Supplementary Information

Fabrication of PAN-PA6/PANI Membrane Using Dual Spinneret Electrospinning Followed by In-situ Polymerization for Separation of Oil-in-Water Emulsion

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The following equations were used for calculation of membrane properties.

1- Membrane flux [1, 2]:

$$J_0 = \frac{V}{A_0 \Delta t}$$

Where J_0, V, A_0, Δt and ΔP are the pure water flux/permeate flux, permeated water volume, membrane effective area, measurement time, and applied pressure across the membrane, respectively.

2- Membrane permeability [1, 2]:

$$Permeability = \frac{J_0}{\Delta P}$$

3- Oil Rejection[2]:

$$R = \frac{C_f - C_P}{C_f}$$

Where R is the oil rejection and C_f and C_p are the concentrations of oil in the feed and permeate solutions, respectively.

4- Porosity[2-6]:

$$\varepsilon(\%) = \frac{W_W - W_d}{\rho_W AL}$$

Where W_w and W_d are the weight of the wet and dry membranes, respectively; ρ_w is the water density (0.998 g.cm^{-3}); A is the effective area of the membrane and L is the membrane thickness.

5- The mean pore size[3-6]:

$$r_m = \sqrt{\frac{(2.9 - 1.75\varepsilon) \times 8\eta l Q_T}{\varepsilon A \Delta P}}$$

Where ε is the membrane porosity; is the water viscosity (8.9×10^{-4} Pa.s); l is the membrane thickness; Q_T is the permeate volume per unit time; ΔP is the applied pressure (1 bar) and A is the effective area of the membrane.

6-The maximum pore size[3]:

$$R_{max} = \frac{2\sigma Cos\theta}{P}$$

Where σ is the surface tension of water (72.80×10^{-3} Nm^{-1}); θ is the contact angle of water on the membrane and P is the minimum bubble point pressure.

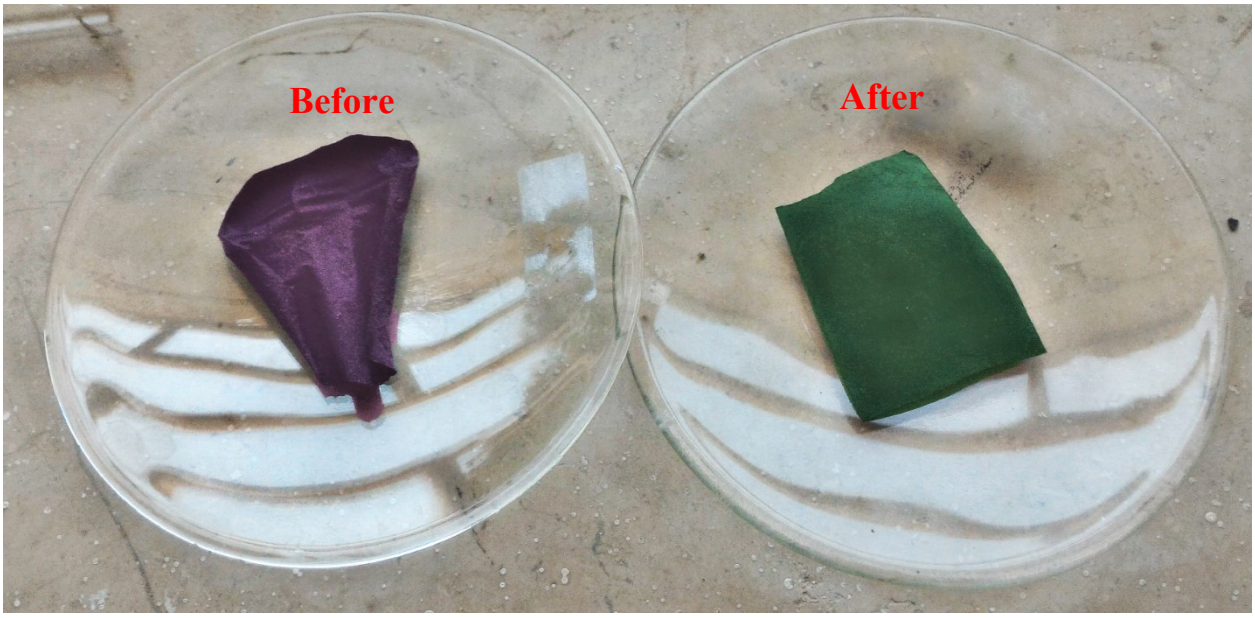
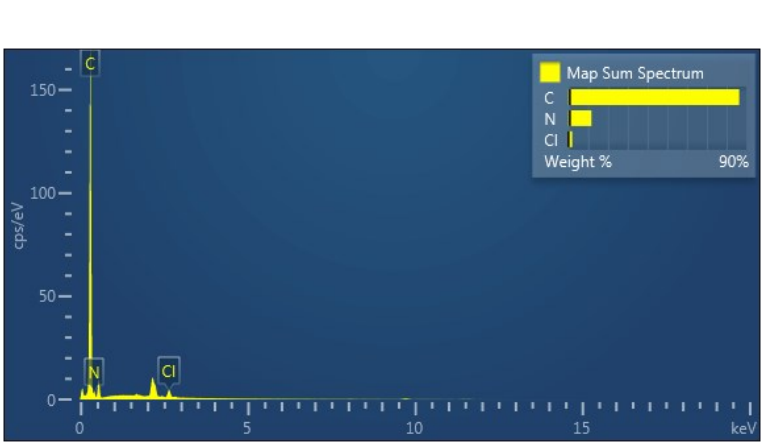
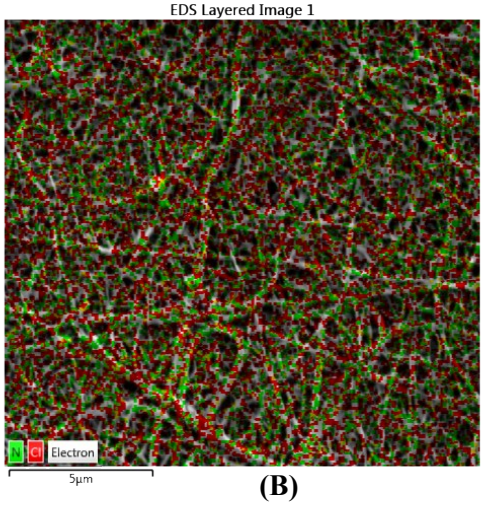


