Ethylenediamine modified carbon nanospheres from Biomass for Selective Membrane Filtration

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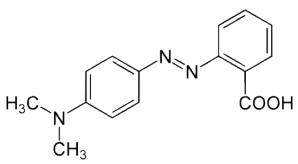
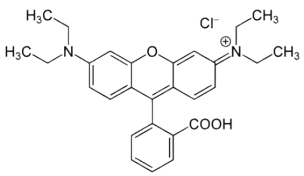
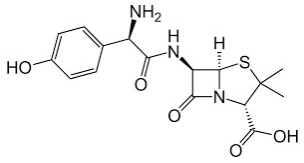
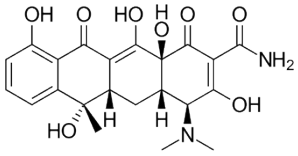
Table S1. Summary of abbreviations of CNS variants and membrane codes

Abbrevation	**Description**
CNS	Carbon nanospheres
RH-CNS	Rice husk derived carbon nanospheres
O-CNS	Acid functionalized carbon nanospheres
E-CNS	Ethylenediamine functionalized carbon nanospheres
PVDF-0	Pristine PVDF (no E-CNS) membrane
PVDF-1	PVDF membrane with 0.1 wt% E-CNS
PVDF-2	PVDF membrane with 0.3 wt% E-CNS
PVDF-3	PVDF membrane with 0.5 wt% E-CNS
PVDF-4	PVDF membrane with 0.7 wt% E-CNS

Table S2. Specifications for organic dyes and antibiotics

Dye	**Molecular weight (g/mol)**	**Structure**	**Wavelength (**λmax)
Methyl Red	269.3		520 nm

Rhodamine B	479.02		550 nm
Amoxicillin	365.4		270 nm
Tetracycline	444.43		276 and 357 nm

