Supplementary Information

Multi-functional polydopamine coating: simultaneous enhancement of interfacial adhesion and CO_2 separation performance of mixed matrix membranes

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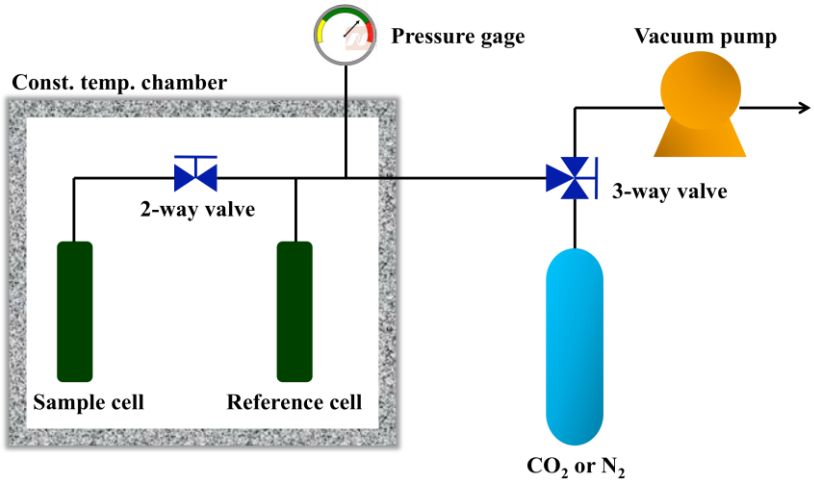

Fig.S1 Experimental apparatus for gas sorption

The gas sorption isotherms of the prepared membranes were investigated using the barometric pressure decay method with a dual-volume, comprised of a sample container and a reference volume where the chambers were connected in series. The volumes of both chambers were carefully calibrated before the measurements. The device was placed in a temperature-controlled water bath to minimize the effect of environmental temperature on the gas sorption behavior. In this study, the temperature was maintained at 25 ^{o}C. The membranes were introduced into the sample chamber and degassed for more than 3 h to remove all adsorbed species. Feed gas was firstly charged into the reference chamber and then the pressure decay was immediately initiated after opening the valve between the sample and reference chamber. The gas sorption reached equilibrium once no further pressure decay was observed. The

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concentration of gas adsorbed in prepared membranes was evaluated by using the equation of state and the Soave-Redlich-Kwong (SRK) equation of state.[1] In this work, the sorption test CO_2 saturated with water vapor or not was conducted to investigate the difference of CO_2 sorption under at humidified and dry states. But for N_2, under humid conditions, both water and nitrogen are present in the system. Because the N_2 sorption was quite low, the pressure drop upon N_2 sorption would also be very small. Therefore, the relative pressure fluctuation caused by water evaporation and condensation cannot be neglected; accordingly, we cannot accurately measure the amount of N_2 sorbed under humid conditions. Hence, the N_2 sorption tests were carried out under dry conditions.

[1] S. Kanehashi and K. Nagai, *J. Membr. Sci.*, 2005, **253**, 117-138.

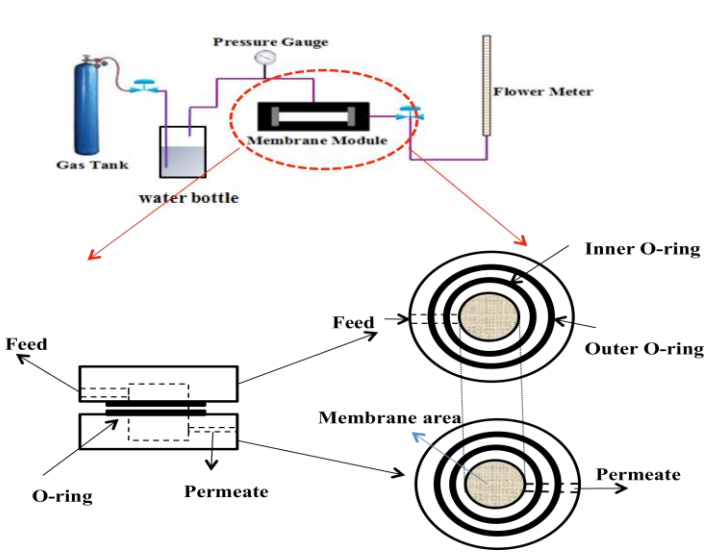

Fig.S2 Experimental apparatus for gas permeability

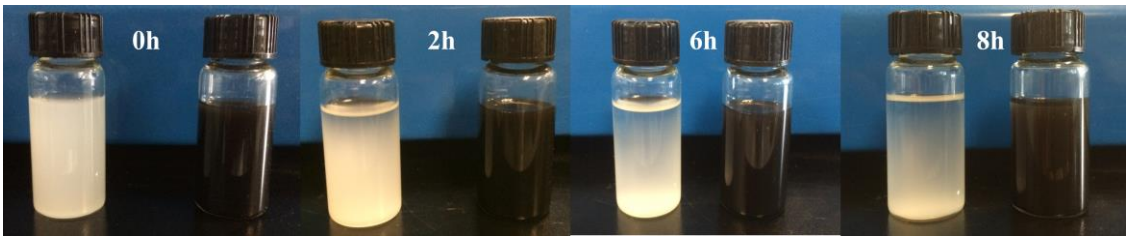

Fig.S3 Photographs of dispersion stability of ZIF-8 (white) and PDA@ZIF-8 (black) versus time

