

S1-Supplementary files.

Enhanced hydrophilic property and performance evaluation of PVDF-TiO₂-nZVI-SiO₂ nanocomposite membranes for the remediation of heavy metal contaminated wastewater

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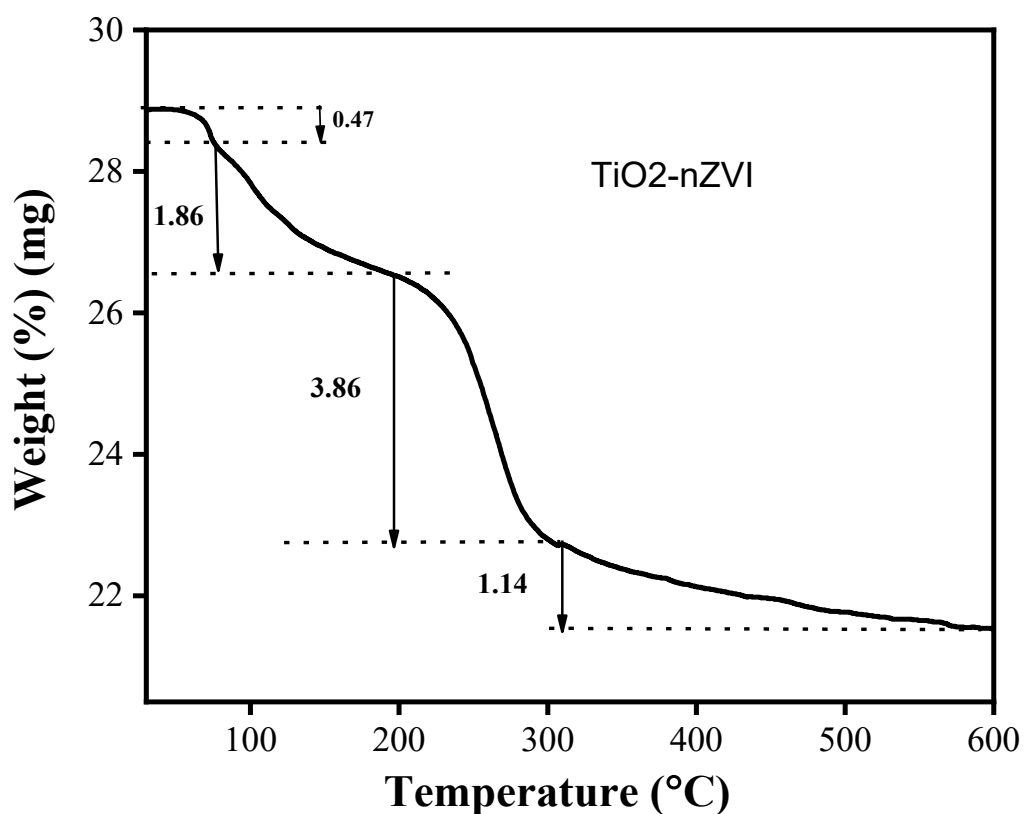
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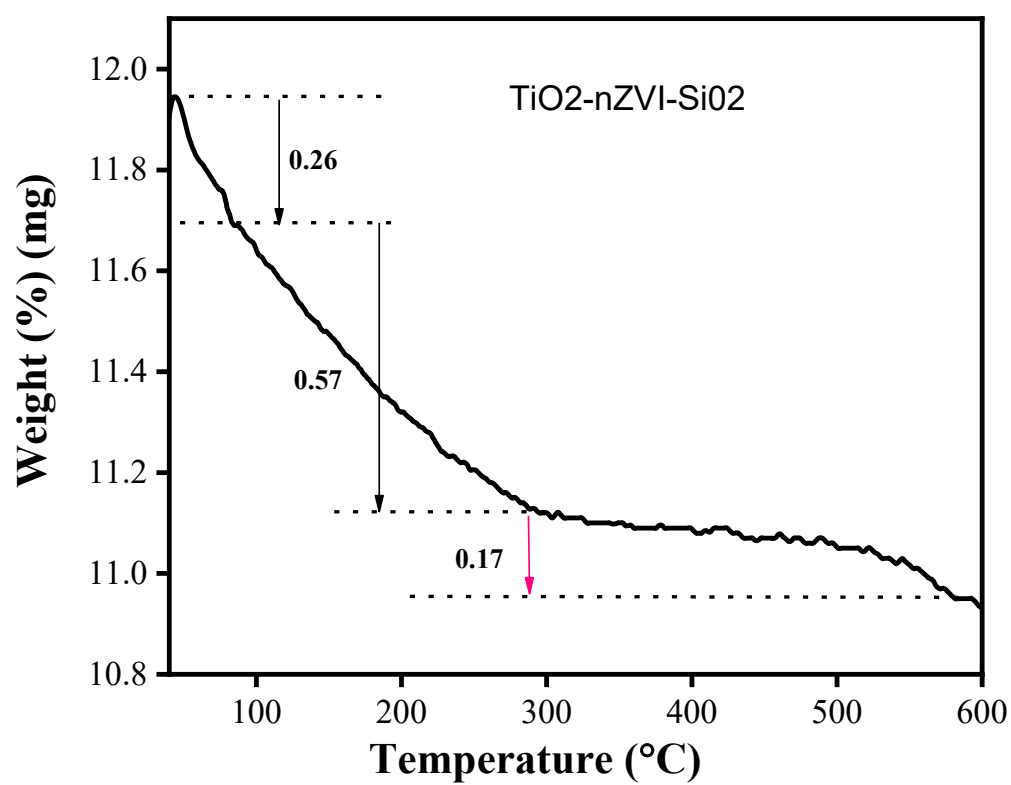
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TGA weight loss analysis of the TiO₂-nZVI and SiO₂ coated nanocomposite material



S1 TGA 1: Weight loss analysis of TiO₂-nZVI



S1 TGA 2: Weight loss analysis of $\text{TiO}_2\text{-nZVI-SiO}_2$

Membrane Crystallinity Analysis

$$\text{Crystalline index (\%)} = \frac{A_c}{A_t} \times 100$$

$$A_t = A_c + A_m$$

$$D = \frac{k\lambda}{\beta \cos \theta}$$

Where;

