Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information for

Designer Membrane Tool-box with Mixed Metal Organic Framework and RAFT-synthesized Antibacterial Polymer Perform in Tandem towards Desalination, Antifouling and Heavy Metal Exclusion

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I. Reaction overview

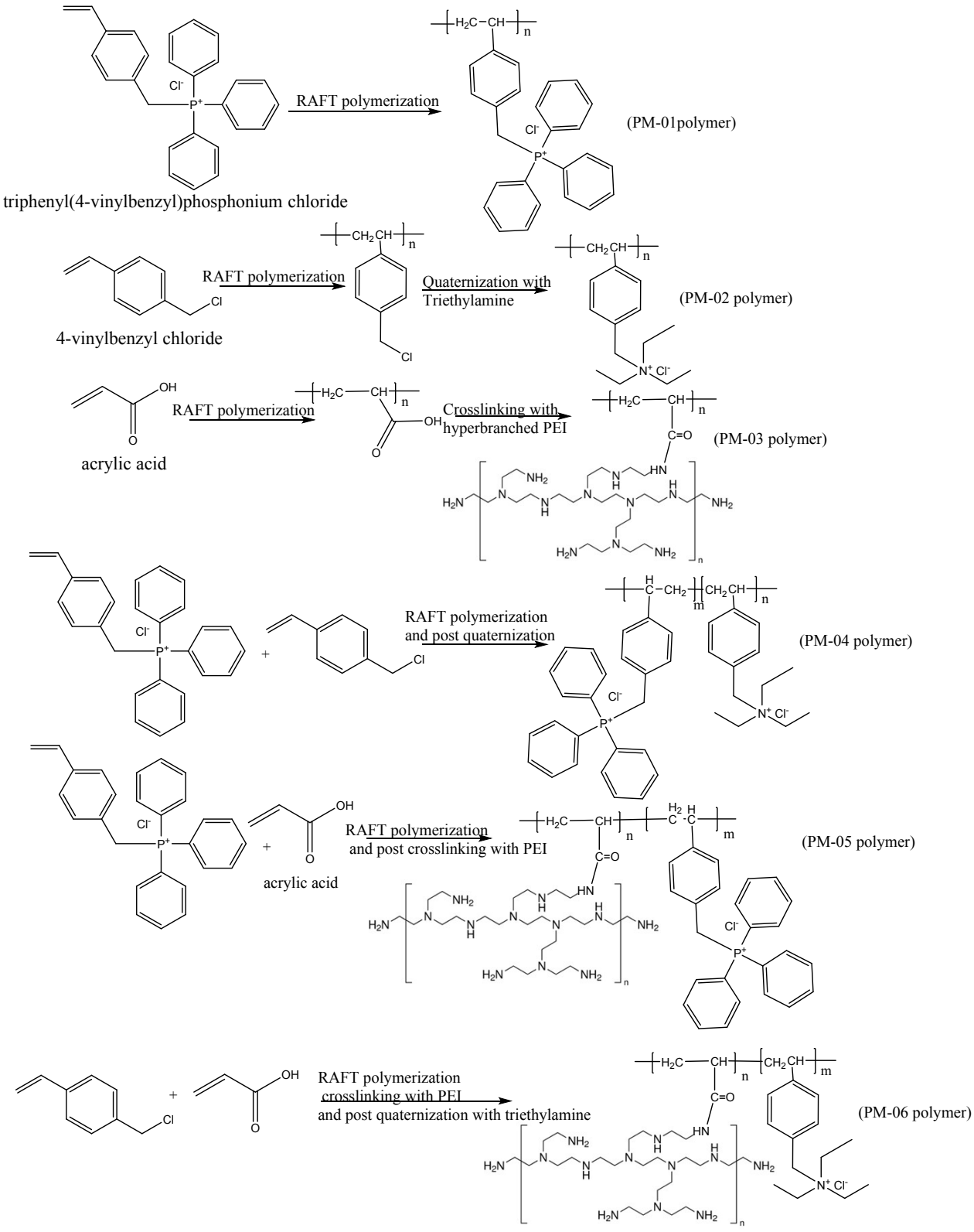


Figure S-01: Overview of the polymerization performed

II. FTIR of PM-01 to PM-06 polymer

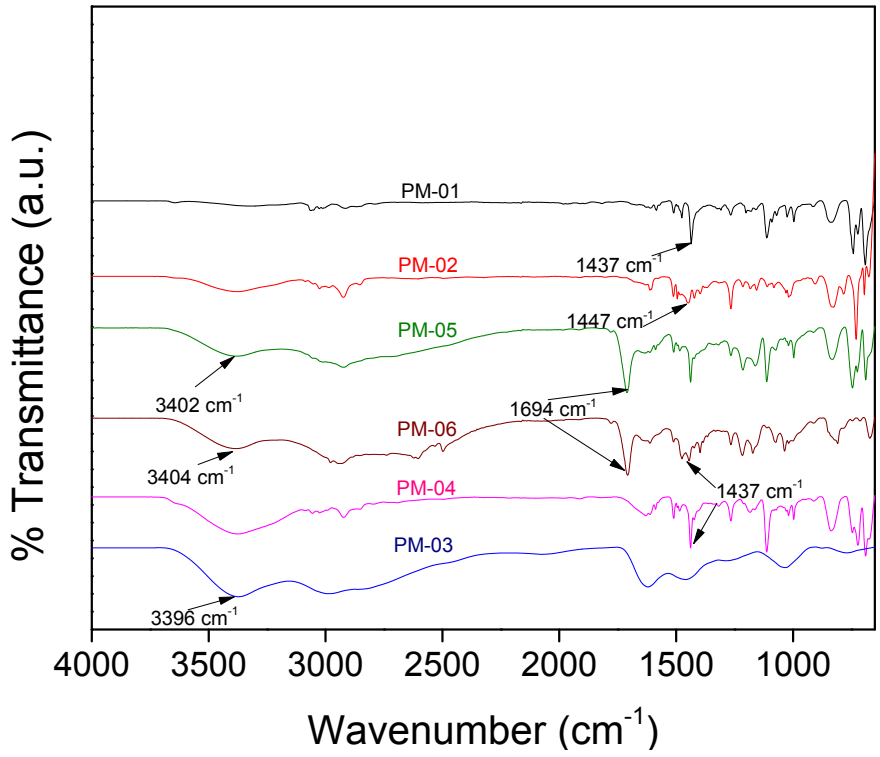
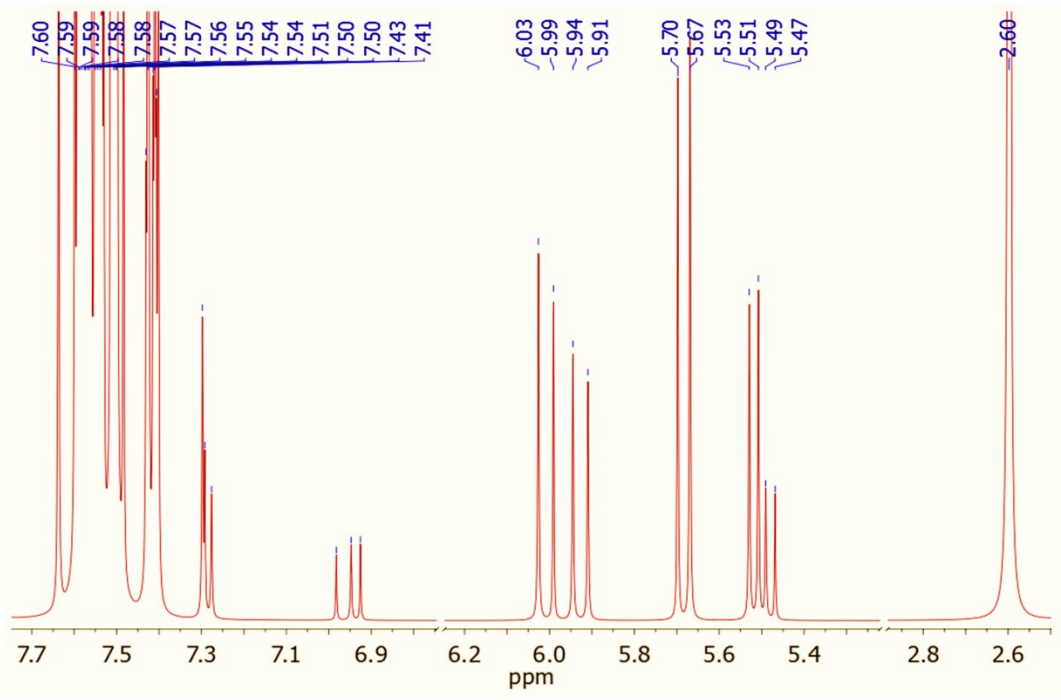