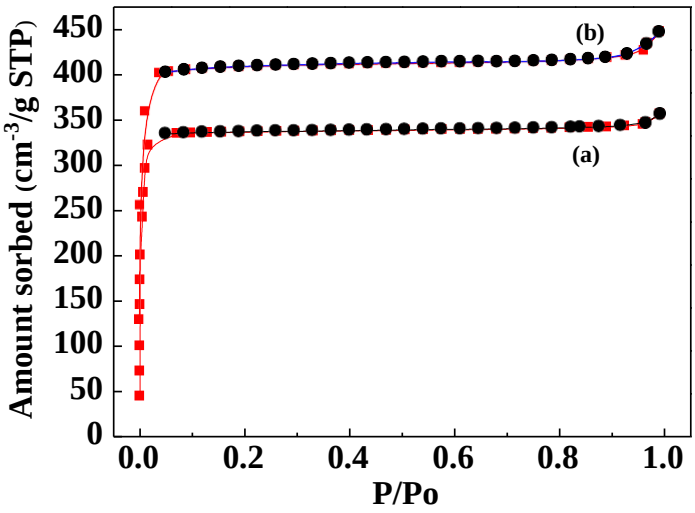

Fig. S4 Nitrogen sorption isotherms of ZIF-8 (b) and PDA@ZIF-8 (a) at 77K. Red and black data correspond to the adsorption and desorption branches, respectively.

Table S1 BET and micropore volume of ZIF-8 and PDA@ZIF-8

Sample	BET Surface Area (m^2/g)	Langmuir Surface Area (m^2/g)	t-Plot micropore volume (cm^3/g)
PDA@ZIF-8	1139	1465	0.51
ZIF-8	1360	1785	0.60

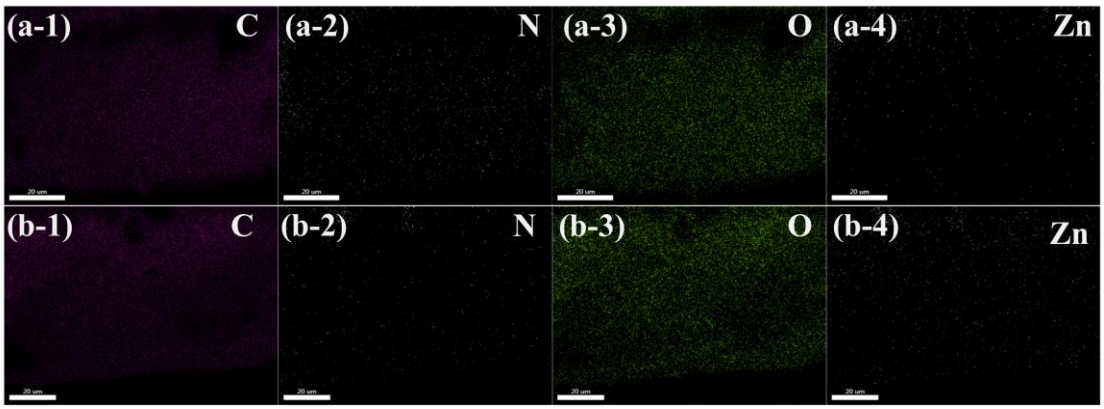

Fig. S5 EDAX maps of Peabx/ZIF-8-15 (a) and Peabx/PDA@ZIF-8-15 (b).

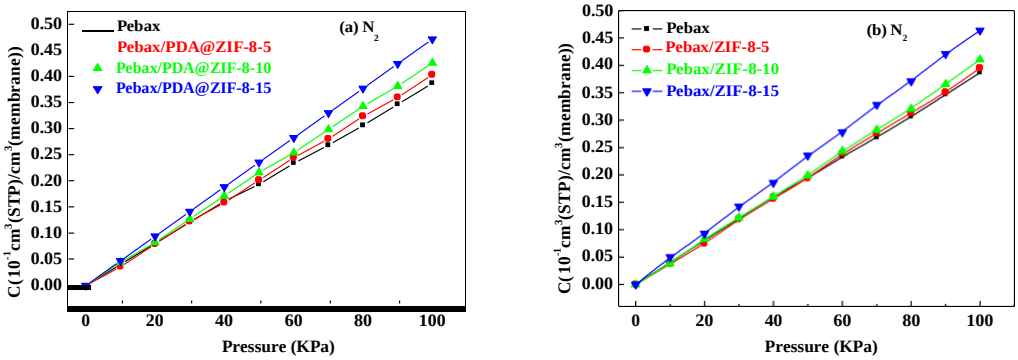

Fig. S6 Sorption isotherms of N_2 on pure Pebax control and MMMs at 25 °C