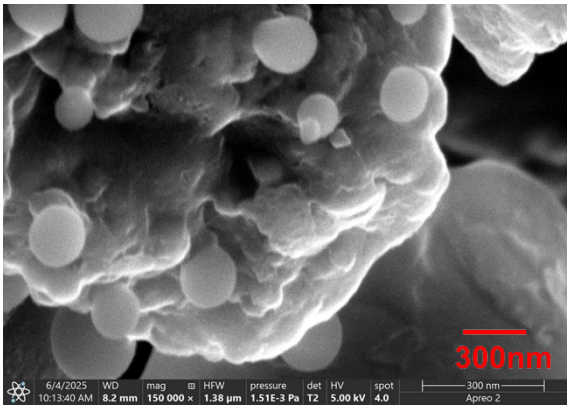


Fig S1. FESEM images of RH-CNS

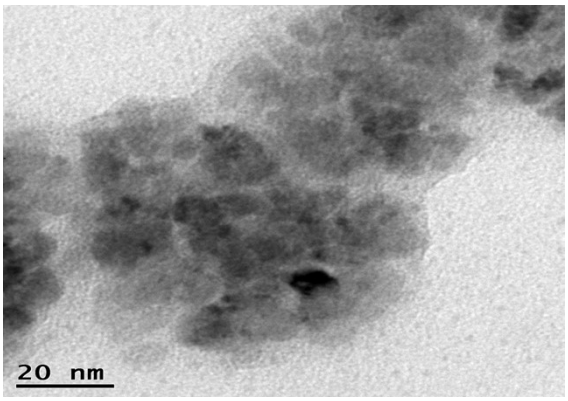
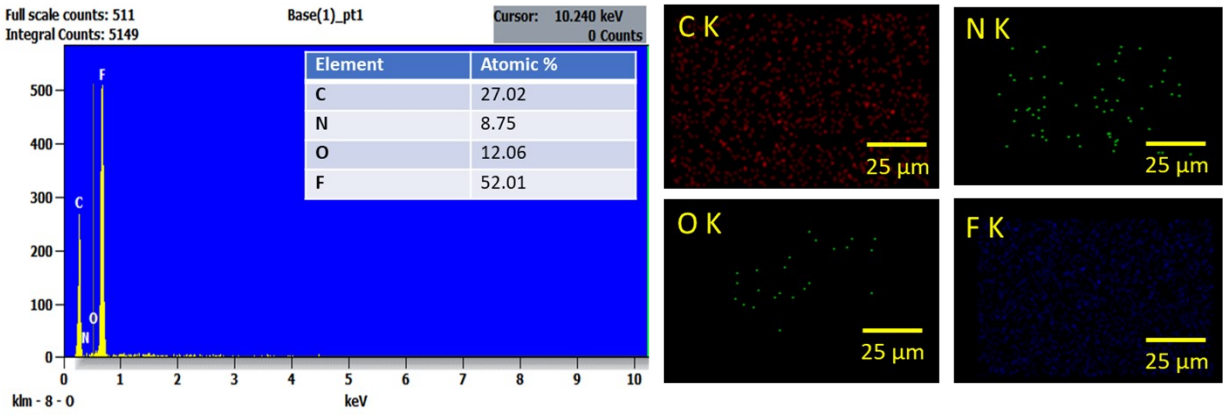
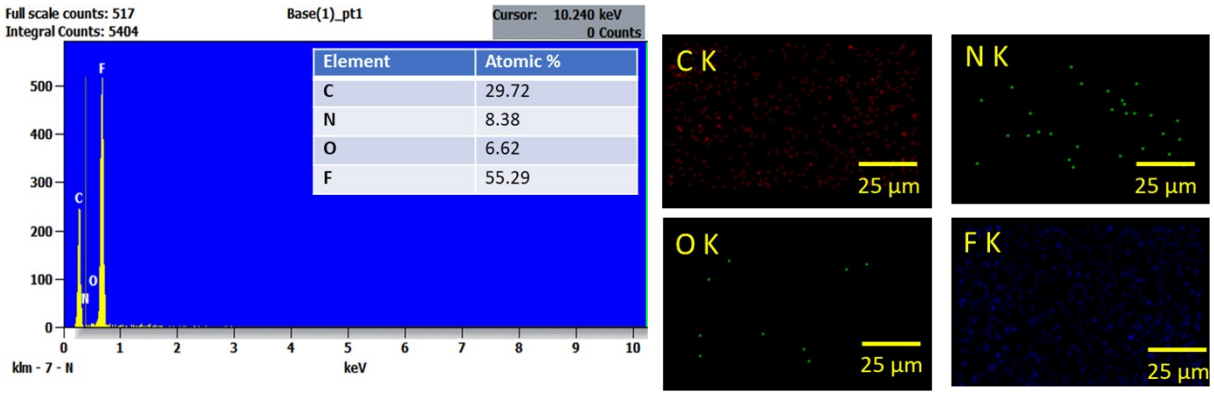


Fig S2. TEM image of E-CNS

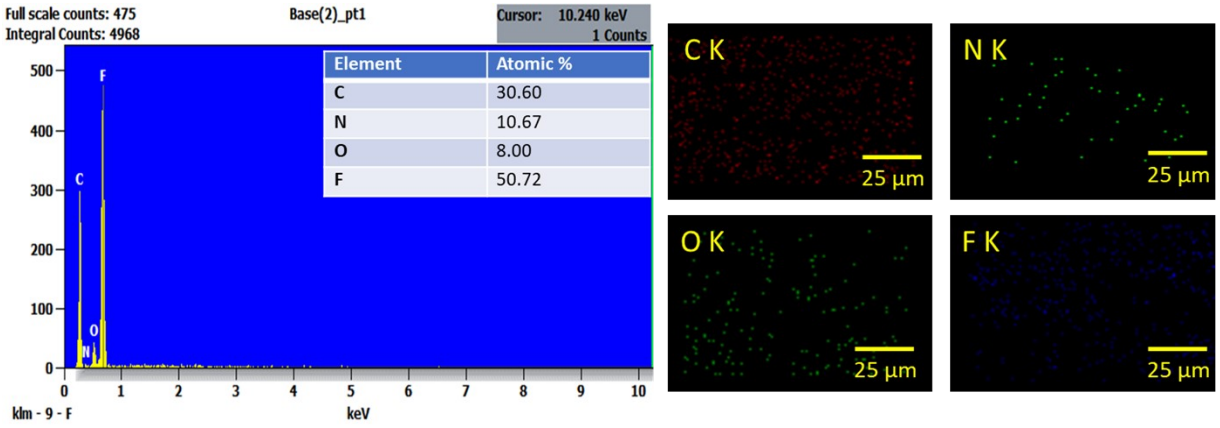
a) PVDF-1 membrane with (0.1 wt% E-CNS content)



b) PVDF-2 membrane with (0.3 wt% E-CNS content)



c) PVDF-3 membrane with (0.5 wt% E-CNS content)



d) PVDF-4 membrane with (0.7 wt% E-CNS content)