A_c represent “Sum of the area of all the individual crystalline peak

A_m represents the area of amorphous peaks

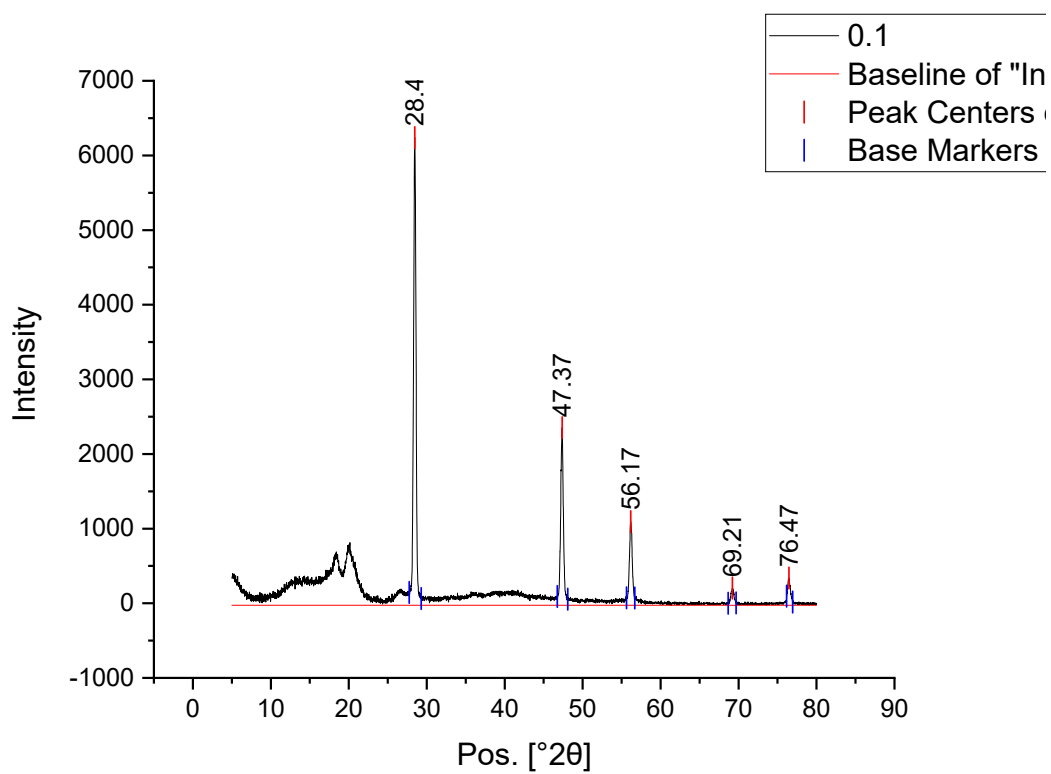
A_t total area of all peaks

k is the Scherrer constant = 0.94

