

## **Electronic Supplementary Material**

# **Self-Healing and Superwetable Nanofibrous Membranes for Efficient Separation of Oil-in-Water Emulsions**

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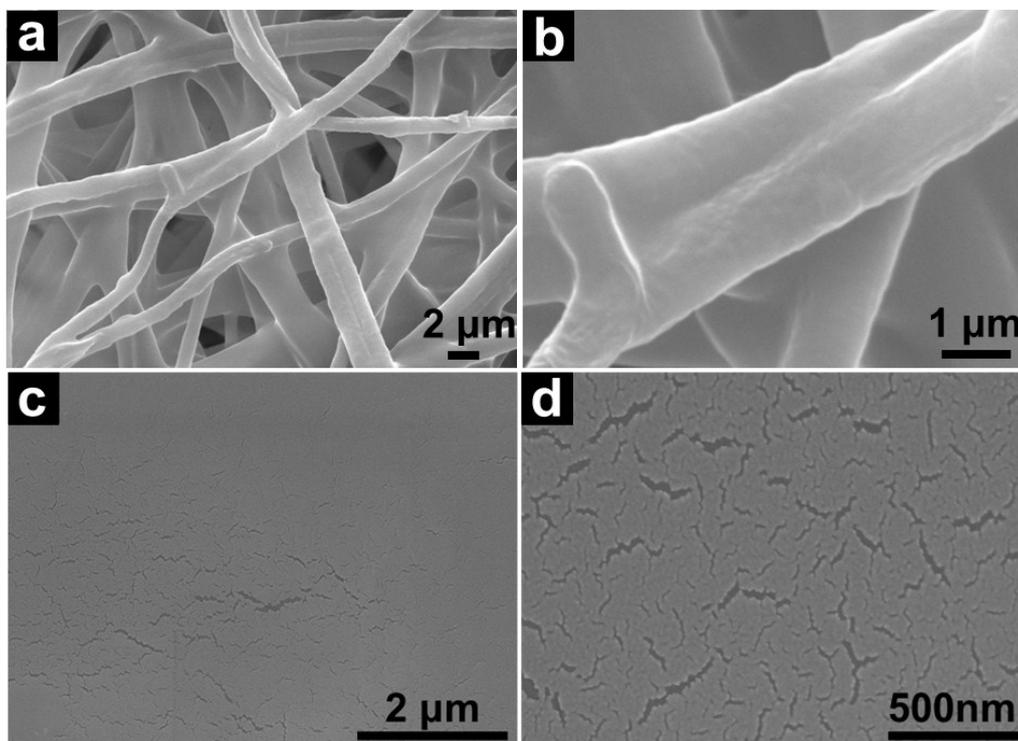
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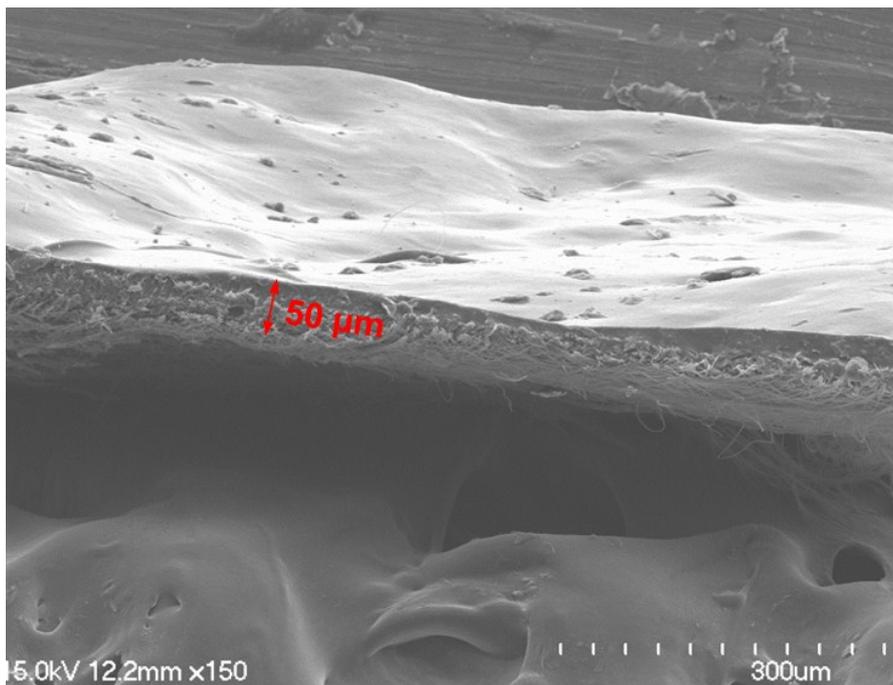
S6.1 Separation performance test.