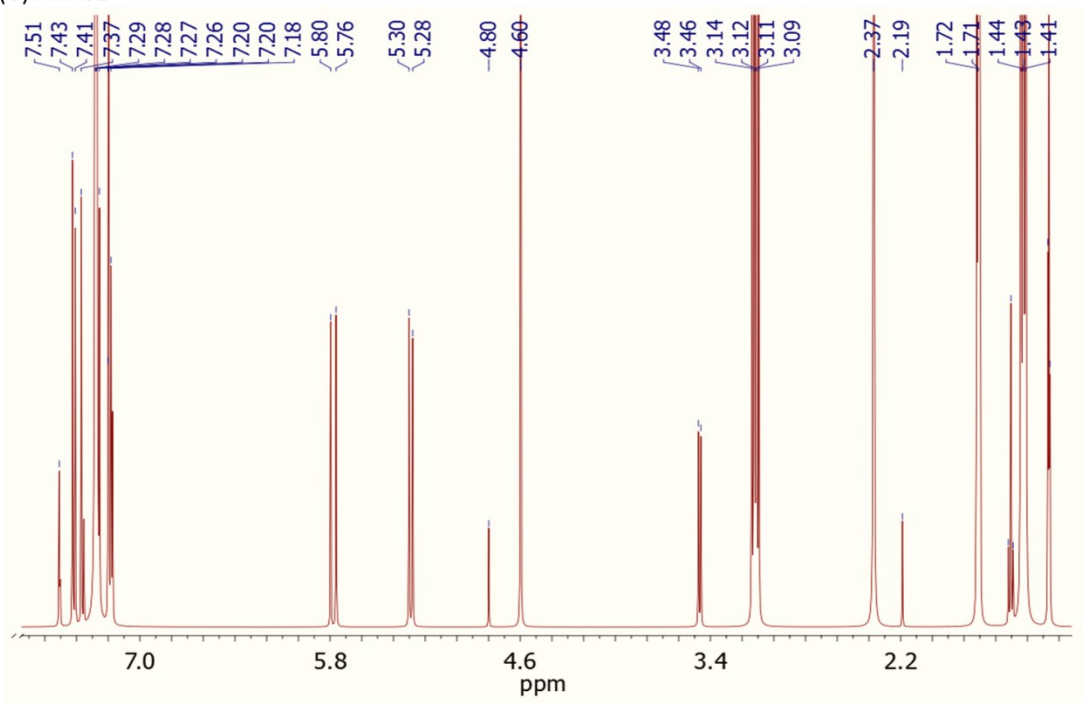
Figure S-02: FTIR of all the polymeric samples.

