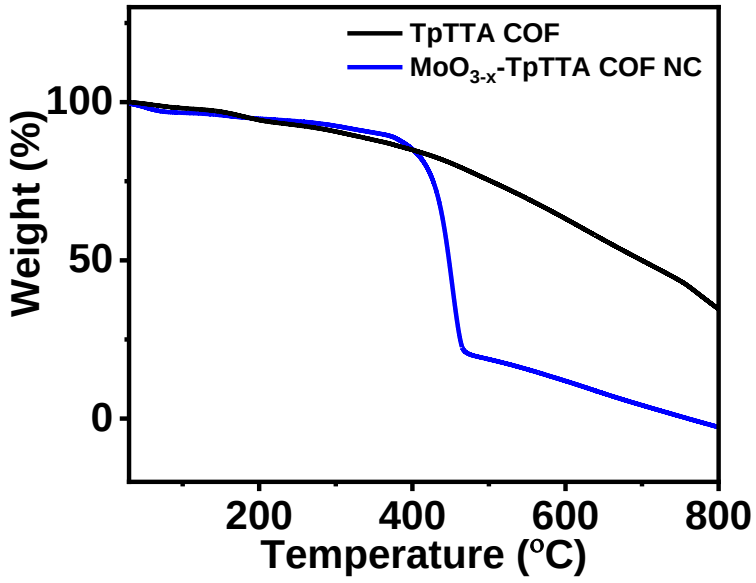

Figure S4. TGA analysis of TpTTA COF and MoO_{3-x}-TpTTA COF NC.

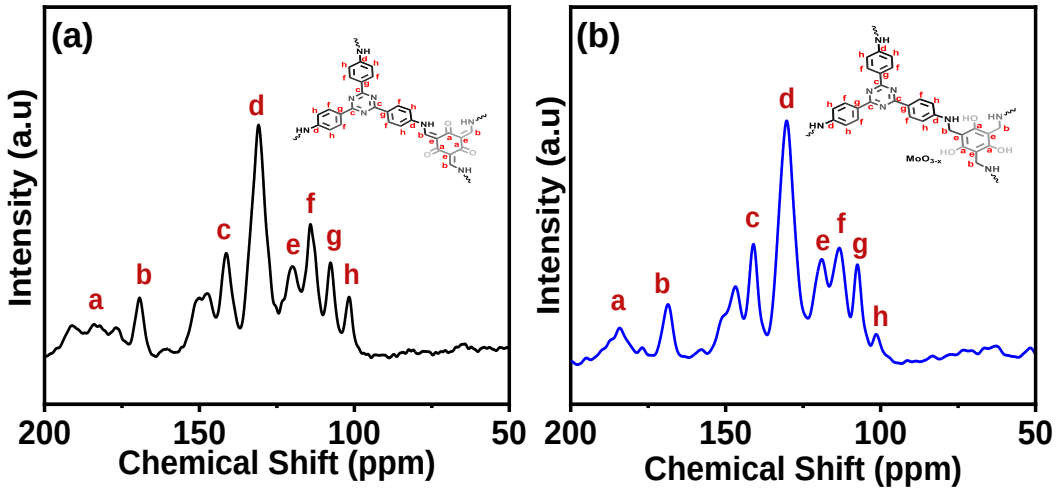

Figure S5. Solid state ^{13}C NMR Spectrum of (a) TpTTA COF and (b) MoO_{3-x}-TpTTA COF NC.