## S1 Surface structure and performance of the prepared PAN@PPH composite membranes

S1.1 SEM image of the PAN@PPH composite membranes.

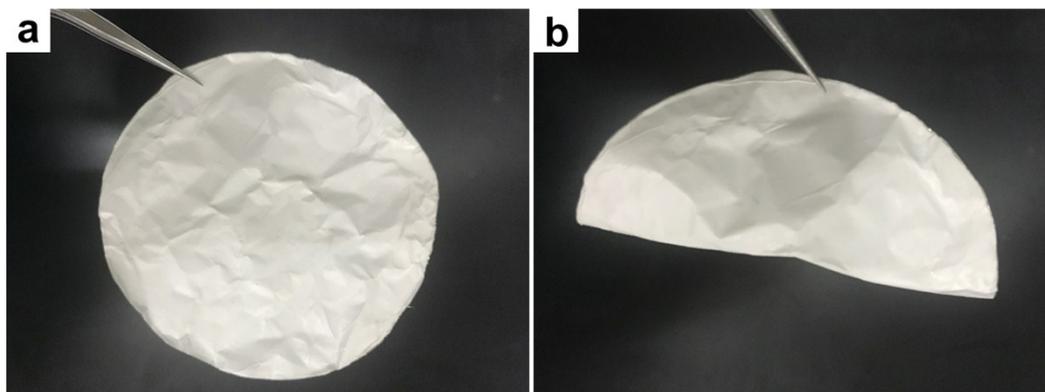


**Figure S1.** Scanning electron microscopy (SEM) images of: a, b and c, d are the as-prepared PAN@PPH composite membranes prepared by adopting the layer-by-layer (LbL)-assembly method and subjecting the membranes to three and seven dip-coating processes, respectively.

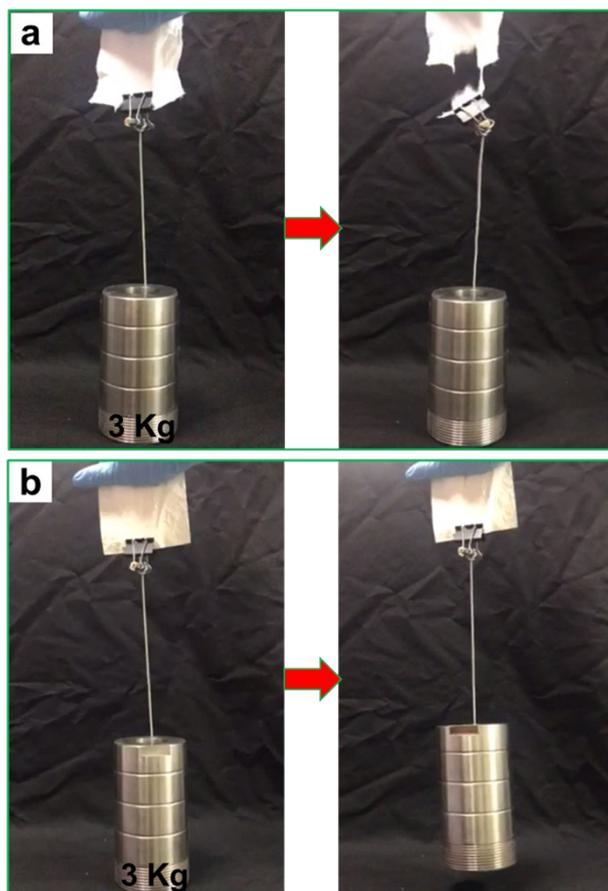


**Figure S2.** SEM cross section image of the prepared composite membrane. The thickness of the composite membrane about 50  $\mu\text{m}$  five dip-coating processes.

S1.2 The strength and flexibility test of the as-prepared PAN@PPH composite membranes.