III. ^{1}H NMR of all polymeric samples

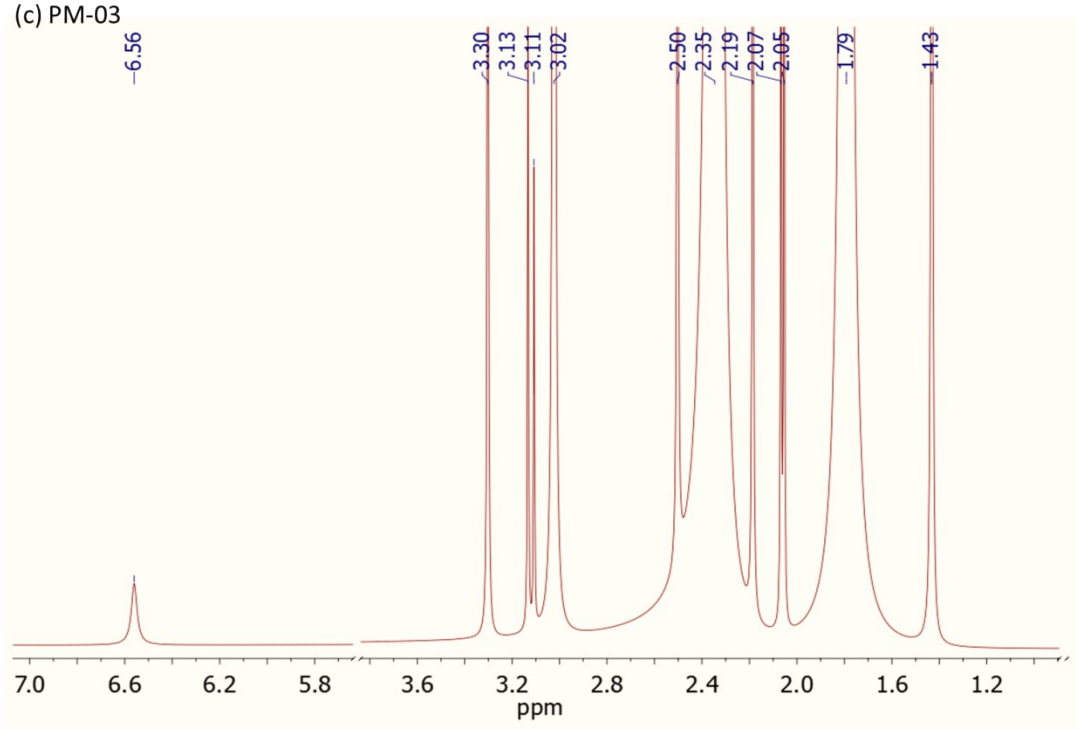
(a) PM-01



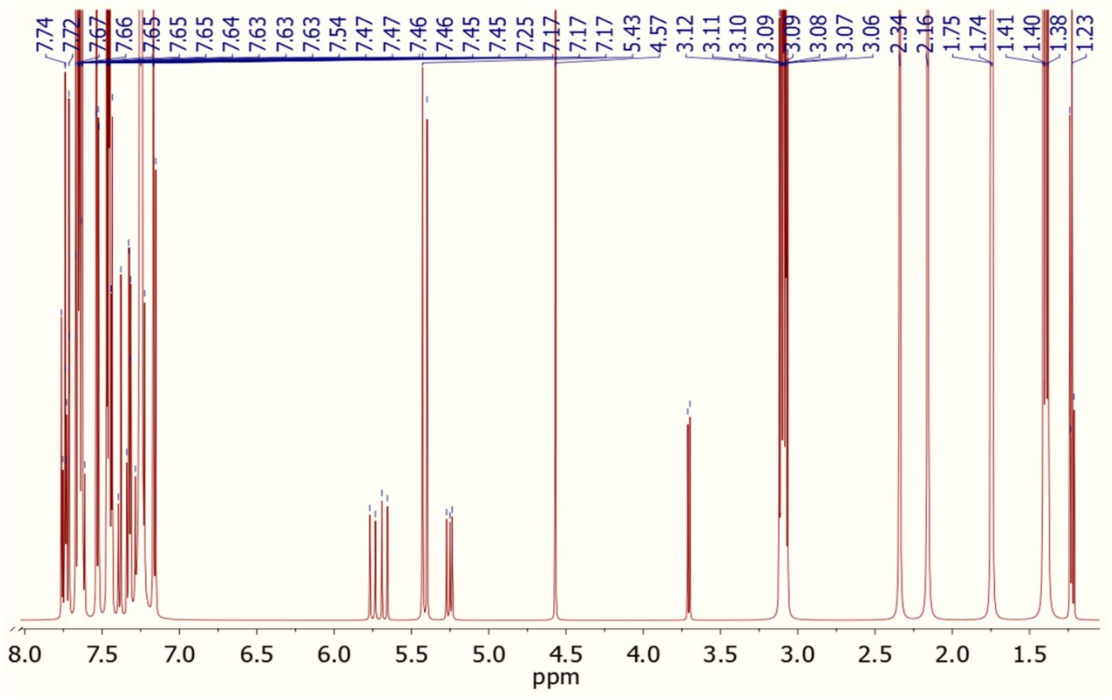
(b) PM-02



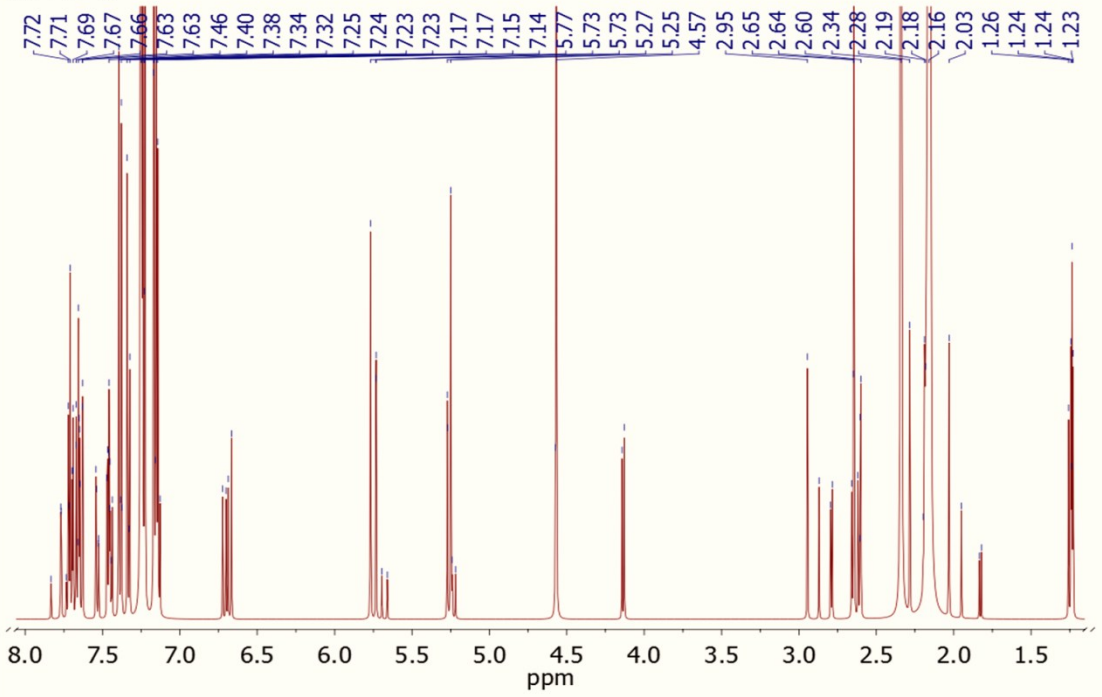
(c) PM-03


6.56
3.30
3.13
3.11
3.02
2.50
2.35
2.19
2.07
2.05
1.79
1.43
7.0
6.6
6.2
5.8
3.6
3.2
2.8
2.4
2.0
1.6
1.2
ppm

(d) PM-04


7.74
7.72
7.67
7.66
7.65
7.65
7.65
7.64
7.63
7.63
7.63
7.54
7.47
7.47
7.46
7.46
7.45
7.45
7.25
7.17
7.17
7.17
5.43
4.57
3.12
3.11
3.10
3.09
3.09
3.08
3.07
3.06
2.34
2.16
1.75
1.74
1.41
1.40
1.38
1.23
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
ppm

