Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Synthesis and adsorption properties of highly monodisperse hollow microporous polystyrene nanospheres

Xinren Kang,[a,b] Yeru Liang,[*b] Luyi Chen, [a,b] Weicong Mai,[b] Zhiyong Lin,[*a] Ruowen Fu,[b] and Dingcai Wu[*b]

[a] *College of Material Science and Engineering, Huaqiao University, Xiamen, 361021, P. R. China*

[b] *Materials Science Institute, PCFM Laboratory, School of Chemistry and Chemical Engineering, Sun Yat-sen University, Guangzhou 510275, P. R. China*

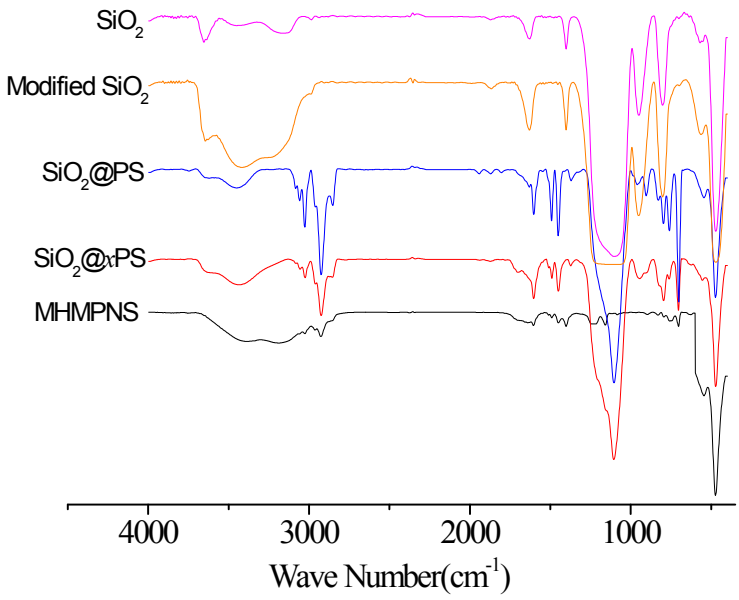


Fig. S1 FTIR spectra of SiO_2, modified SiO_2, SiO_2@PS, SiO_2@*x*PS and MHMPNS.

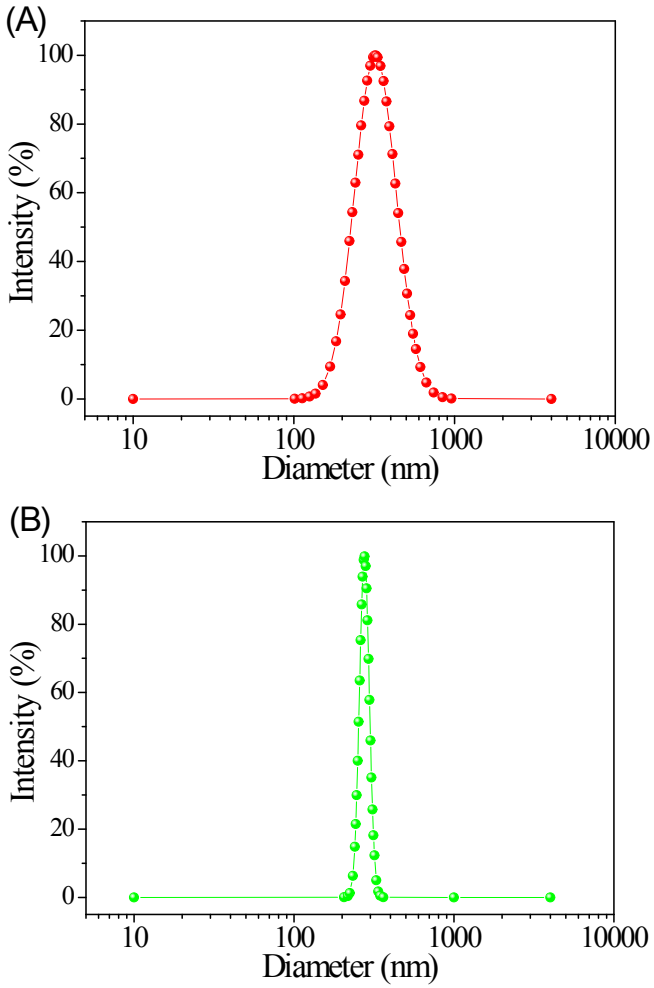
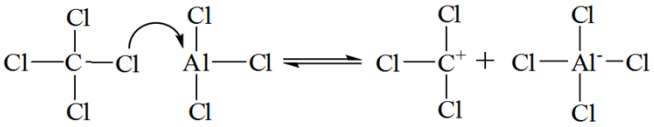
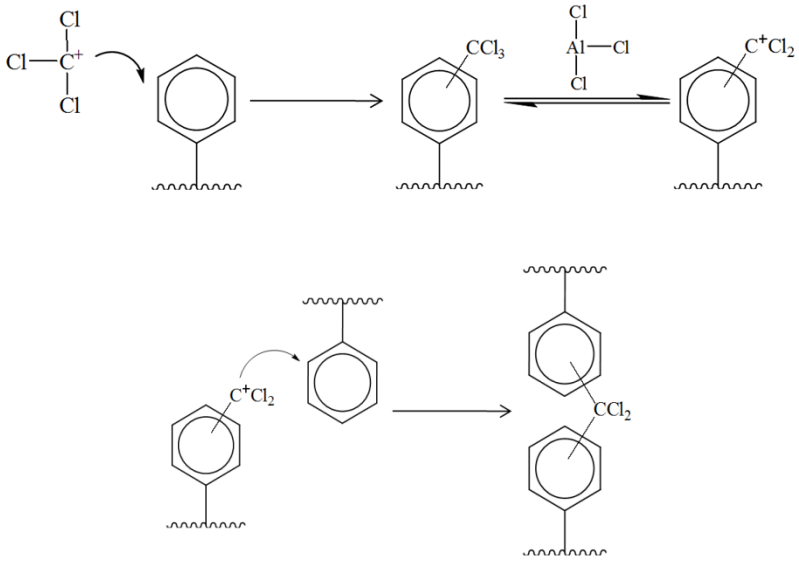


