

## Supplementary Information

### **Probing the charged nature and ion-exclusion mechanism of fluorine-enriched non-ionogenic polyamide derived thin film composite nanofiltration membranes**

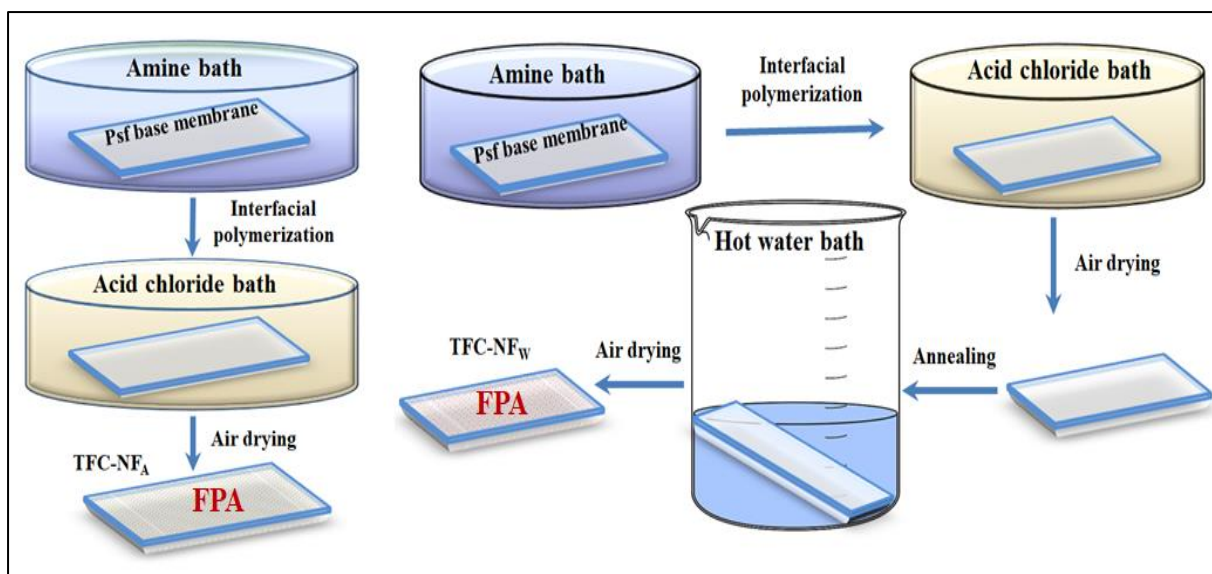
Avishek Pal,<sup>a,c</sup> T. K. Dey,<sup>\*a</sup> Kaustava Bhattacharyya<sup>b</sup> and R. C. Bindal<sup>a,c</sup>

<sup>a</sup>*Membrane Development Section, Chemical Engineering Group, Bhabha Atomic Research Centre, Trombay, Mumbai – 400085, India*

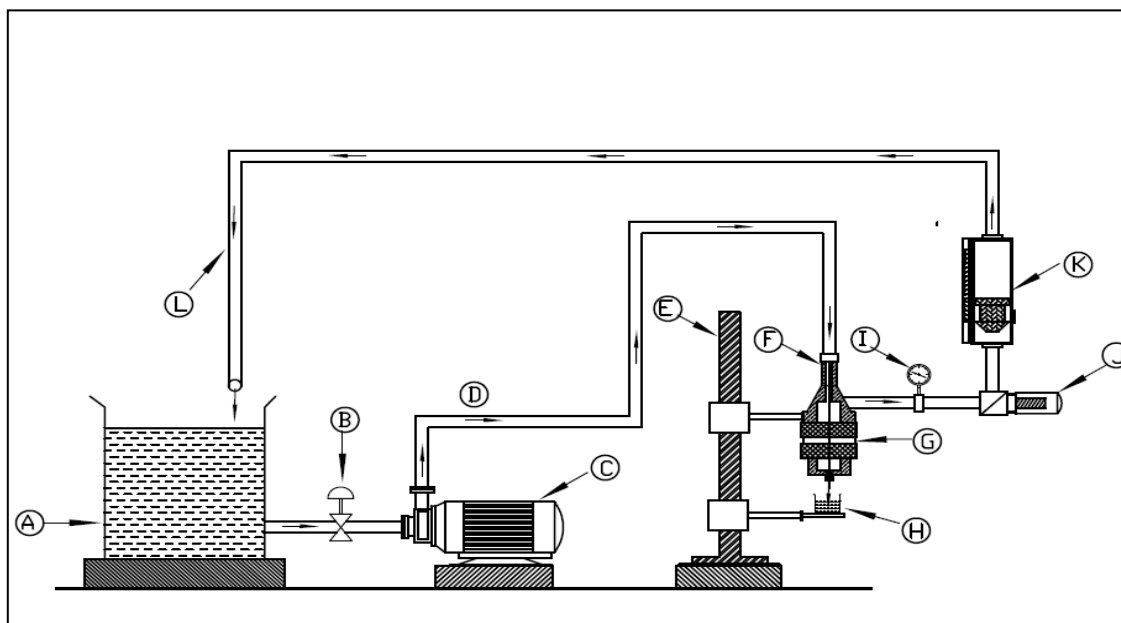
<sup>b</sup>*Chemistry Division, Bhabha Atomic Research Centre, Trombay, Mumbai – 400085, India*

