

Supporting information

Table S1. The membrane resistances at different temperatures.

Item	OPBI	OPBI-0.5AM	OPBI-0.8AM	OPBI-1.0AM	OPBI-2.0AM
40°C	1.179×10^5	2.715×10^4	1.070×10^4	7.638×10^3	3.307×10^3
60°C	7.656×10^4	2.159×10^4	7.054×10^3	5.147×10^3	2.573×10^3
80°C	4.110×10^4	1.326×10^4	4.576×10^3	3.709×10^3	1.662×10^3
100°C	2.206×10^4	8.388×10^3	3.357×10^3	2.431×10^3	1.200×10^3
120°C	2.102×10^4	5.615×10^3	2.428×10^3	1.780×10^3	1.066×10^3
140°C	1.661×10^4	4.743×10^3	1.893×10^3	1.423×10^3	9.234×10^2
160°C	1.503×10^4	4.558×10^3	1.602×10^3	1.163×10^3	8.352×10^2
180°C	1.290×10^4	4.677×10^3	1.703×10^3	1.236×10^3	9.165×10^2

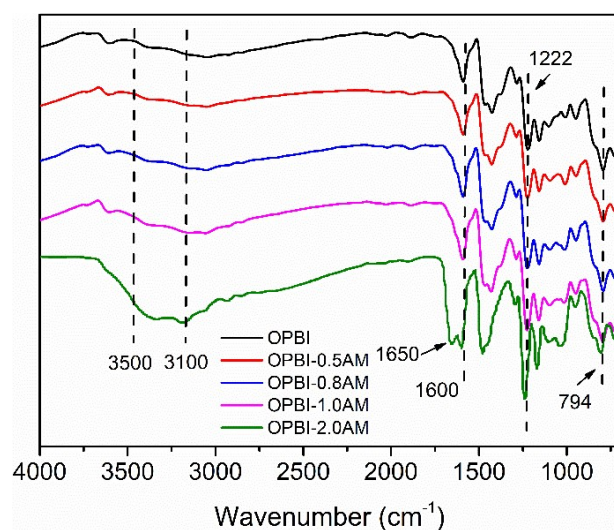


Fig. S1. FTIR spectra of the PBI-AM membrane.

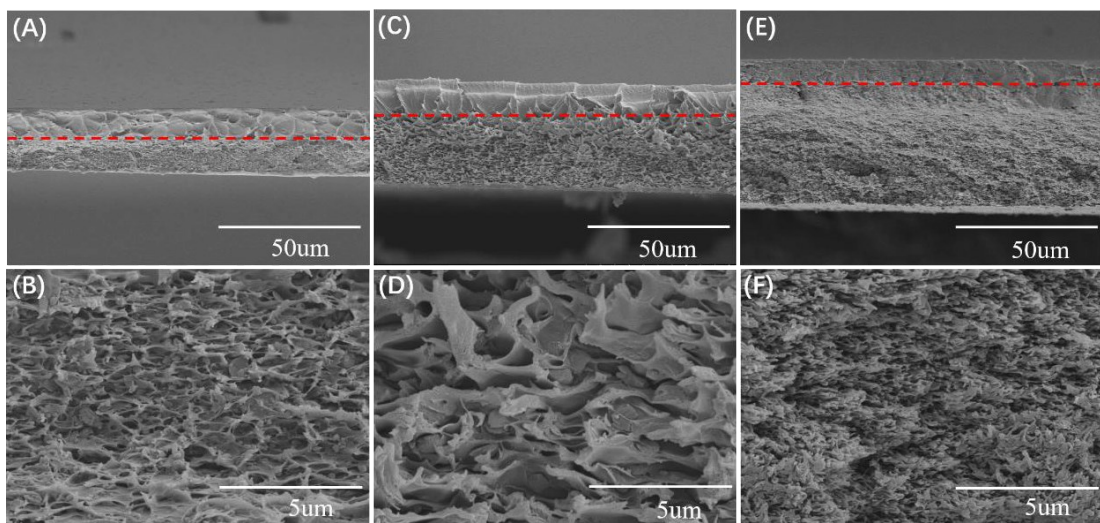
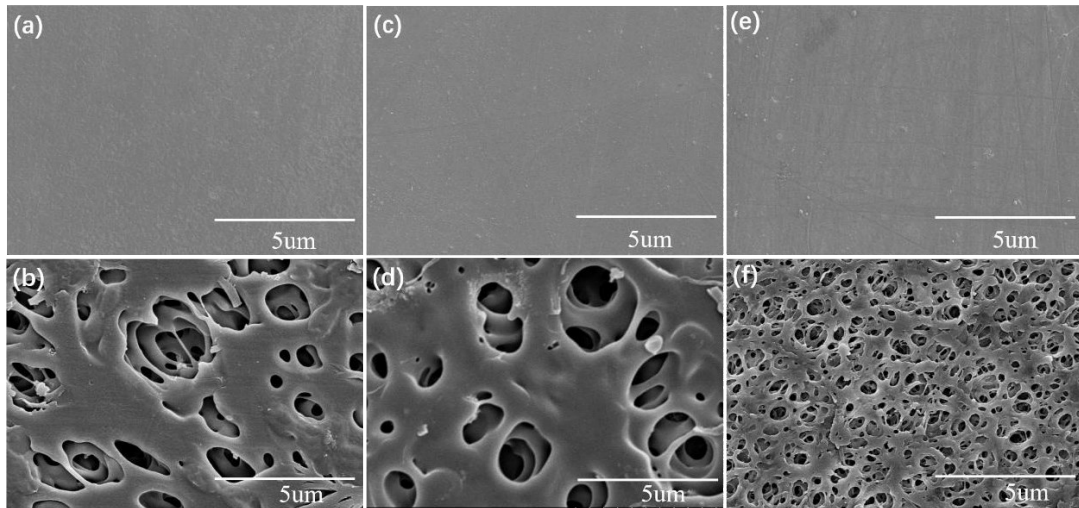