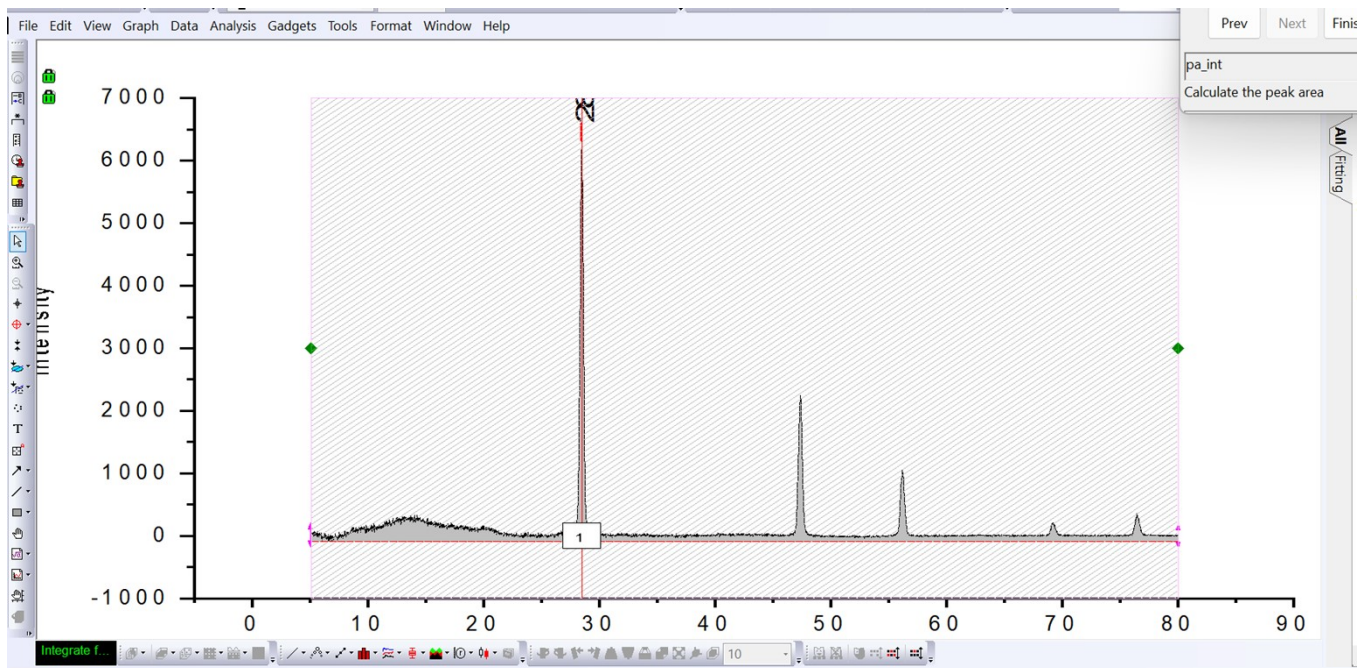
λ (nm) is the X-ray wavelength = 1.5418

β (radians) represent the full width at half maximum, FWHM

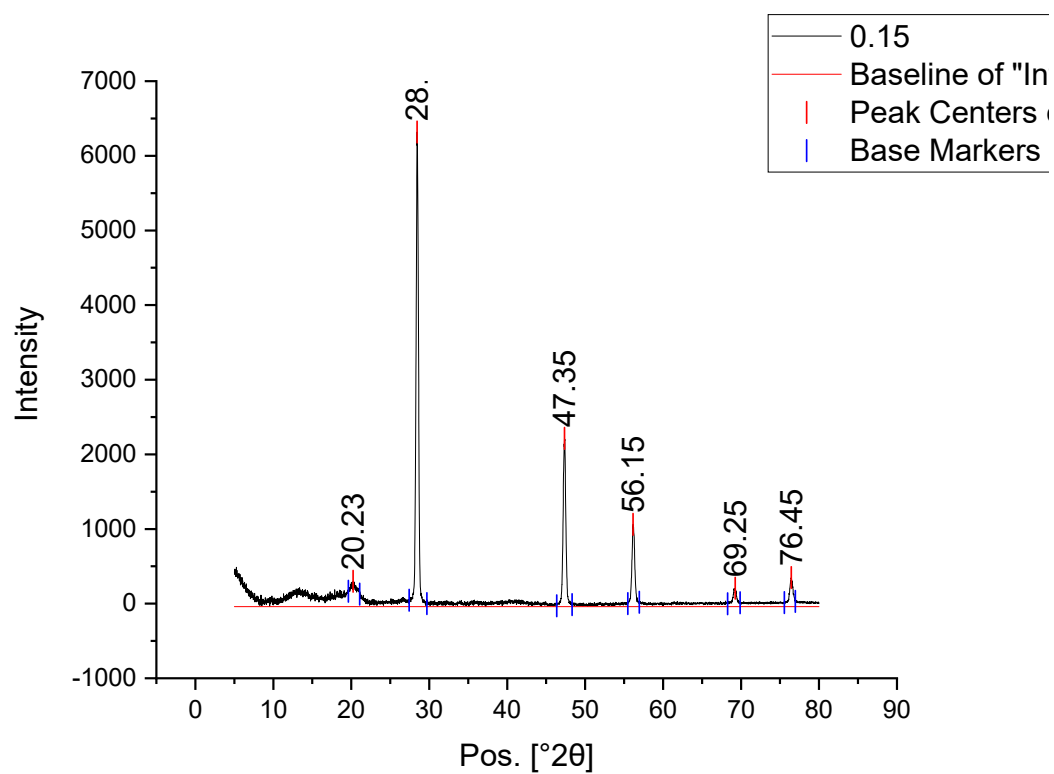
θ (Degree) is the Bragg angle.



