Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Support Information

The crystalline structure characterized by XRD patterns are presented in Fig. 1a (NaA) and Fig. 1b (Silicalite-1). It's confirmed that synthesized zeolites are standard NaA and Slicalite-1, respectively, since the results is consistent with previous related literature[1, 2].

The morphology of synthesized zeolites are showed in Fig. 1c (NaA) and Fig. 1d (Silicalite-1). Both micrographs demonstrate that NaA and Silicalite-1 nanzeolites appear in a near spherical shape. To ensure that nanocrystals can be enclosed in polymer matrix, size distribution of two kinds zeolites are tailored to 50nm-150nm (by adjusting synthesis temperature) as showed in SEM images because ultra-thin PA film by interfacial polymerization is always 100-200nm in thicknesss.

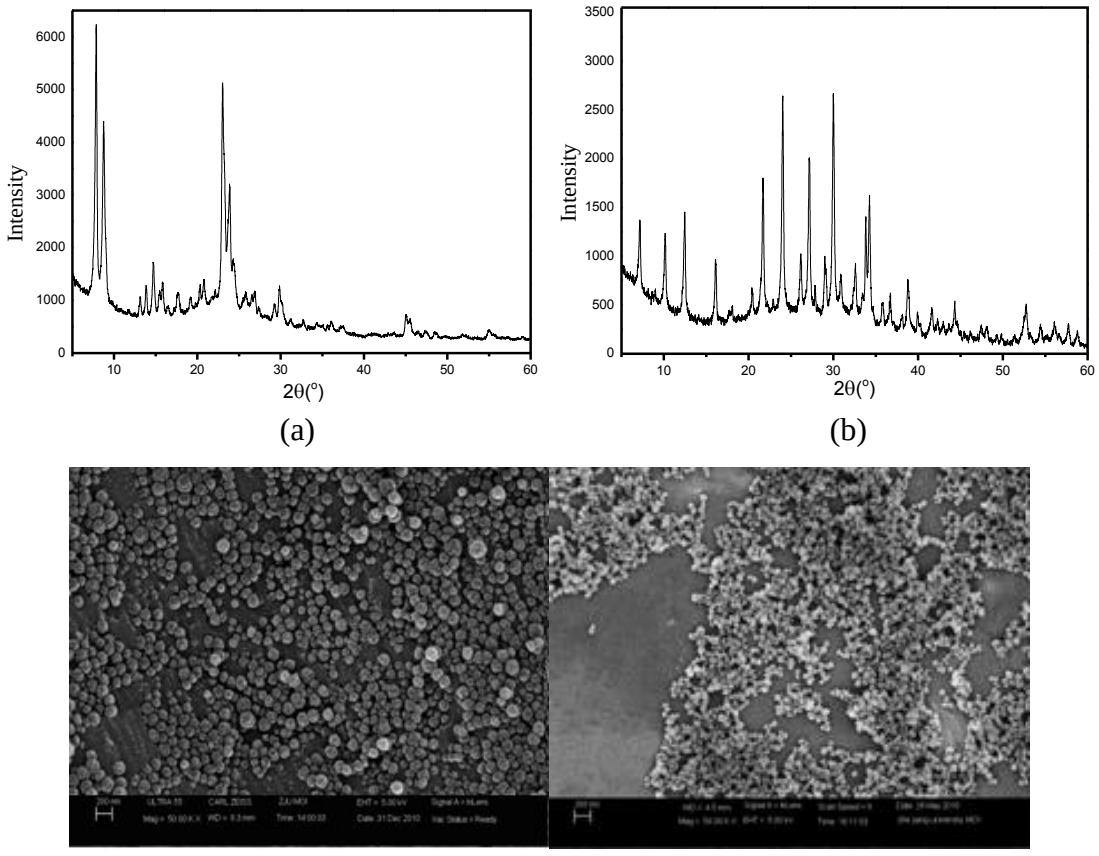
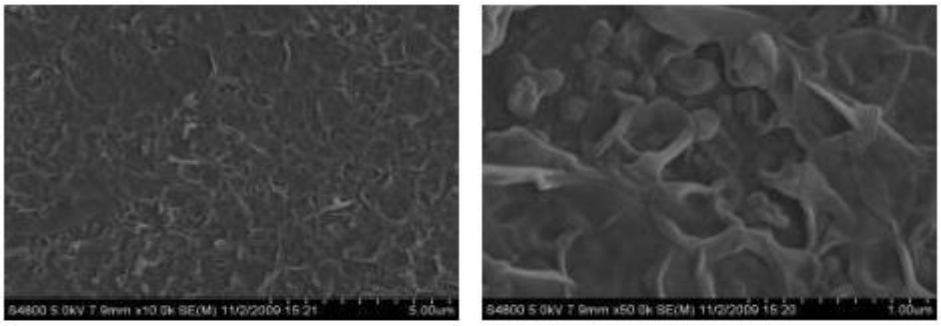
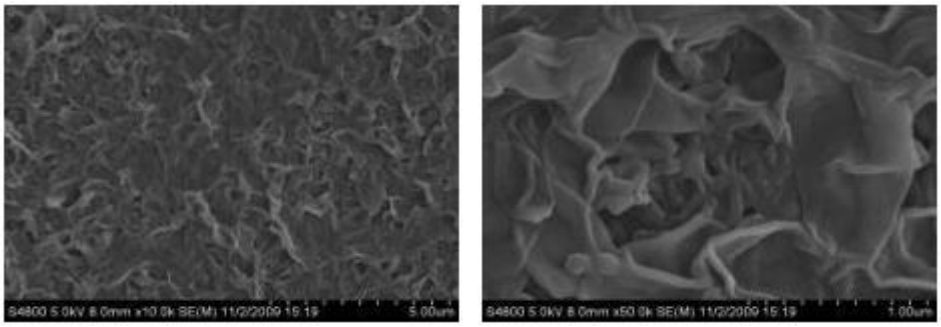