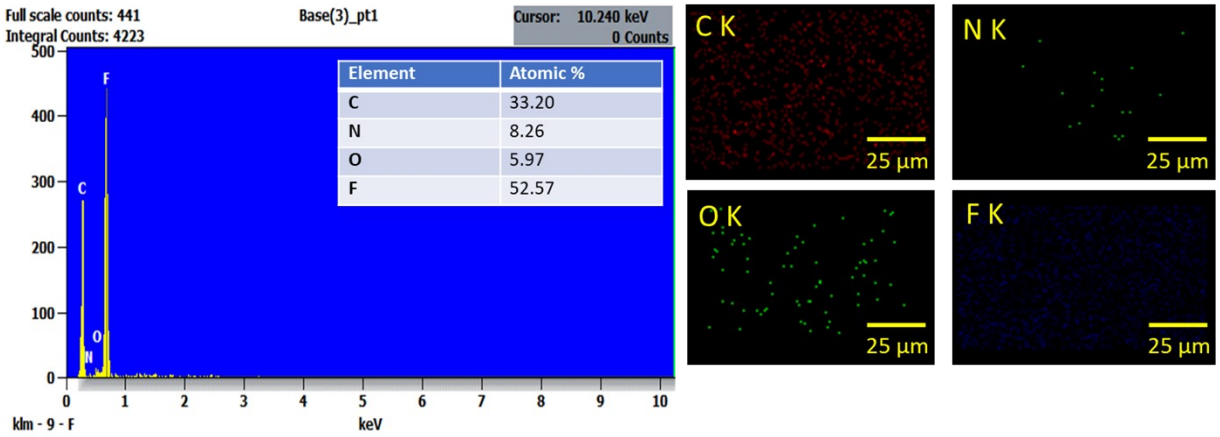


Fig S3. EDS mapping on PVDF/E-CNS membranes

Table S3. Porosity of pristine PVDF and PVDF/E-CNS composite membranes

Membrane designation	Porosity ε, (%)
M-0	62.41
M-1	72.64
M-2	78.89
M-3	73.75
M-4	71.12