Fig. S2. SEM micrographs of OPBI-AM membranes. (a)(b) The surface of the OPBI-0.5AM membrane; (c)(d) OPBI-1.0AM membrane; and (e)(f) OPBI-2.0AM membrane; (A)(B) The cross-sections of the OPBI-0.5AM membrane; (C)(D) OPBI-1.0AM membrane; and (E)(F) OPBI-2.0AM membrane

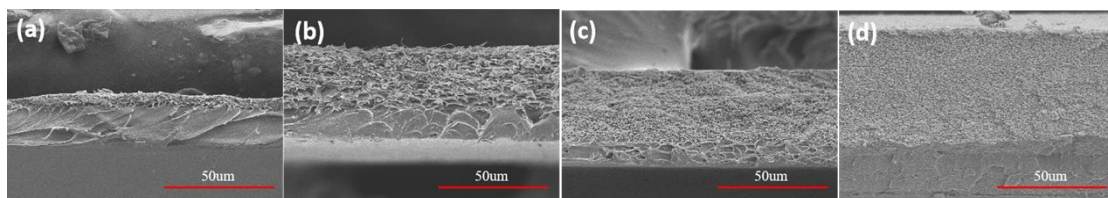


Fig. S3. The SEM micrographs of hydrated membranes using freeze drying (a) OPBI-0.5AM; (b) OPBI-0.8AM; (c) OPBI-1.0AM; (d) OPBI-2.0AM.

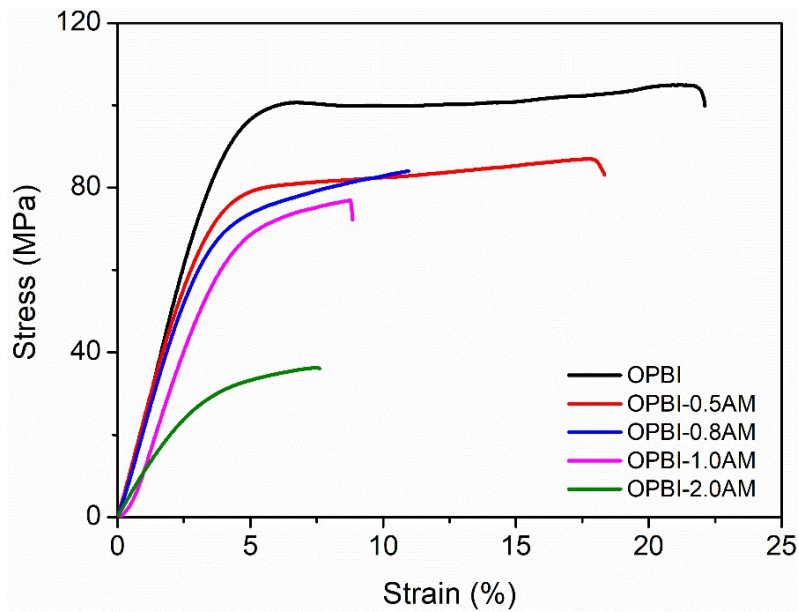


Fig. S4. Tensile stress and strain curves of the pure membranes.