<sup>c</sup>*Homi Bhabha National Institute, Anushakti Nagar, Mumbai – 400094, India*

**\*Corresponding author.** E-mail: tkdey@barc.gov.in



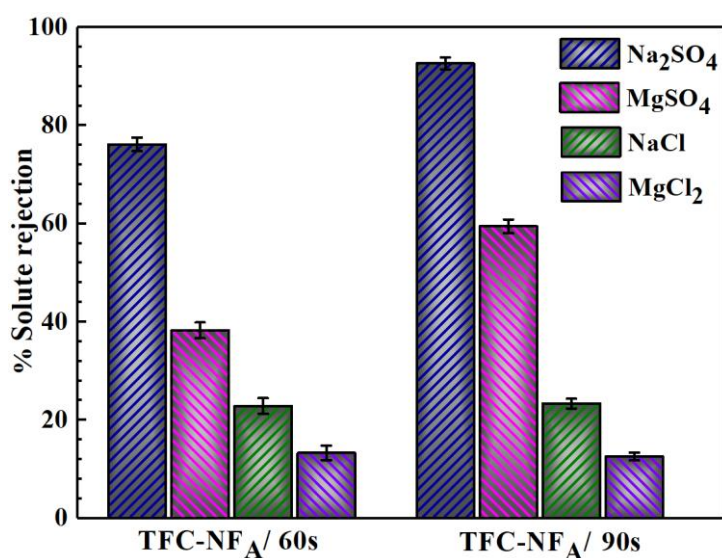
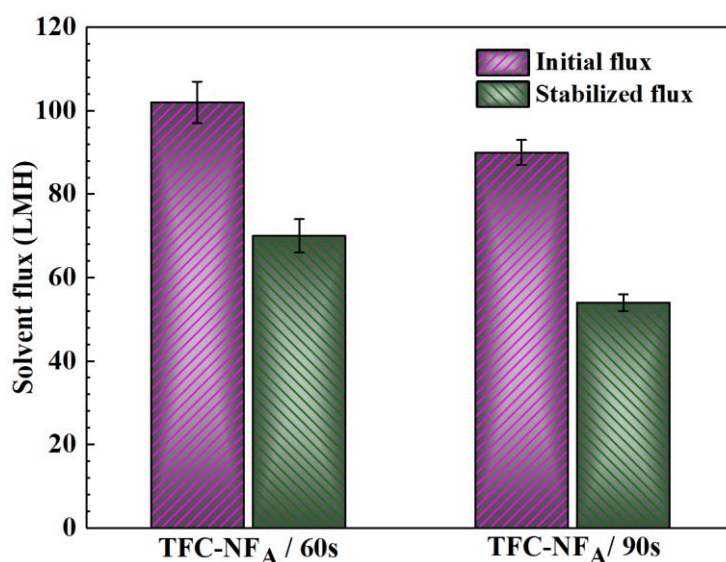
**Figure S1.** Schematic of FPA-based TFC-NF membrane fabrication process following *in-situ* interfacial polymerization technique, by using PIP as diamine monomer and TFSC as fluorine-bearing diacyl chloride monomer; in one route of preparation (depicted on left side), the membrane (TFC-NF<sub>A</sub>) is dried in air, and in another route of preparation (depicted on right side), the membrane (TFC-NF<sub>W</sub>) is annealed in hot water-bath and then dried in air.



**Figure S2.** Schematic description of cross-flow filtration equipment for evaluation of nanofiltration performance; (A) feed tank, (B) valve, (C) diaphragm pump, (D) feed line, (E) stand with clamps, (F) test cell, (G) membrane, (H) permeate collector, (I) pressure gauge, (J) pressure relief valve, (K) rota meter, and (L) reject line.

**Table S1**Surface hydrophilicity and electrokinetic features of TFC-NF<sub>A</sub> type membranes.

Membrane Code	$\theta_w$ ( $^\circ$ )	$\zeta$ (mV)	$\sigma_s$ (C/m <sup>2</sup> ) $\times 10^{-3}$
TFC-NF <sub>A</sub> / 60s	42.1( $\pm$ 0.3)	- 4.4	- 3.1
TFC-NF <sub>A</sub> / 90s	35.8( $\pm$ 0.1)	- 5.6	- 4.0

**Figure S3.** Nanofiltration performances of TFC-NF<sub>A</sub> type membranes, prepared undergoing 60 and 90 s of reaction time during *in-situ* interfacial polymerization; solute rejection against isosmotic solutions of Na<sub>2</sub>SO<sub>4</sub>, MgSO<sub>4</sub>, NaCl, and MgCl<sub>2</sub> at 15 bar transmembrane pressure.**Figure S4.** Solvent fluxes of TFC-NF<sub>A</sub> type membranes, prepared undergoing 60 and 90 s of reaction time during *in-situ* interfacial polymerization, at 15 bar transmembrane pressure.