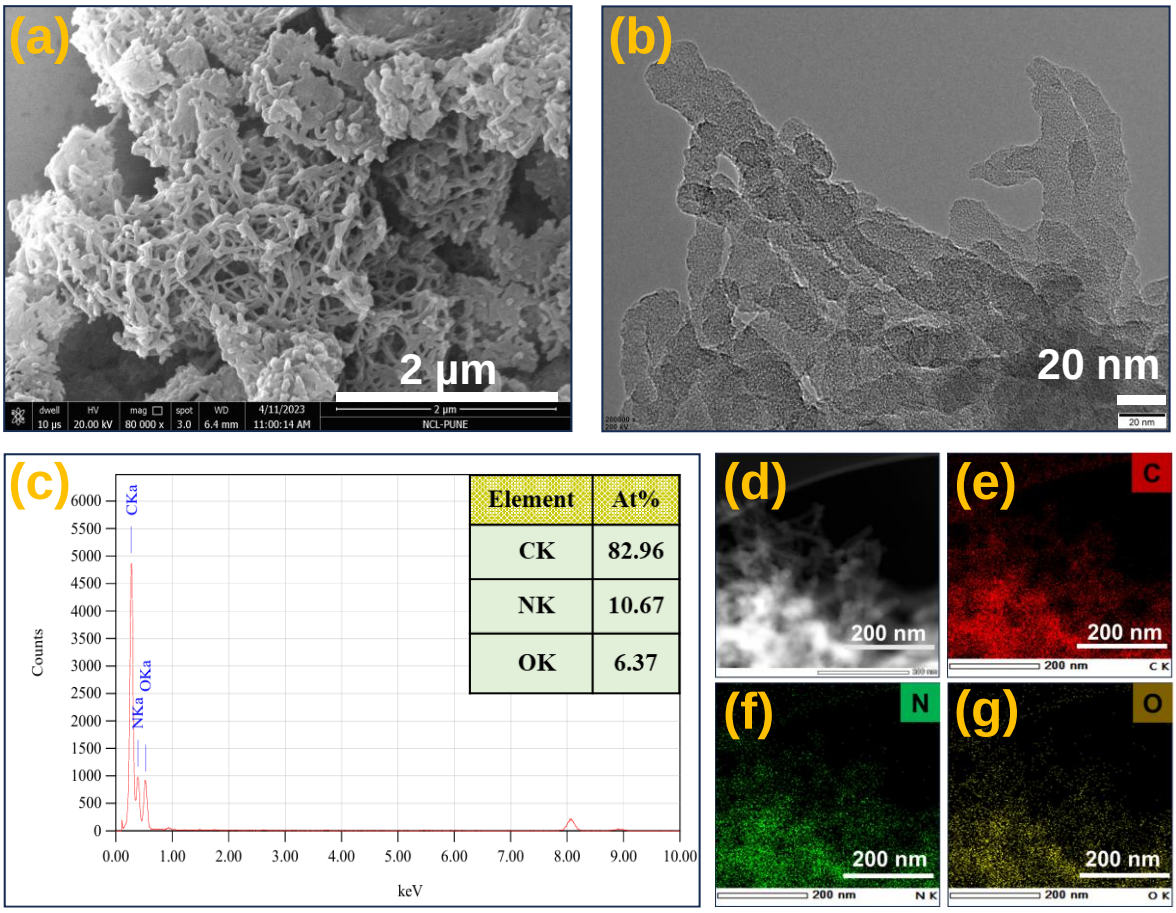

Figure S6. (a) FESEM, (b) HRTEM, (c) EDS, (d) HAADF-STEM image, and (e)-(g) Elemental mapping of TpTTA COF.

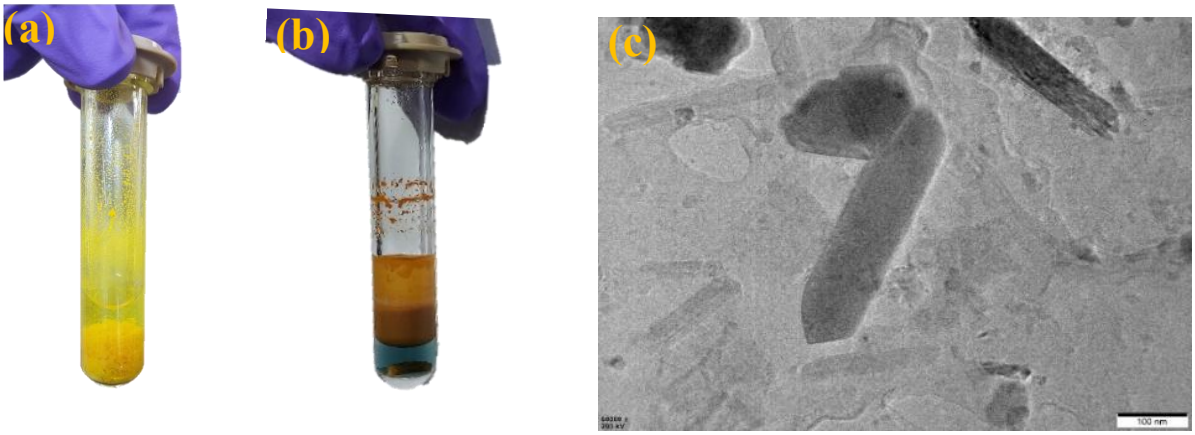

Figure S7. Images of reaction mixture containing product in glass vial after microwave-assisted synthesis via (a) one-step, (b) two-step and (c) HRTEM image of the product obtained via two-step microwave-assisted synthesis.