Fig. S1. Transition of PAN-PA6/PANI membrane appearance color before and after doping process (violet to dark green).

Fig. S2. Home made set up for oil/water separation studies



(A)



(B)

Fig. S3. (A) FESEM-EDX spectra , (B) Mapping pattern of PAN-PA6/PANI Doped nanofibers

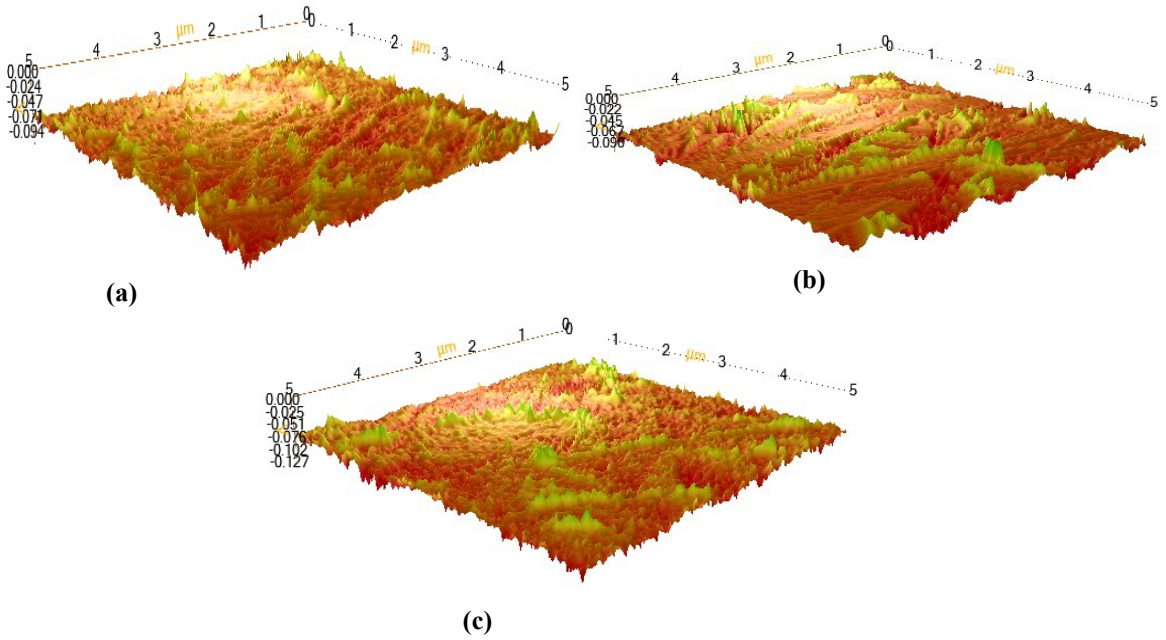


Fig. S4. AFM images of PAN-PA6/PANI electrospun nanofiber mats with (a) 45; (b) 60 and (c) 75 minutes polymerization time.