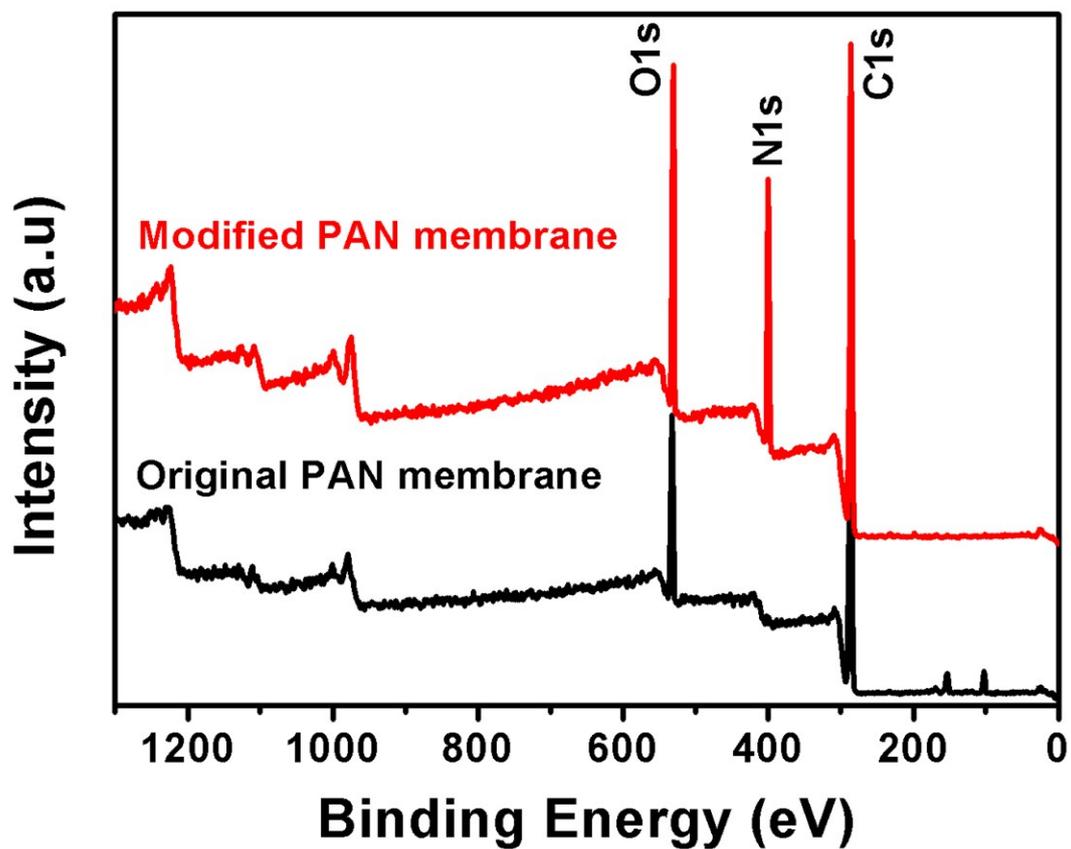
**Figure S3.** Optical microscopy images of the as-prepared PAN@PPH composite membranes.



**Figure S4.** The strength and toughness of the PAN@PPF composite membranes  
Optical microscopy images a) the pure PAN membrane; b) the prepared PAN@PPH  
composite membrane.

## S2 X-ray photoelectron spectroscopy (XPS) analysis of the prepared PAN@PPH composite membranes

### S2.1 XPS analysis of the composite membranes.



**Figure S5.** XPS survey spectrum of the pure PAN membrane and PAN@PPH composite membrane.

S2.2 The elemental content analysis of the composite membranes.

<b>a</b>	<b>Element</b>	<b>At (%)</b>
	<b>C</b>	<b>67.41</b>
	<b>N</b>	<b>19.48</b>
	<b>O</b>	<b>13.11</b>

<b>b</b>	<b>Element</b>	<b>At (%)</b>
	<b>C</b>	<b>68.10</b>
	<b>N</b>	<b>20.73</b>
	<b>O</b>	<b>12.17</b>

<b>c</b>	<b>Element</b>	<b>At (%)</b>
	<b>C</b>	<b>64.61</b>
	<b>N</b>	<b>22.01</b>
	<b>O</b>	<b>14.38</b>