Fig. 1. SEM images of (a) NaA zeolites, (b) Silicalite-1 zeolites and XRD pattern of NaA (c) and Silicalite-1(d)

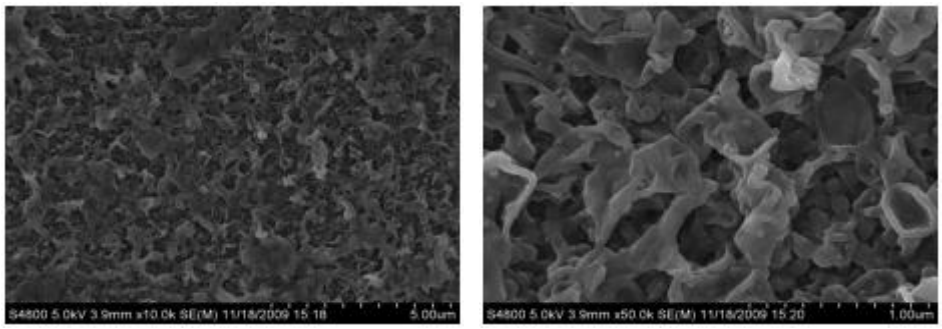
The morphology of different membranes integrated with two kinds of nanozeolites in varied loading amount is also characterized by SEM detection in Fig.2 and Fig.3.



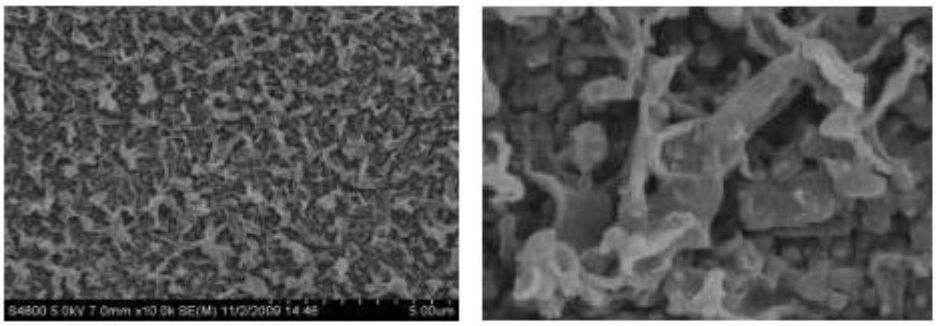
(a)



(b)