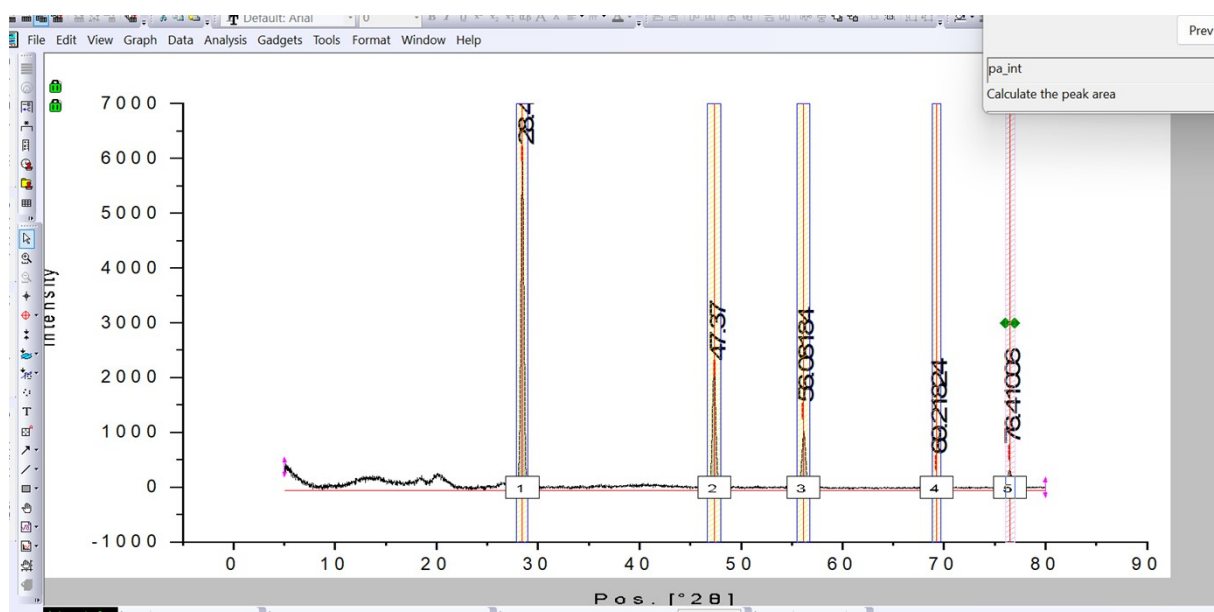
S1 CA 1 Sum of individual peaks M1

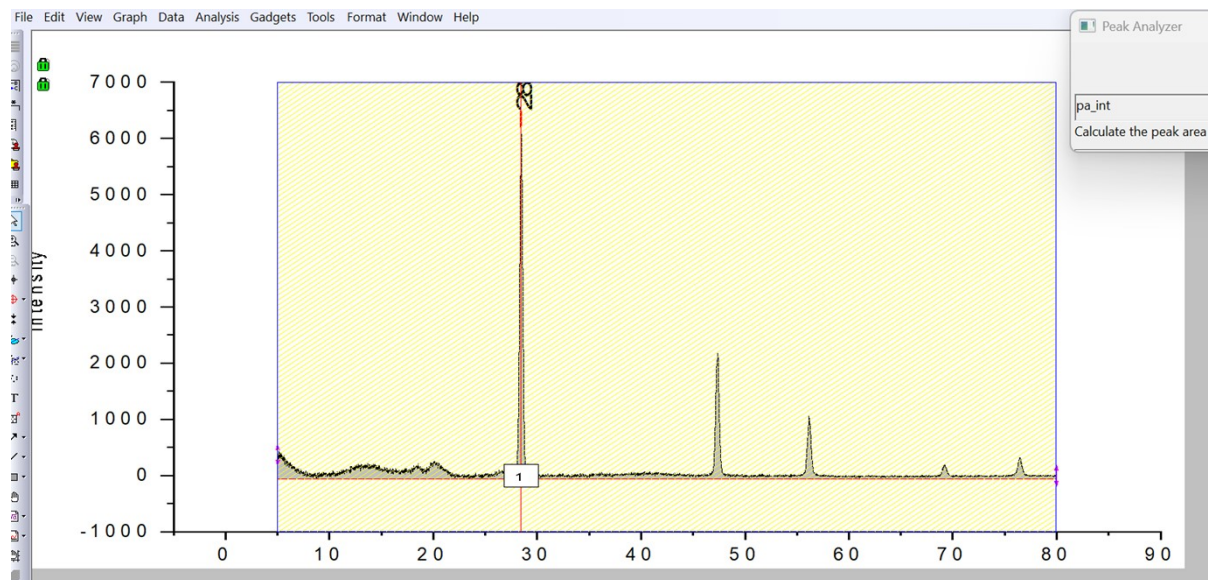


S1 CA 2 Sum of total peaks M1

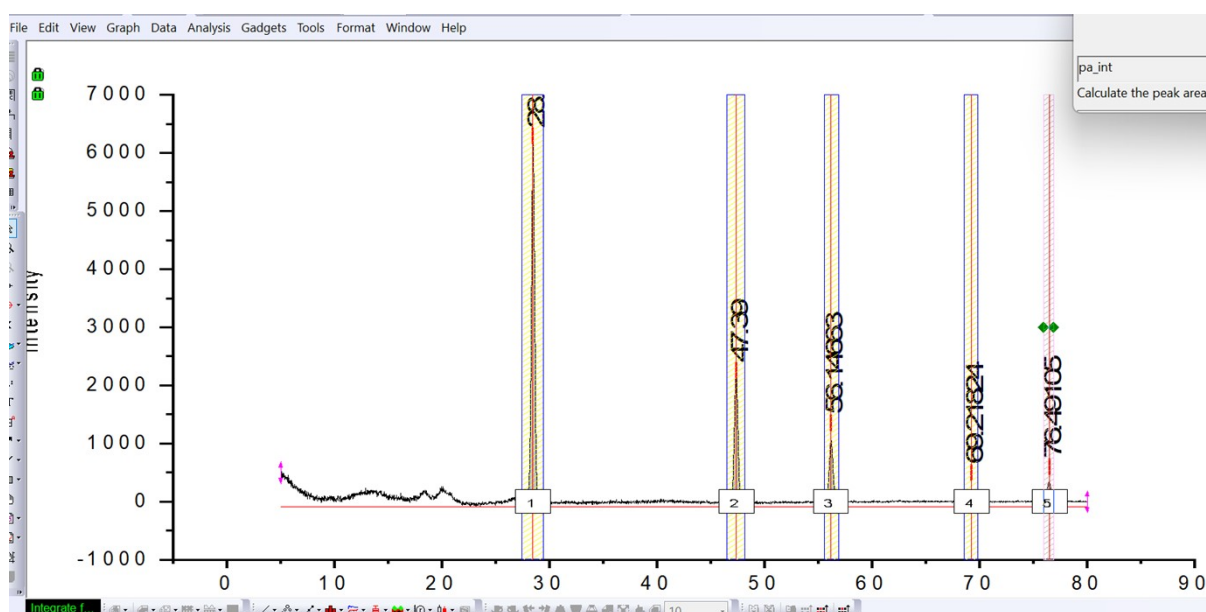