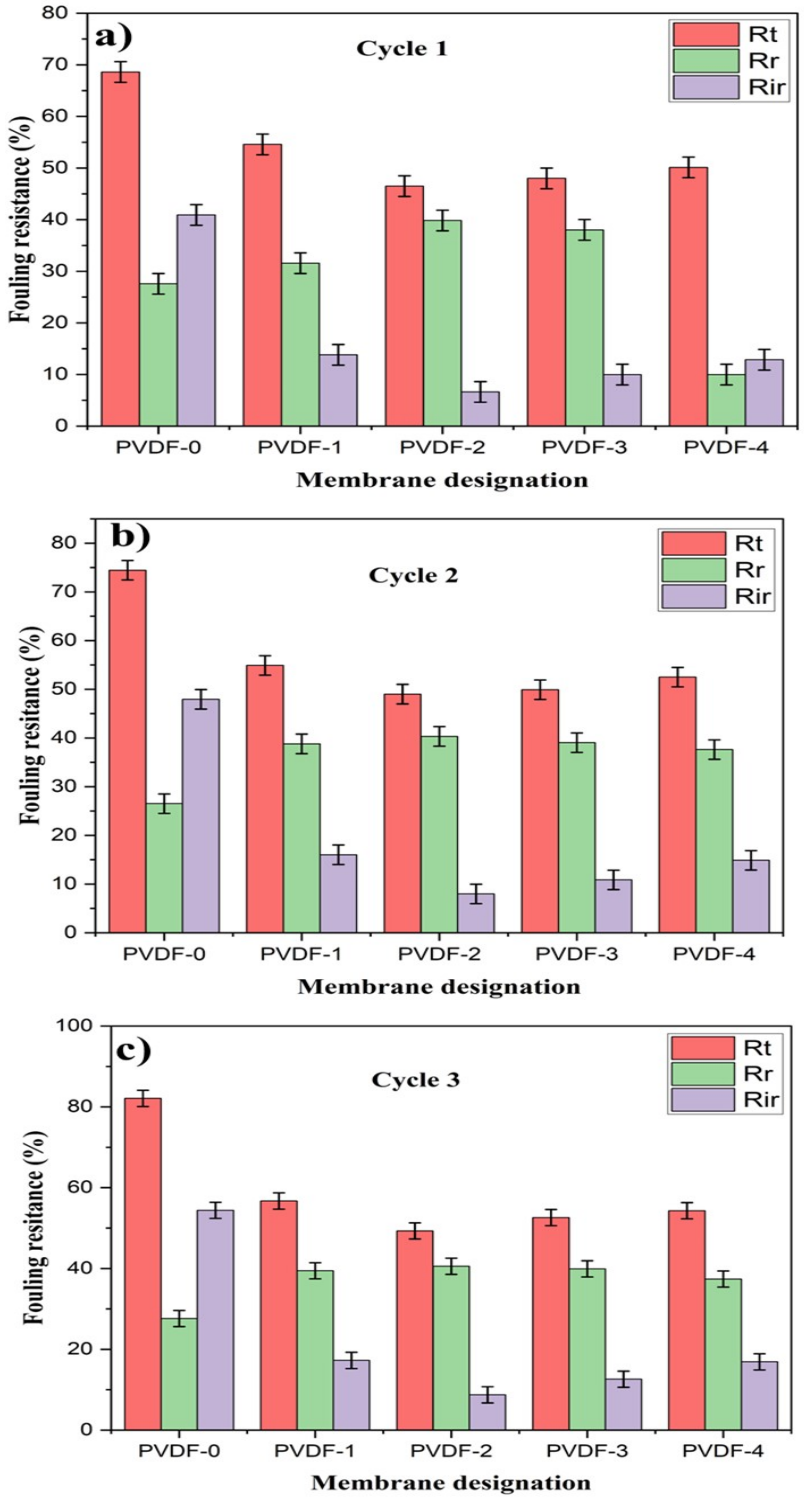


Fig S4. Rt, Rr, Rir of pristine PVDF and PVDF/E-CNS composite membranes (a) Cycle 1, (b) Cycle 2, (c) Cycle 3

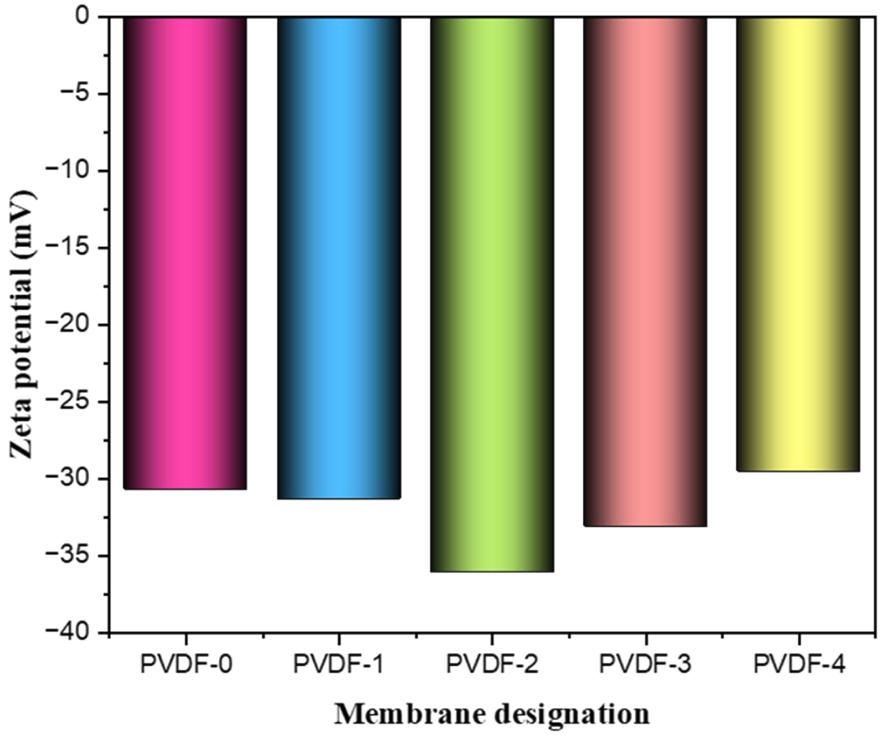


Fig S5. Zeta potential values of pristine PVDF and PVDF/E-CNS composite membranes