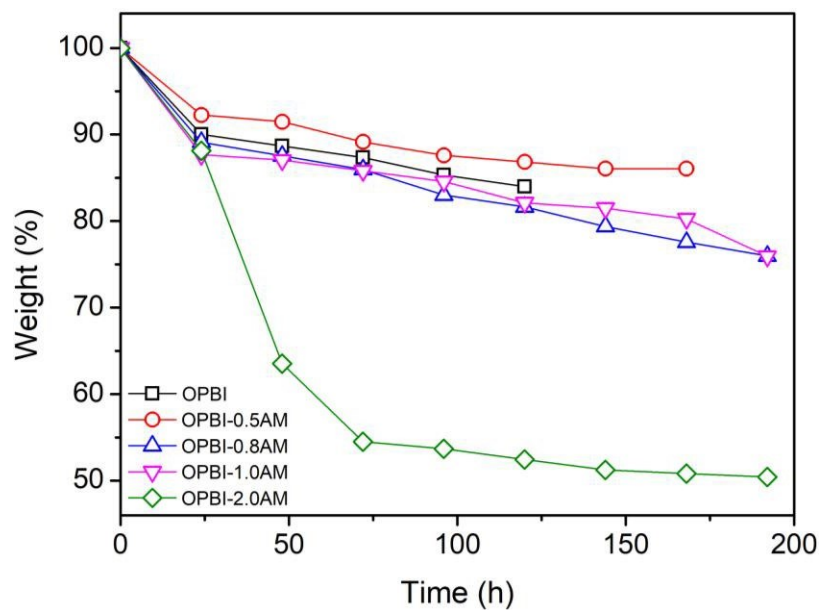


Fig. S5. Fenton test results of the membranes prepared in a 3 wt% H_2O_2 solution containing 4 ppm Fe^{2+} at 80 °C

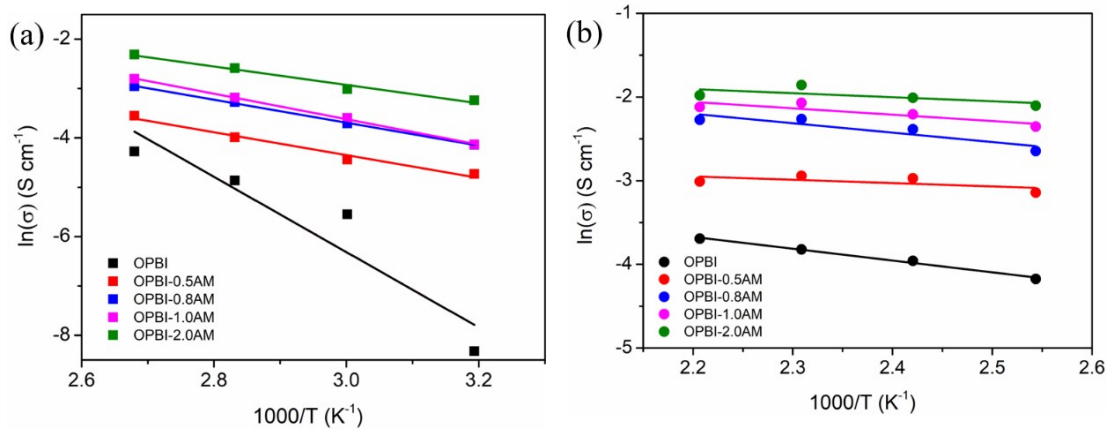


Fig. S6. The Arrhenius plot of OPBI, OPBI-0.5AM, OPBI-0.8AM, OPBI-1.0AM, OPBI-2.0AM (a) at temperature 40-100°C; (b) at temperature 120-180°C