S1 CA 3 Base line and Sum of individual peaks M2

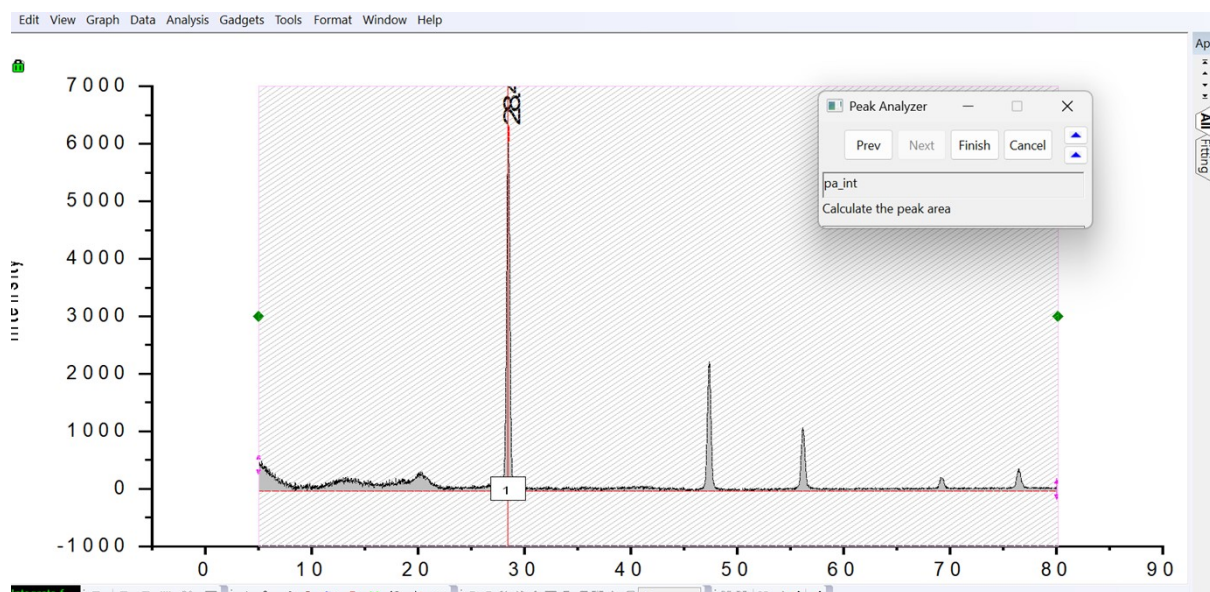




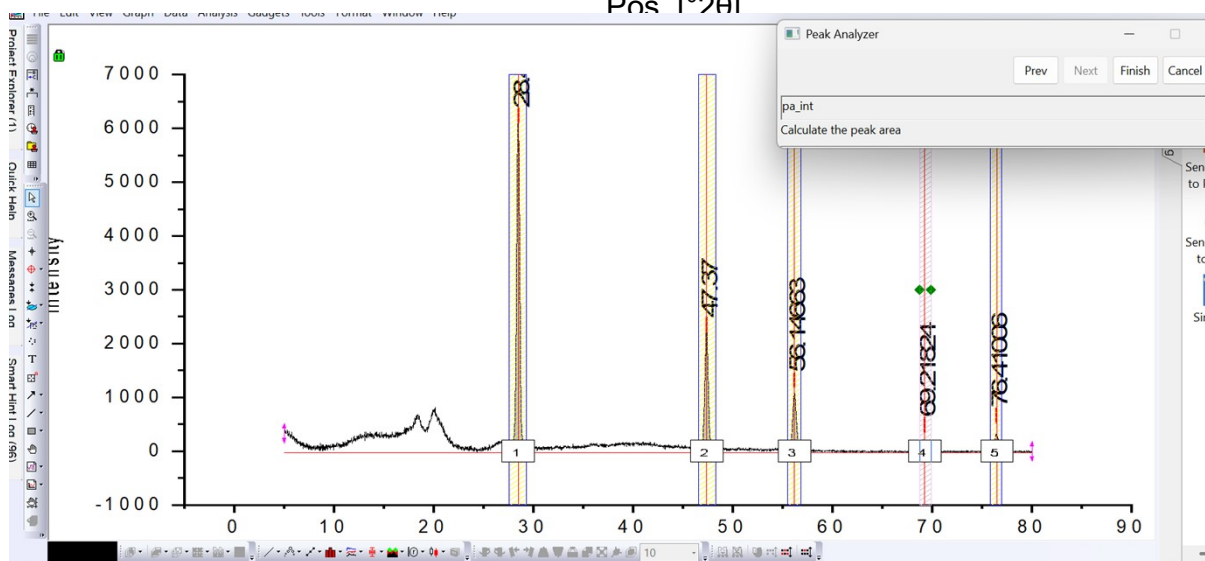
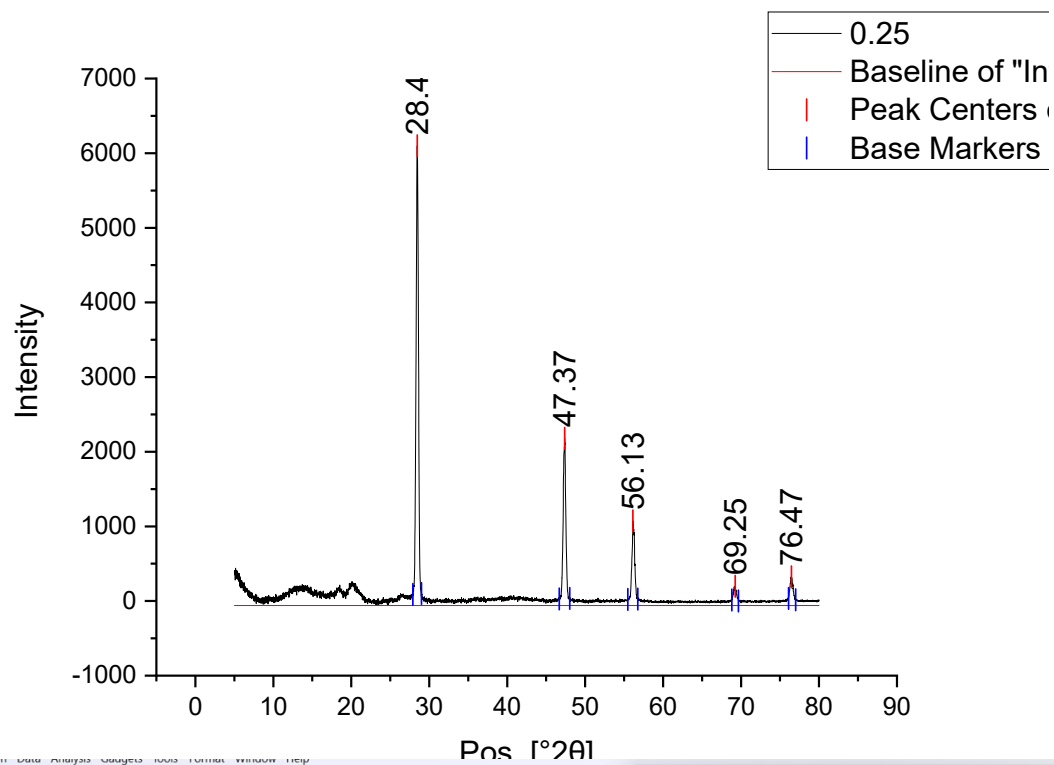
S1 CA 4 Sum of total peaks M2