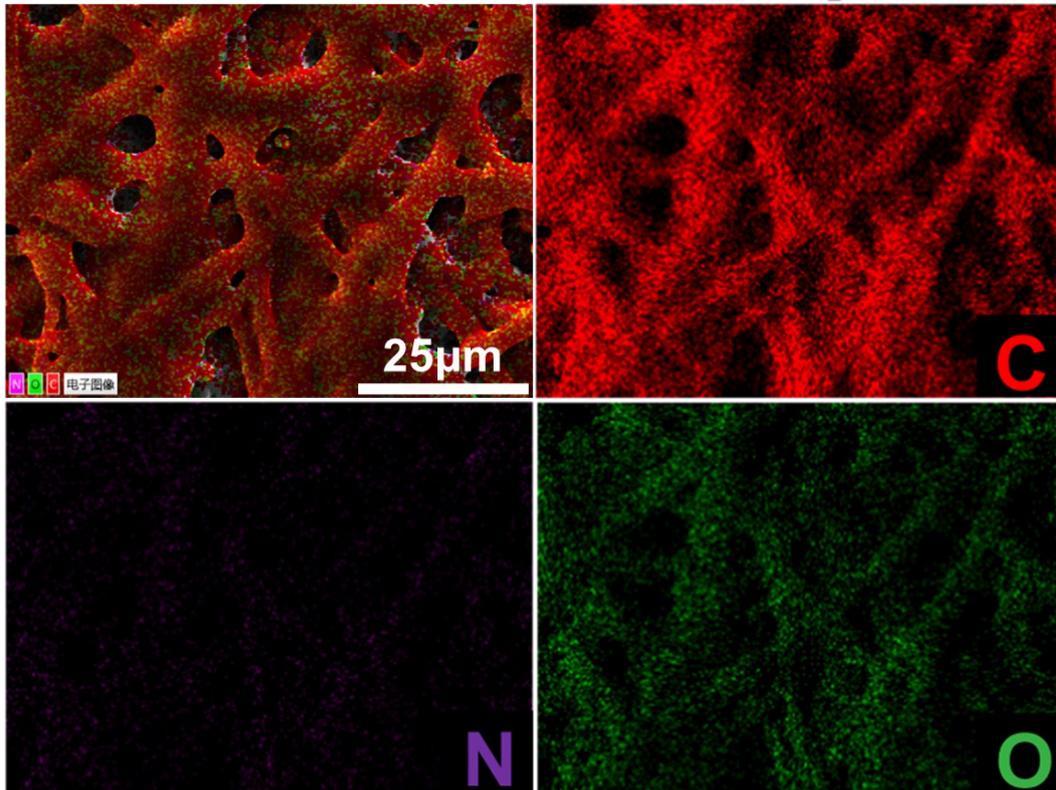
  

<b>d</b>	<b>Element</b>	<b>At (%)</b>
	<b>C</b>	<b>65.28</b>
	<b>N</b>	<b>24.93</b>
	<b>O</b>	<b>11.79</b>

**Figure S6.** The elemental content by XPS of the PAN@PPH composite membrane subjected the membranes to one and five dip-coating processes, respectively.