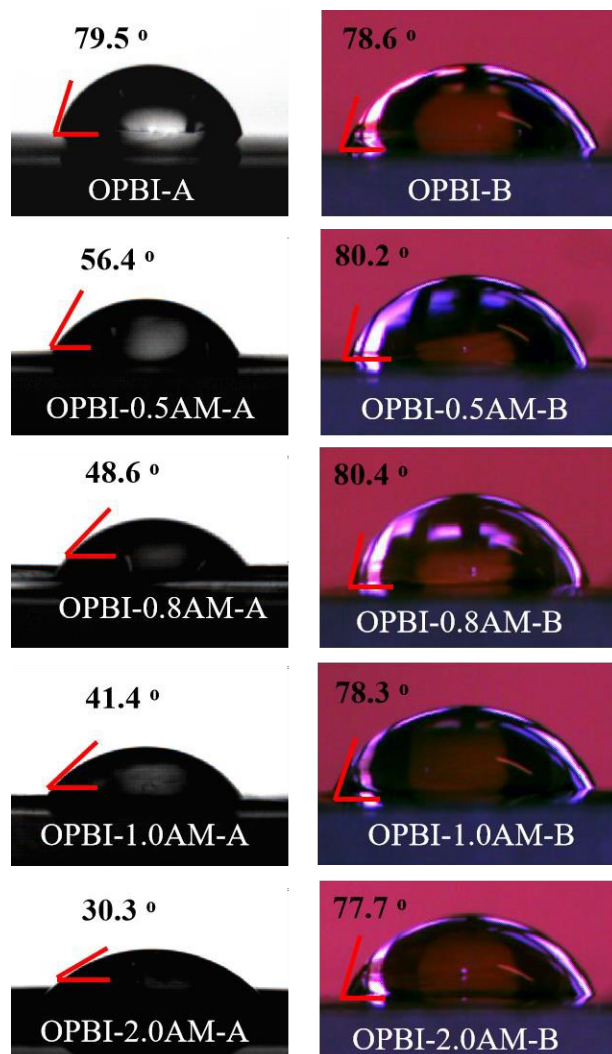


Fig. S7. Water contact angles of the membranes: A is the bottom of membrane (closed to PAM side) B is the top of membrane (closed to OPBI side)

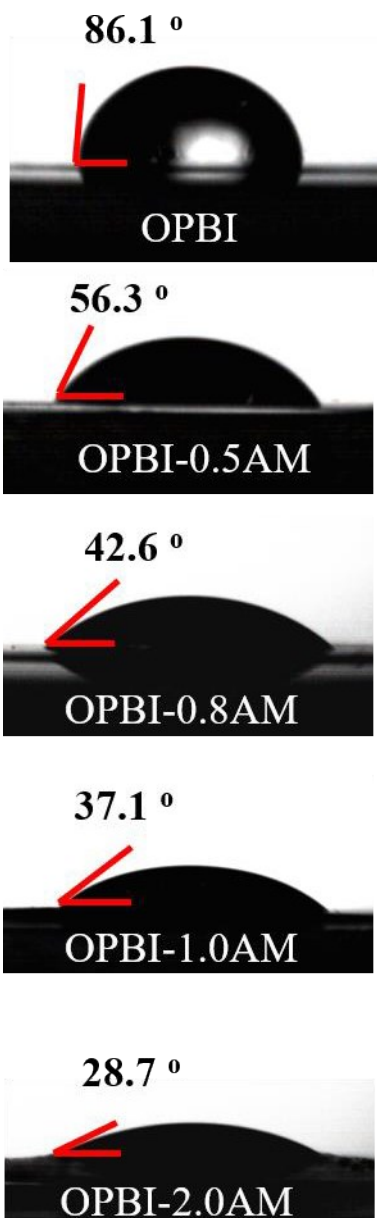


Fig. S8. Phosphoric acid contact angles of the membranes.

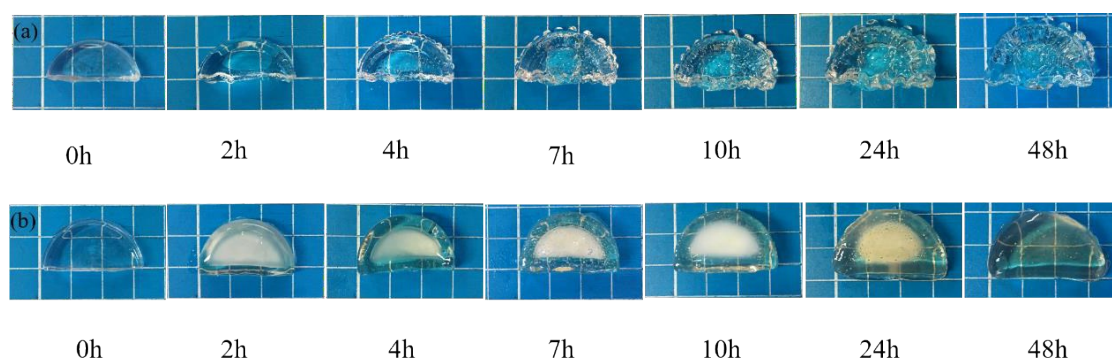


Fig. S9. The photos of polyacrylamide hydrogel in phosphoric acid solution: (a) 80 °C; (b) 160 °C