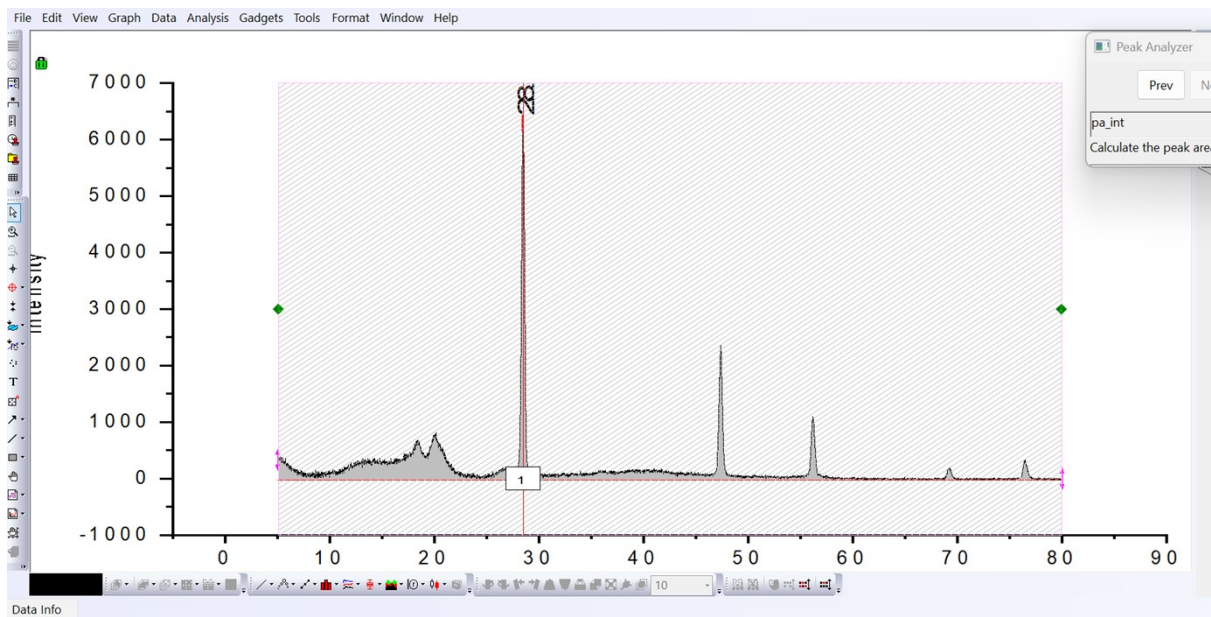
S1 CA 5 Sum of individual peaks M3



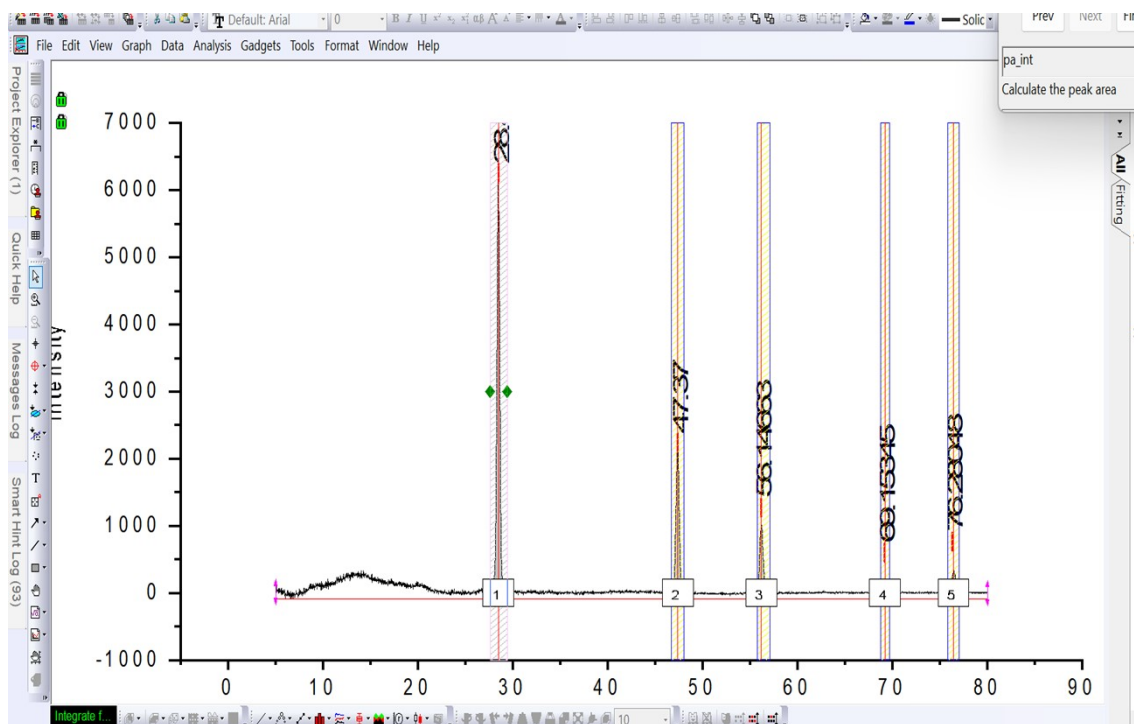
S1 CA 6 Sum of total peaks M3



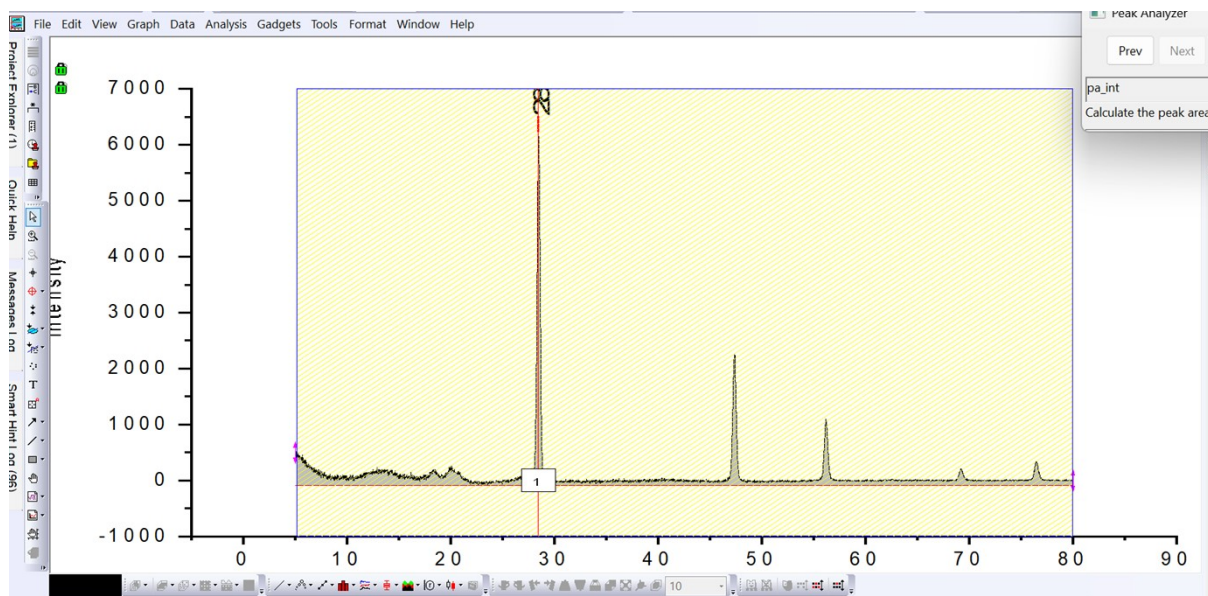
S1 CA 7 Base line and Sum of individual peaks m4