(e) PM-05



(f) PM-06

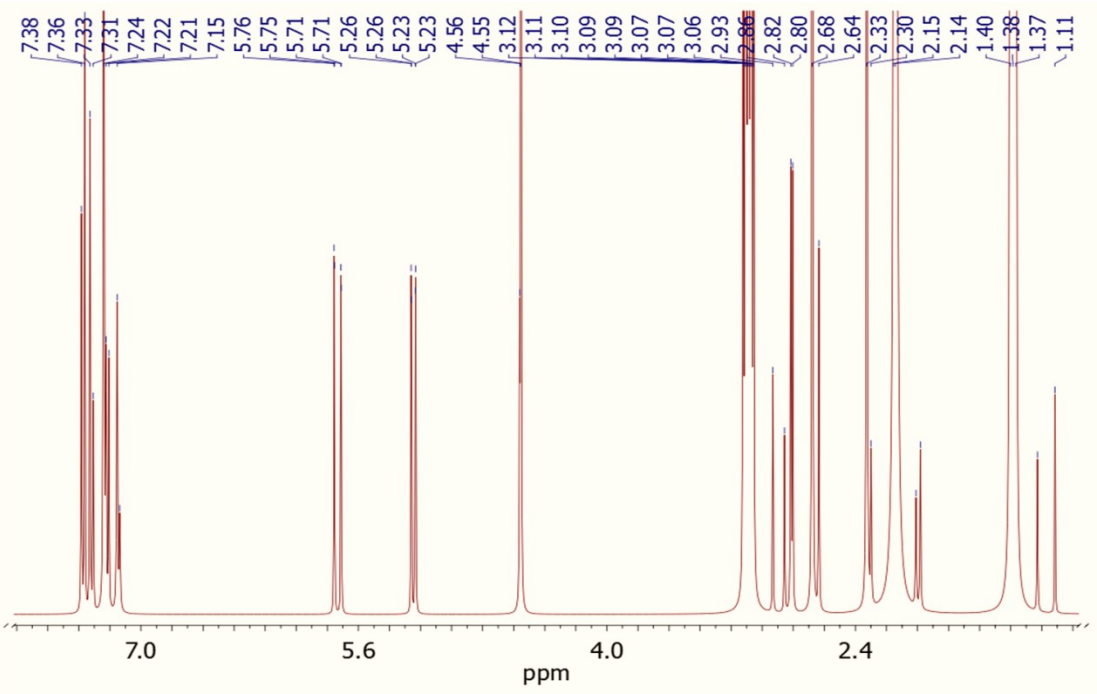


Figure S-03: ^{1}H NMR of all the polymeric samples.

IV. C1s XPS spectrum of modifications

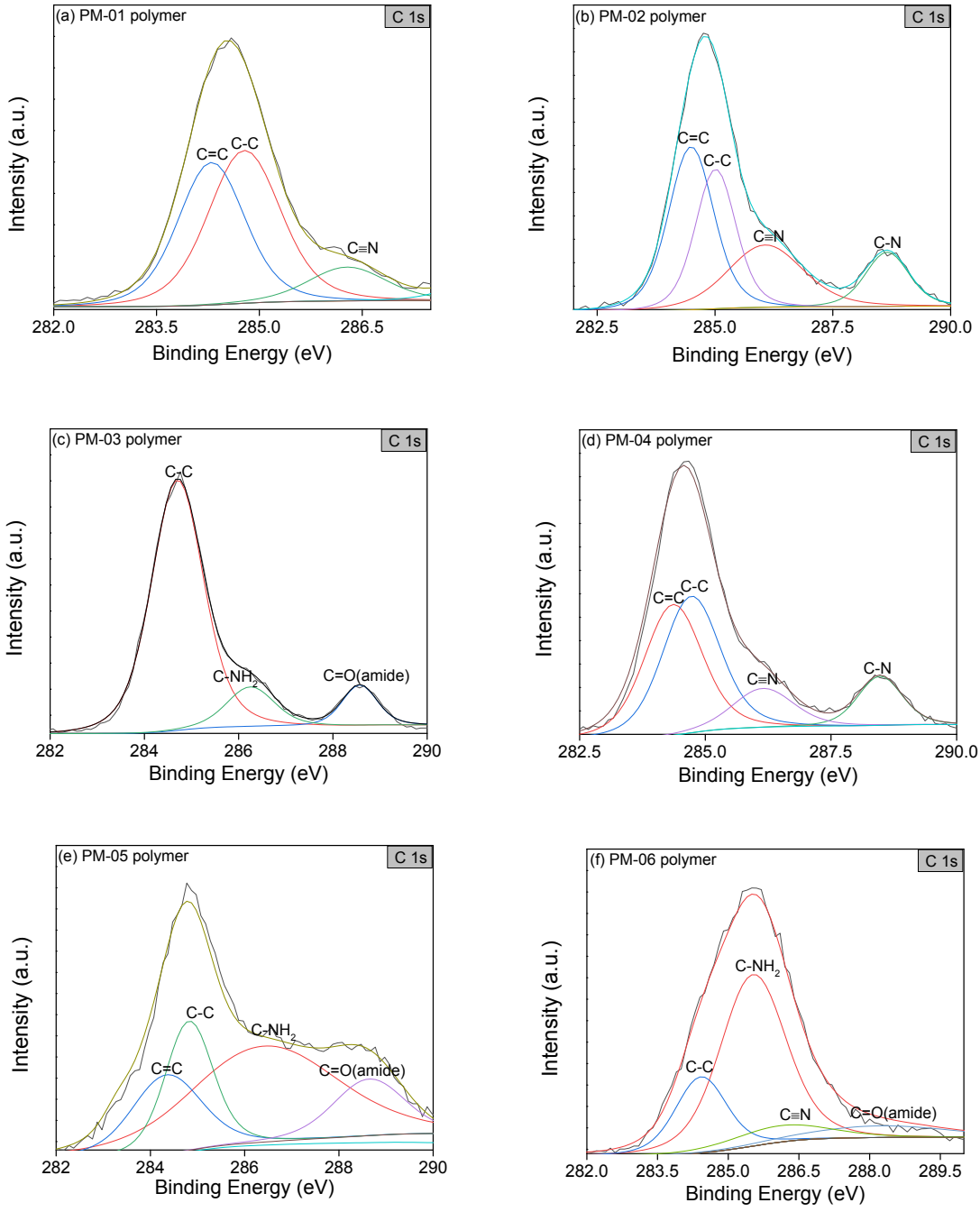


Figure S-04: C1s spectra of all the polymeric samples.