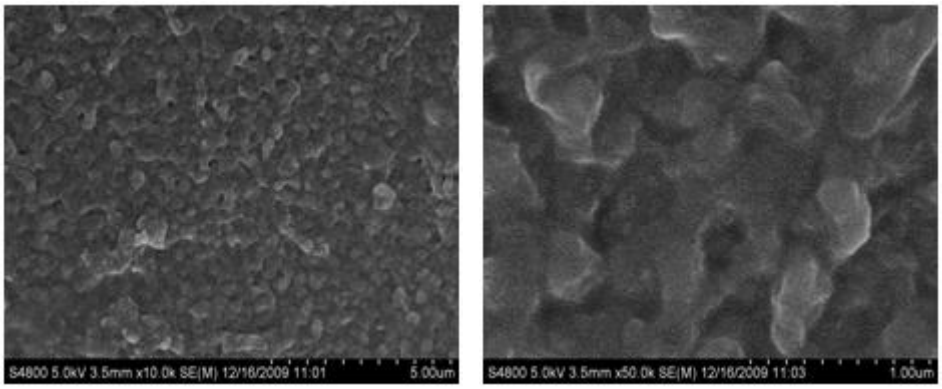


(c)

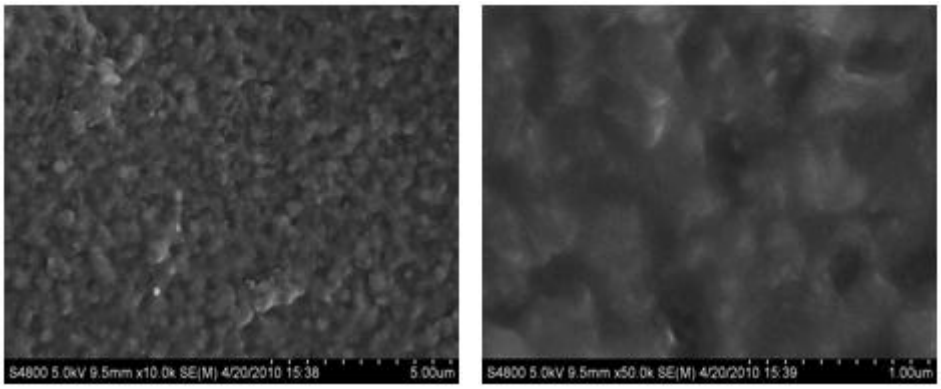


(d)

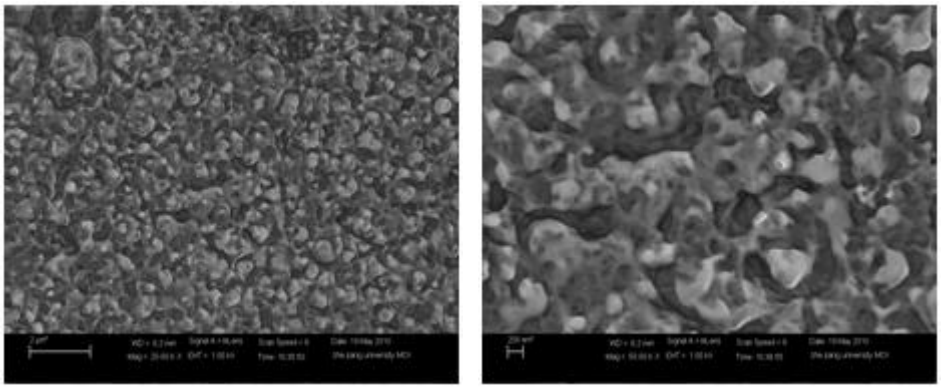
Fig.2 Effect of NaA zeolite loading on the TFN membrane morphology (a)0.012 wt% (b)0.05 wt% (c)0.1 wt% (d)0.2 wt%



(a)



(b)



(c)

Fig.3 Effect of Silicalite-1 zeolite loading on the TFN membrane morphology (a) 0.012 wt% (b) 0.05 wt% (c) 0.1wt% (d) 0.2 wt%

References

1. C. Yu, C. Zhong, Y. Liu, X. Gu, G. Yang, W. Xing and N. Xu, *Chemical Engineering Research & Design*, 2012, **90**, 1372-1380.
2. Y.-Q. Deng, S.-F. Yin and C.-T. Au, *Industrial & Engineering Chemistry Research*, 2012, **51**, 9492-9499.