### S3 Energy dispersive spectra (EDS) elemental mapping images

#### S3.1 EDS elemental mapping images of the composite membrane.



**Figure S7.** SEM mapping images of the PAN@PPH composite membrane.

## S4 Infrared spectrum (IR) analysis of the prepared PAN@PPH composite membranes

### S4.1 IR analysis of composite membrane.

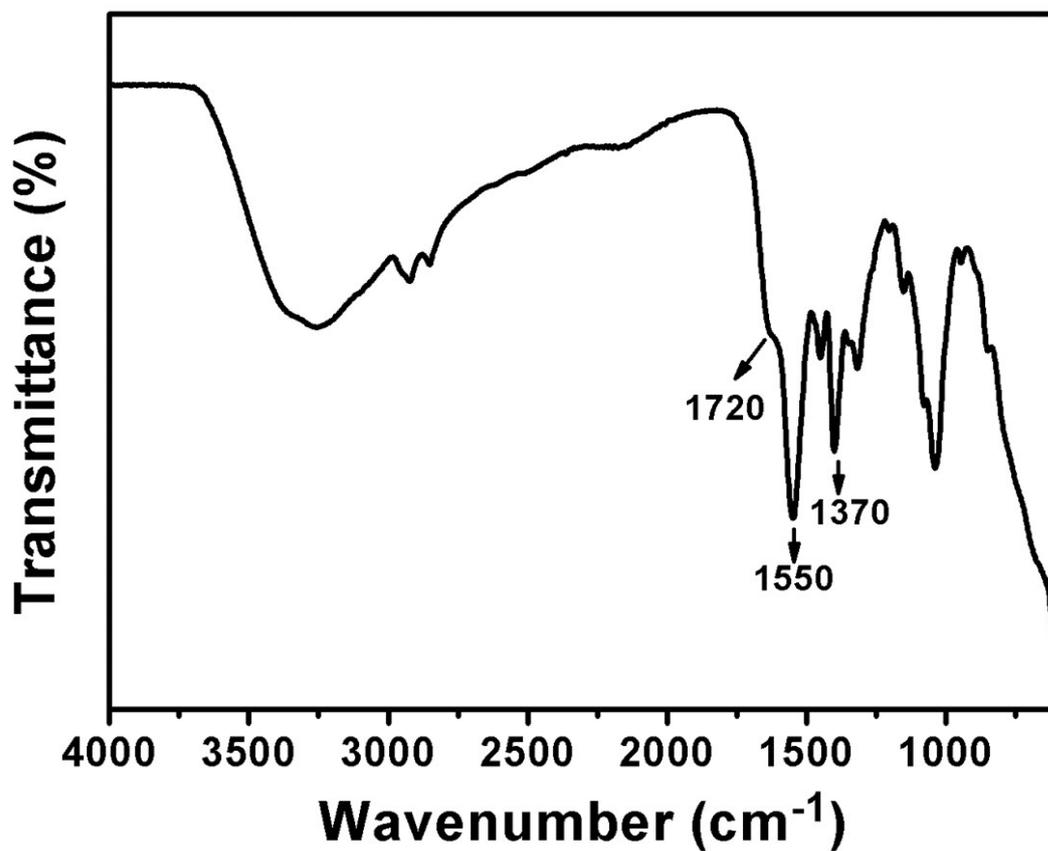


Figure S8. IR spectra of the PAN@PPH composite membrane.

## S5 Studying the effect of composite membrane composition on various properties

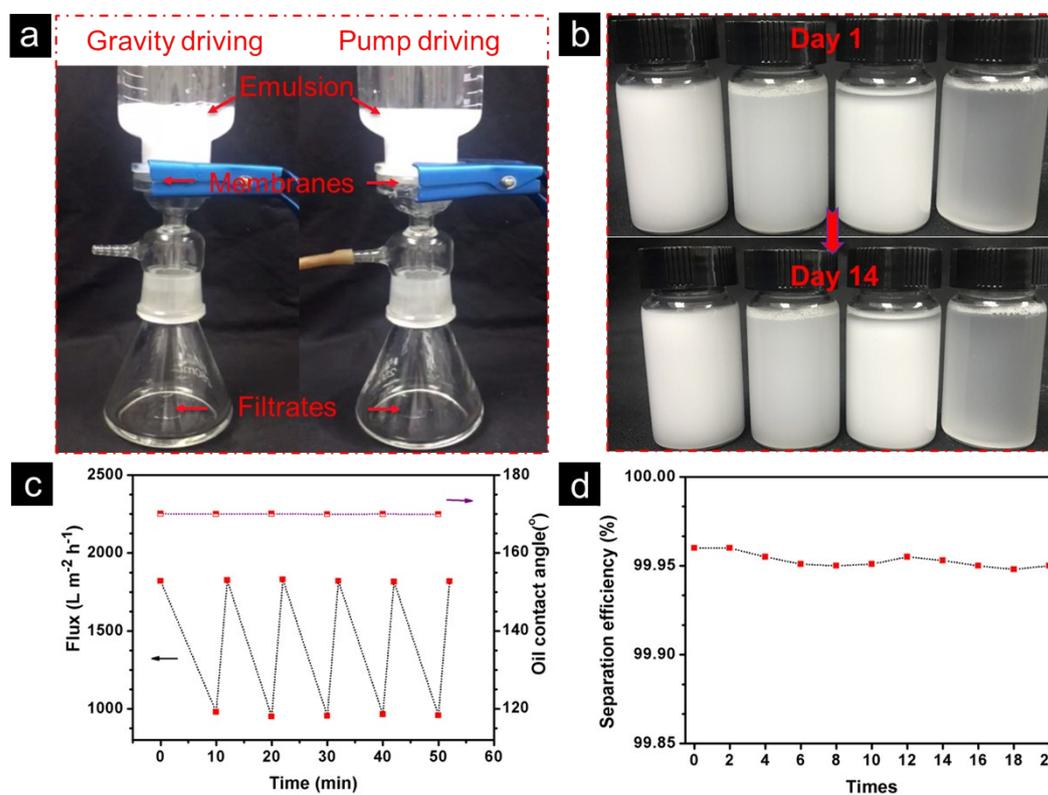
### S5.1 Influence of LbL-assembled number.

LbL-assembled number	Properties of modified membrane		
	Flux ( $\text{L m}^{-1} \text{h}^{-1}$ )	Efficiency (%)	Self-healing
0	3215	85.30	No
1	2682	90.30	No
3	1983	95.65	No
5	1850	99.98	Yes
7	885	99.99	Yes

**Table S1.** Effect of composite membrane composition on various properties.

## S6 Emulsion separation process and its cycle performance test

### S6.1 Separation performance test.



**Figure S9.** a) Digital photos showing the process of emulsion separation under the driving of gravity and external pressure. b) Digital photos showing the emulsions have excellent stability. c, d) The cycling separation performance of the membrane for corresponding emulsifier-stabilized emulsion.