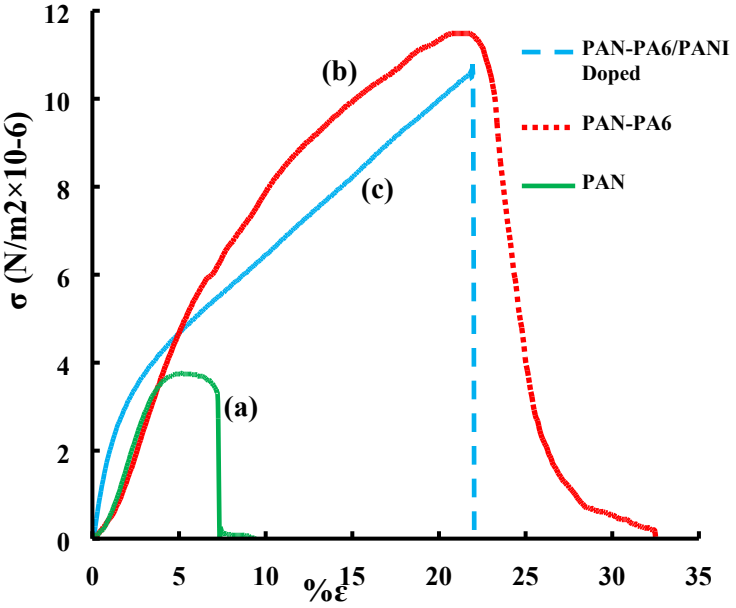


Fig. S5. The stress-strain curve of the (a) PAN; (b) PAN-PA6 and (c) PAN-PA6/PANI Doped membrane.

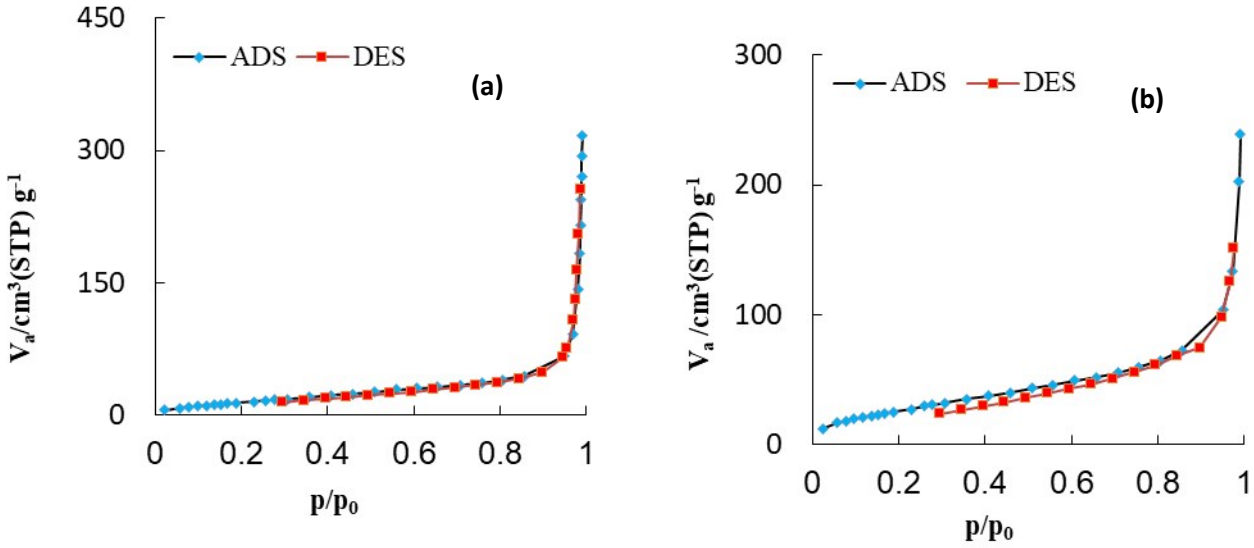


Fig. S6. Adsorption-desorption isotherm graphs for (a) PAN-PA6 (b) PAN-PA6/PANI electrospun nanofiber mats.