V. FTIR of Zn-MMOF

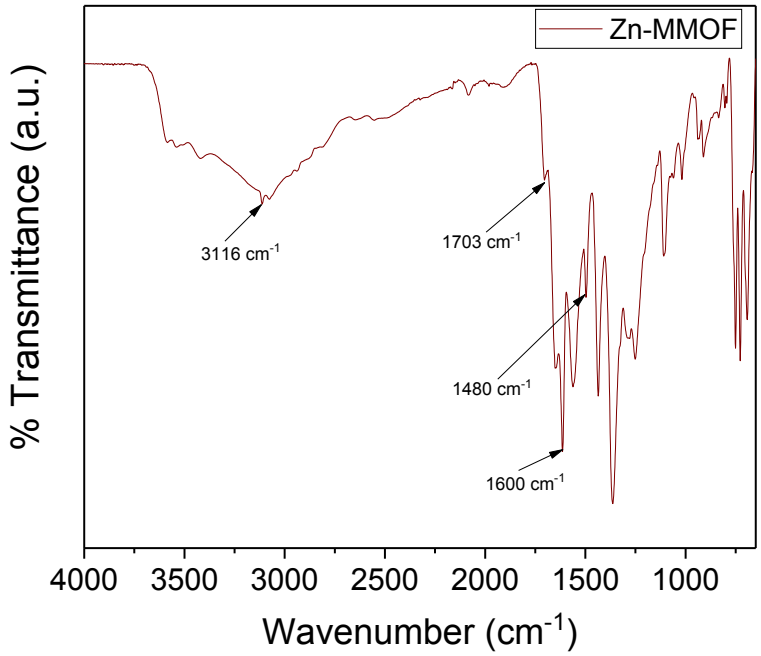


Figure S-05: FTIR spectrum of Zn-MMOF.