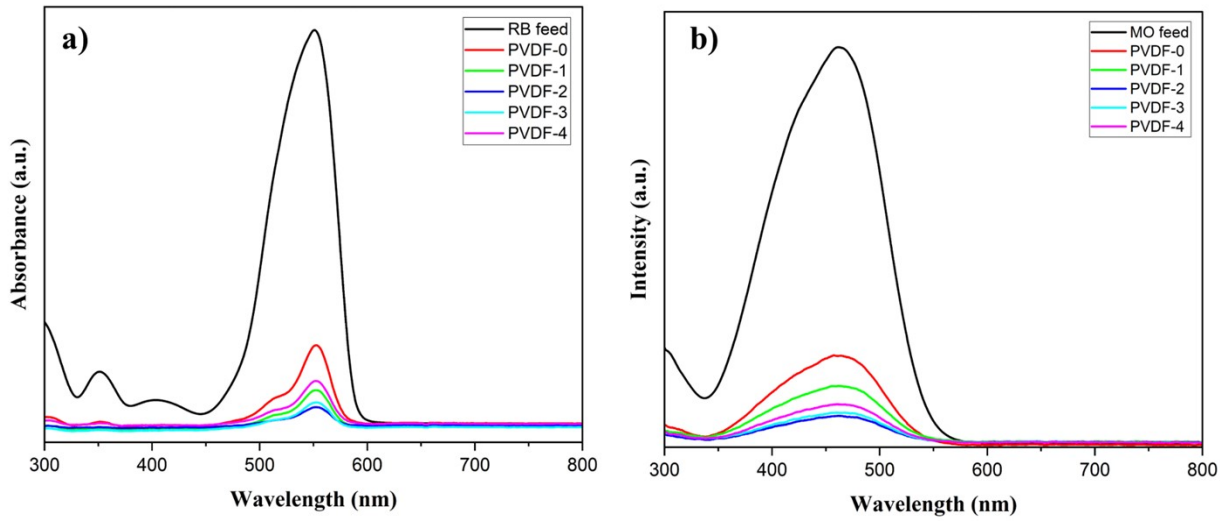


Fig S6. UV-Vis spectra of (a) RB feed and permeate solutions, (b) MO feed and permeate solutions

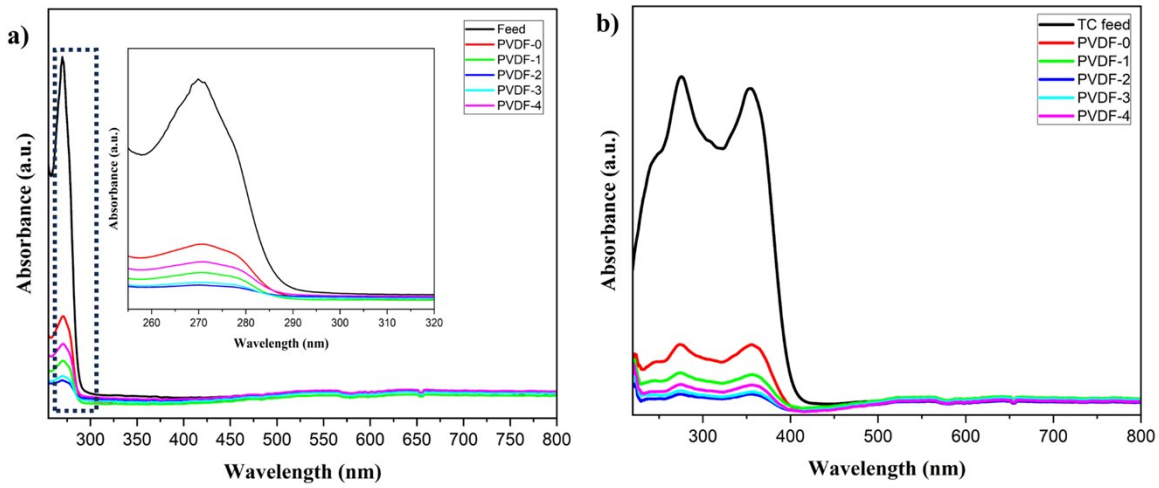


Fig S7. UV-Vis spectra of (a) AM feed and permeate solutions, (b) TC feed and permeate solutions