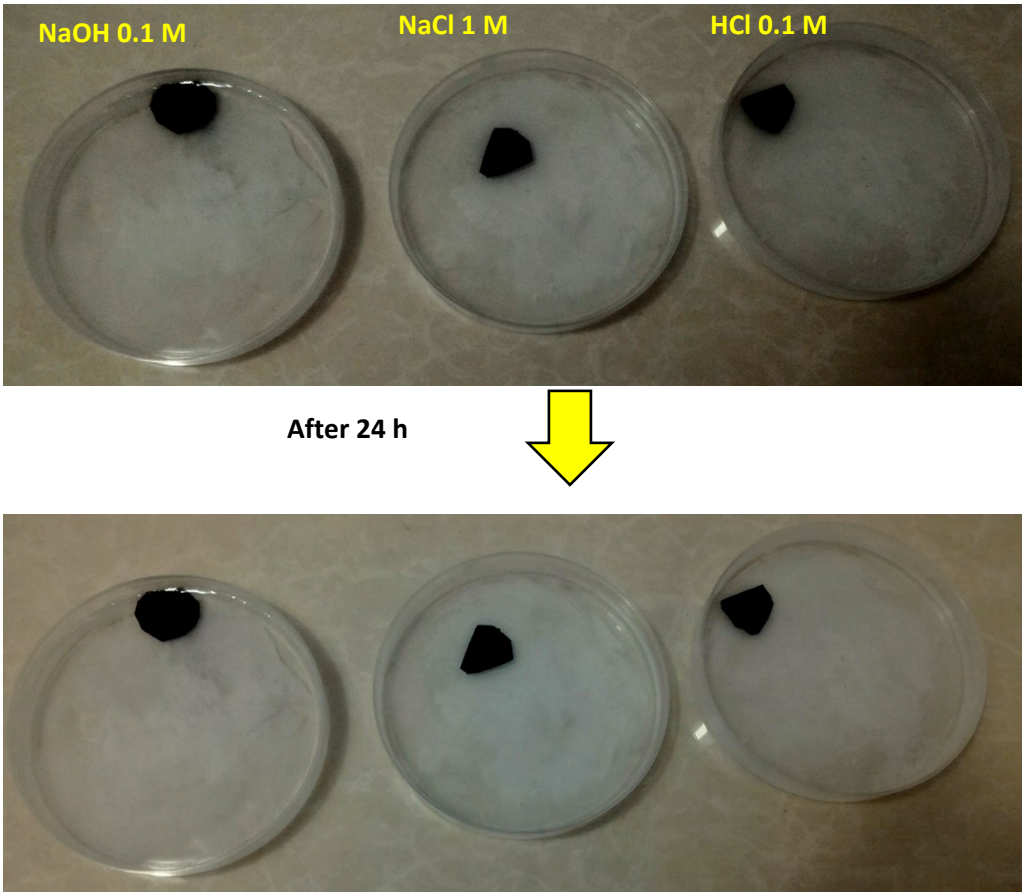


Fig. S7. Photographs of PAN-PA6/PANI Doped membranes before and after immersing in 0.1 M HCl, 1 M NaCl and 0.1 M NaOH solution for 24 h

sample	net weight (mg)	after coating weight (mg)	after doping weight (mg)	Weight loss after doping procces (mg)
1	17.4	20.2	19.5	0.7
2	15.3	19	17.9	1.1
3	16.3	18.2	17.5	0.7
4	18.4	21.4	20.5	0.9
5	15.1	16.9	16.1	0.8
6	16.6	19.2	18.3	0.9
7	18.7	22.4	21.9	0.5
8	14.6	18.7	18.2	0.5
9	16.3	19.7	19.3	0.4
10	19	21.5	20.7	0.8
11	10.5	14.4	13.9	0.5
12	20.2	24.7	24	0.7
13	19	21.7	21.2	0.5
14	19.6	22.4	22	0.4
15	22.3	25.7	24.6	1.1
16	14.5	17.6	16.9	0.7
17	14.8	19	18.4	0.6
18	13.5	18	17.3	0.7
19	18.5	20.4	19.6	0.8
20	19.5	24.2	23.4	0.8
Mean	17	20.26	19.56	0.705

Table S1- Weight changes of 20 pieces of PAN-PA6 nanofibers during PANI coating and doping process

Refrences:

1. Ju, J., et al., *Preparation and characterization of pH-sensitive and antifouling poly(vinylidene fluoride) microfiltration membranes blended with poly(methyl methacrylate-2-hydroxyethyl methacrylate-acrylic acid).* Journal of Colloid and Interface Science, 2014. **434**: p. 175-180.
2. Emadzadeh, D., et al., *A novel thin film composite forward osmosis membrane prepared from PSf–TiO2 nanocomposite substrate for water desalination.* Chemical Engineering Journal, 2014. **237**: p. 70-80.

3. Li, J.-F., et al., *Effect of TiO2 nanoparticles on the surface morphology and performance of microporous PES membrane.* Applied Surface Science, 2009. **255**(9): p. 4725-4732.
4. Liao, C., et al., *Synthesis and characterization of low content of different SiO2 materials composite poly (vinylidene fluoride) ultrafiltration membranes.* Desalination, 2012. **285**: p. 117-122.
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