VI. Powder XRD of MMOF

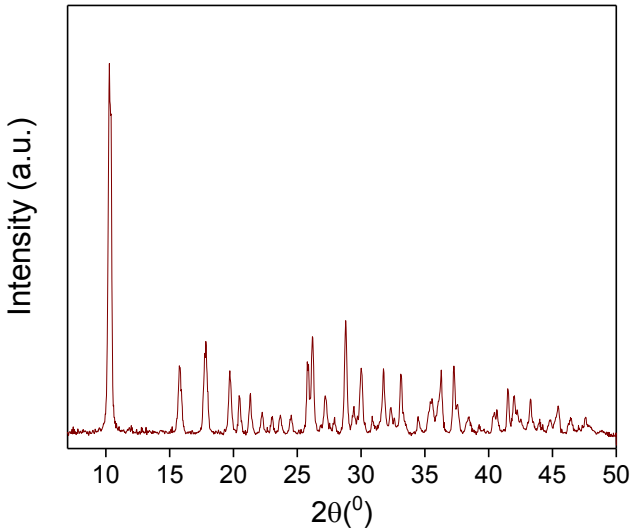


Figure S-06: powder XRD of MMOF

VII. Digital image of the MMOF and the multilayered membranes

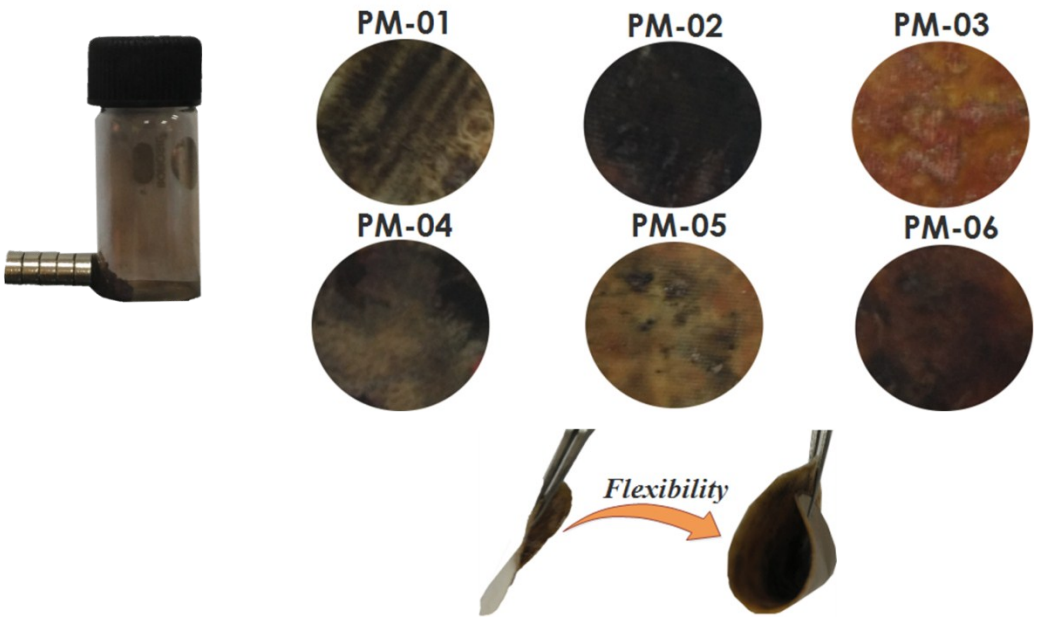


Figure S-07: digital image to show the magnetic property of MMOF (left) and digital image of the flexible composite membranes (right).

VIII. Stability of heavy metal removal

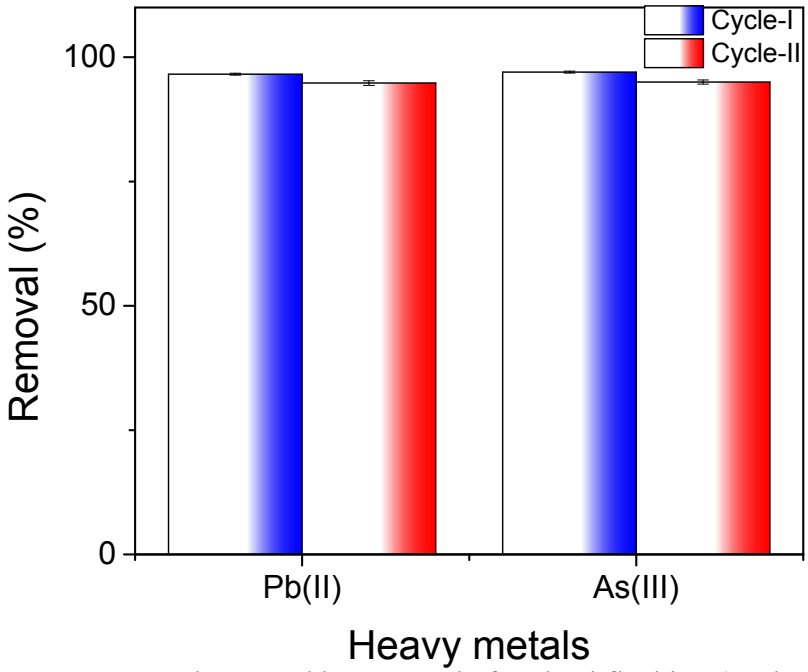
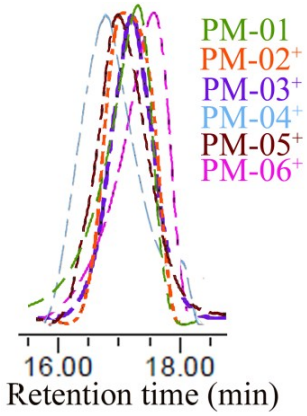


Figure S-08: Heavy metal removal by PM-05 before backflushing (cycle I) and after backflushing (cycle II) for Pb (II) and As (III) respectively for 100 ppm feed.

TABLE S-01: **GPC of RAFT synthesized polymers**



Sample	Mn (x 10^5)	Mw (x 10^5)	PDI
PM-01	1.59	1.88	1.18
PM-02$^+$	1.67	1.85	1.11
PM-03$^+$	1.61	1.82	1.13
PM-04$^+$	1.77	1.93	1.09
PM-05$^+$	1.51	1.74	1.15
PM-06$^+$	1.72	1.84	1.07

$^+$ Indicates that the sample were precursor aliquot of the final polymers