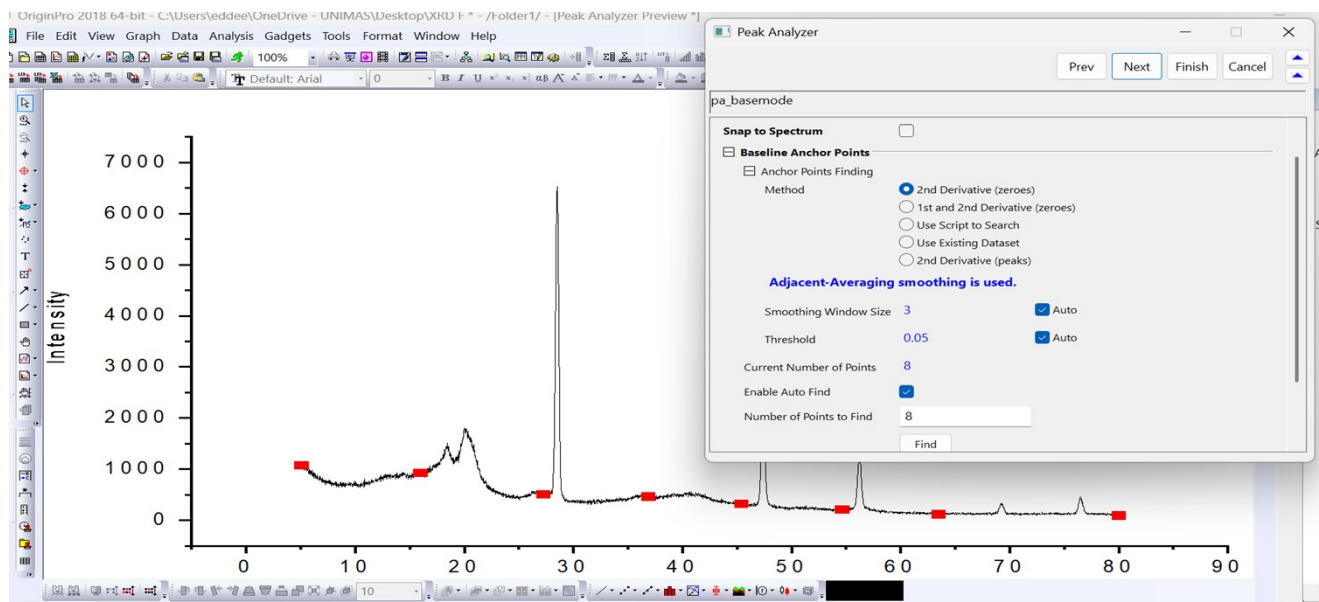
S1 CA 8 Sum of total peaks M4



S1 CA 9 Sum of individual peaks M5



S1 CA 10 Sum of total peaks M6



S1 CA 11 Baseline correction parameters-Origin-analysis-peak-analyser

PVDF-TiO ₂ -nZVI-SiO ₂	H ₂ O	CH ₃ CHOH	CH ₃ OH	Membrane Porosity	Porosity/100	Shrinkage ratio
Mo	0.320	0.801	0.829	60	0.6	17
M1	0.812	0.603	0.696	83.81	0.8381	15
M2	0.823	0.593	0.601	85.30	0.853	14
M3	0.902	0.523	0.594	85.90	0.859	11
M4	1.201	0.321	0.402	85.92	0.8592	12
M5	1.39	0.251	0.385	87.53	0.8753	8

S1 Table1 Solvent test data of the PVDF-TiO₂-nZVI-SiO₂ nanocomposite membrane

	M5		M1	M3	M2	Mo	M4
	4341.698		2491.425	2332.59249	2473.688	2488.521	2439.359
	2947.344		1026.78	961.54687	1032.555	1050.892	947.0145
	1188.093		561.9833	522.58186	567.4215	537.5083	500.7312
	770.6305		179.6259	137.54265	204.0504	120.7285	127.464
	143.4588		266.7087	204.56614	230.6362	178.8174	201.87
	243.608	Ac	4526.523	4158.83001	4508.351	4376.467	4216.439
Ac	9634.833	At	12983.44	10549.31388	11828.42	13240.66	9334.308
At	16501.61	CRI	0.348638	0.394227535	0.381146	0.330532	0.451714
CRI	0.583872	CR (%)	34.86	39.42	38.11	33.05	45.17
CR (%)	58.39						

S1 Table 2 Membrane crystallinity core data

CRI= crystallinity index

CR (%) = percentage crystallinity

Ac= Total Area of Crystalline Peaks

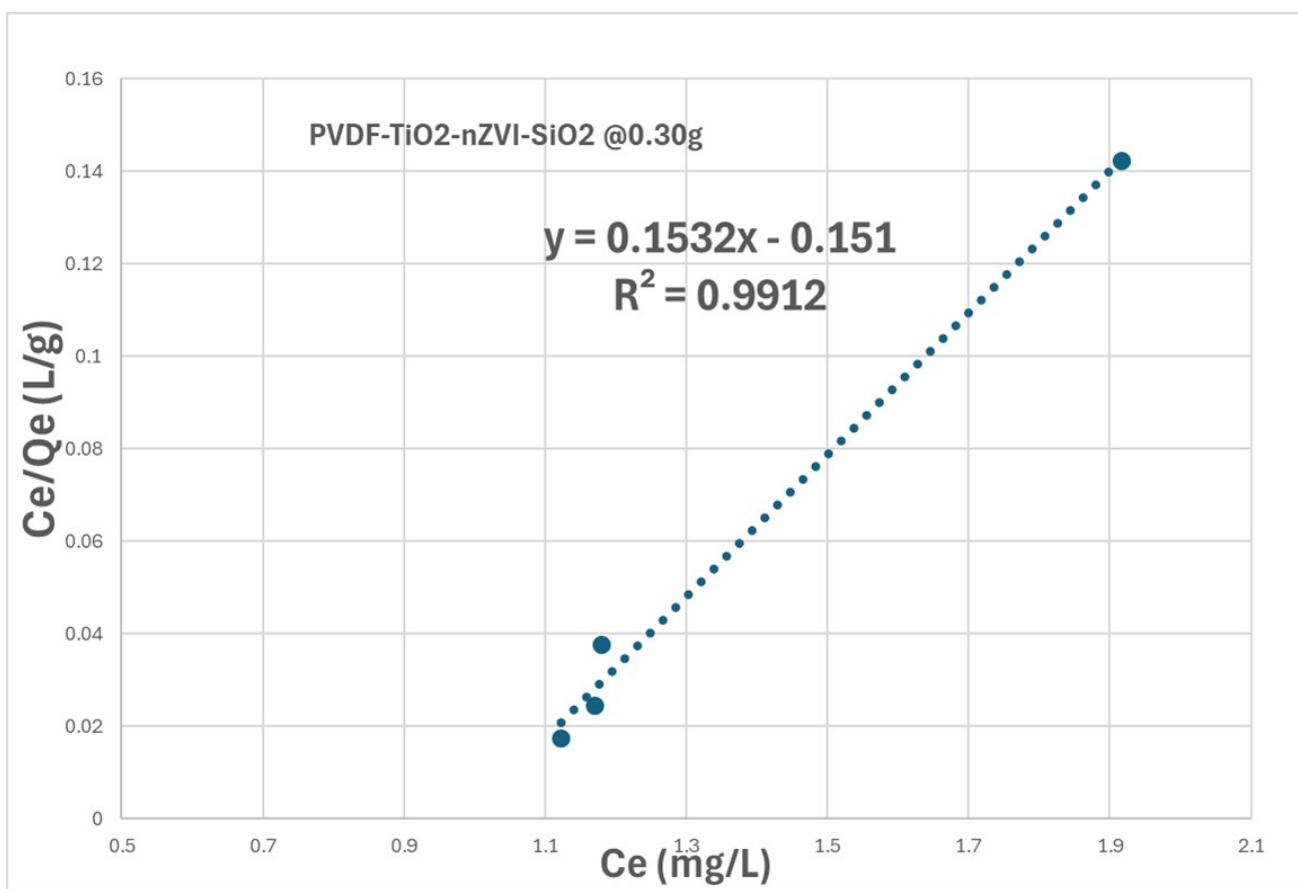
At= Total Peaks area (crystalline + Amorphous)