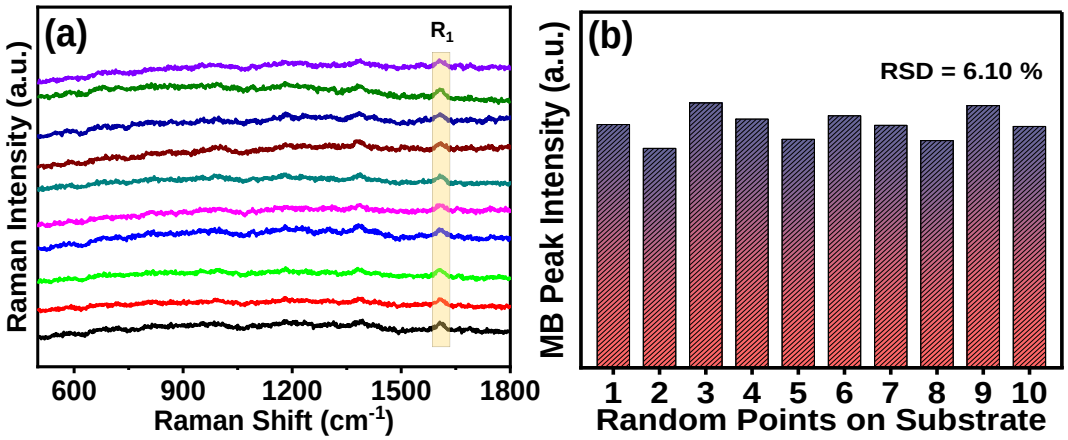

Figure S8. (a) SERS spectra of 10^{-4} M MB on MoO_{3-x}-TpTTA COF nanocomposite collected from 10 random positions, and (b) intensity distribution of 1624 cm^{-1} peak of MB (10^{-4} M) on MoO_{3-x}-TpTTA COF NC.

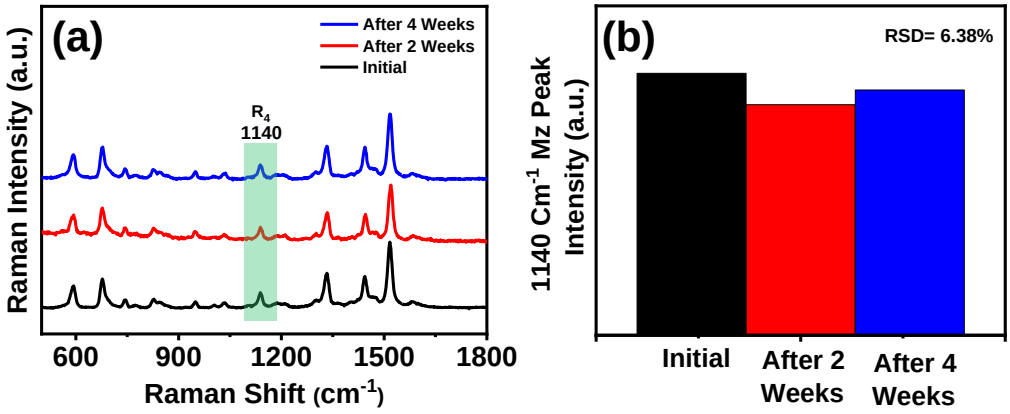

Figure S9. (a) SERS spectra of 500 ppm Mancozeb on MoO_{3-x}-TpTTA COF NC collected over a period of 4 weeks, and (b) the intensity distribution of 1140 cm^{-1} peak of 500 ppm Mancozeb on MoO_{3-x}-TpTTA COF NC.

Table S2. Enhancement Factor (EF) calculation for MoO_{3-x}-TpTTA COF nanocomposite with respect to MB concentration (M).

Sample: MoO_{3-x}-TpTTA COF nanocomposite				
Sr. No.	**Methylene Blue Concentration**	**N_{Bulk}/N_{SERS}**	**I_{SERS}/I_{Bulk}**	**$EF=(N_{Bulk}/N_{SERS})\times(I_{SERS}/I_{bulk})$**
1	10^{-1} M	3.471	0.8799	3.05
2	10^{-2} M	16.558	0.6315	1.05×10^{1}
3	10^{-3} M	752.139	0.214	1.61×10^{2}
4	10^{-4} M	1506.085	0.2062	3.11×10^{2}
5	10^{-5} M	8365.027	0.1871	1.57×10^{3}
6	10^{-6} M	42932.026	0.1722	7.39×10^{3}
7	10^{-7} M	531401.506	0.146	7.76×10^{4}

Table S3. Comparison table of MoO_{3-x}-TpTTA COF nanocomposite with previously reported COF composites used for pesticide detection.

Sr. No.	Substrate/ Material	Synthesis Method	Analyte	Limit of Detection (LoD)	Enhancement Factor (EF)	Reference
1.	MoO_{3-x}-TpTTA COF nanocomposite	One-Step Microwave Synthesis	Methylene Blue (MB)	10^{-7} M	7.76 x 10^4 (MB)	Our Work
			Commercial Mancozeb (All Care)	12.5 ppm		
2.	AgNP's-AuNP's thin film	Pulsed laser deposition (PLD)	Mancozeb	2.8 x 10^{-3} M (~1515 ppm)	10^4	1
3.	Fe_3O_4/GO/ Au	Multistep chemical synthesis	Mancozeb	0.077 ppm	-	2
4.	Ag@Au alloyed nanorods	Electroplating	Mancozeb	0.2 ppm	-	3
5.	TPDH-COF/Au NPs	Multistep electrostatic assembly	Thiabendazole	5 ppb (0.005 ppm)	2.01 x 10^8 (R6G)	4
6.	Fe_3O_4@Ag@COF	Multistep chemical synthesis	4-ATP	10^{-10} M 0.00001252 ppm	--	5
			Methamidophos	8.3 x 10^{-5} mg/kg (0.00008 ppm)		
7.	COF-AuNPs	Multistep electrostatic assembly	Thiram	1.7 x 10^{-8} mol·L^{-1} (0.0041 ppm)	1.13 x 10^6 (4-MBA)	6

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