PVDF-TiO₂-nZVI-SiO₂	FWHM(β)	2 θ (radian)	2 θ (degrees)	(θ)	cos(θ)	$\beta\cos(\theta)$	D= $K\lambda/\beta\cos(\theta)$
M1	0.34299	28.4659	1630.97593	815.488	0.242238	0.083085	17.4298994
M2	0.34634	28.46596	1630.98	815.49	0.244211	0.08458	17.12178933
M5	0.34372	28.46717	1631.048696	815.5243	0.277369	0.095337	15.18992125
M4	0.34442	28.46649	1631.009734	815.5049	0.258601	0.089067	16.25921648
M3	0.34469	28.46632	1630.999994	815.5	0.253893	0.087515	16.54769408
Mo	0.33915	28.46633	1631.0006	815.5003	0.254186	0.086207	16.79861951

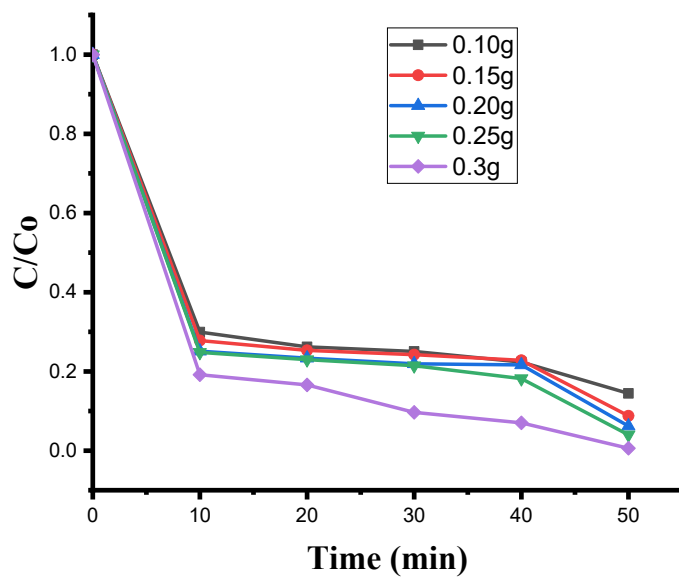
S1 Table 3 FWHM core data of PVDF-TiO₂-nZVI-SiO₂ membranes

S1 Table 4 PVDF-TiO₂-nZVI-SiO₂ Membrane crystallite sites

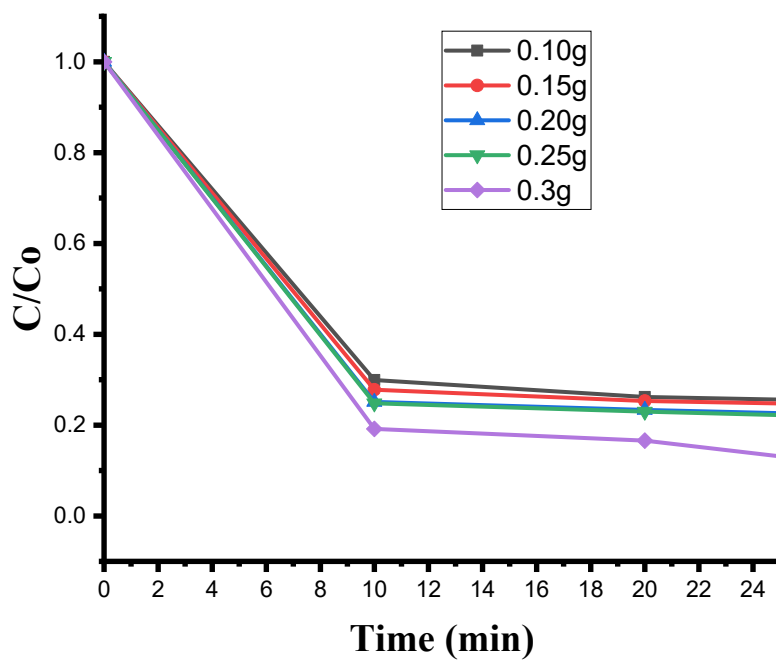
PVDF-TiO₂-nZVI-SiO₂	Crystallite size
M1	17.4298994
M2	17.12178933
M3	16.54769408
M4	16.25921648
M5	15.18992125



S1F01: Linearized Langmuir isotherm.



S1F02 Concentration gradient at 10ppm Pb^{2+} of the nanocomposite membranes



S1F 03 Concentration gradient at 10ppm Pb²⁺ of the nanocomposite membranes in the first 24 minutes of treatment.