Fig. S2 DLS curves of (A) SiO_2@PS and (B) SiO_2@*x*PS.

(1) Formation of carbocation $^{+}CCl_3$



(2) Formation of -CCl_2- crosslinking bridges



(3) Formation of -CO- crosslinking bridges

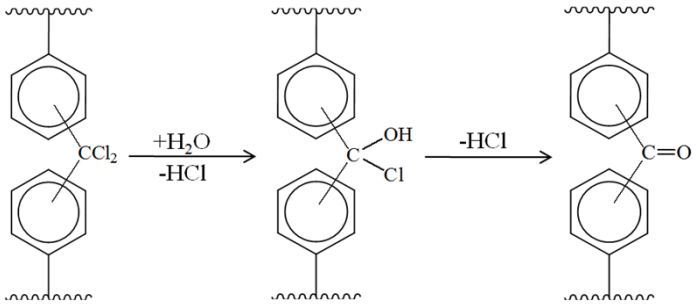


Fig. S3 Formation mechanism of –CO– crosslinking bridges based on the Friedel-Crafts reaction of polystyrene chain and carbon tetrachloride and subsequent hydrolysis.[1]

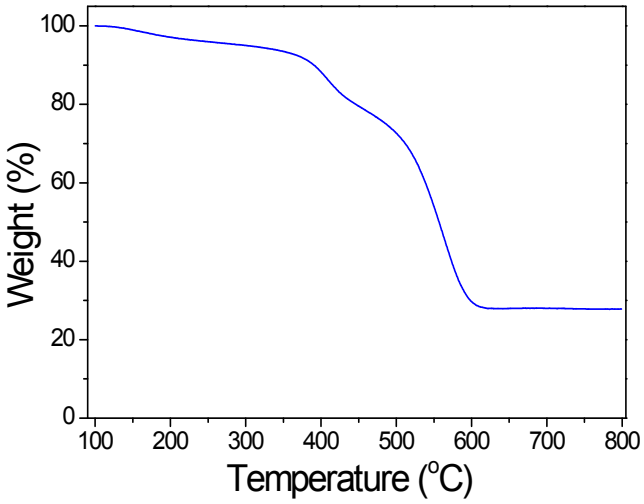


Fig. S4 TGA curve of SiO_2@*x*PS conducted in air from 100 to 800 °C.

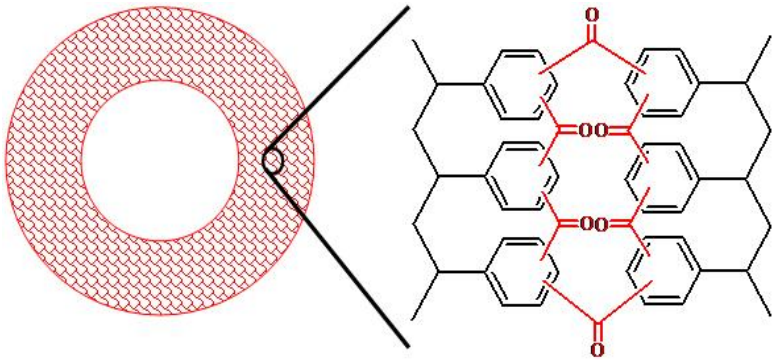


Fig. S5 Scheme of porous structure of MHMPNS.

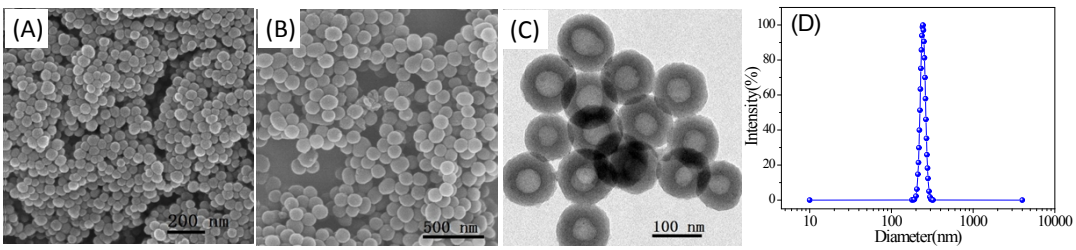


Fig. S6 (A) SEM image of modified SiO_2 nanosphere with particle size of 50 nm. (B) SEM image, (C) TEM image and (D) DLS curve of MHMPNS-2.

Table S1. Adsorption capacities towards organic vapors for SiO_2@*x*PS and MHMPNS obtained from static adsorption measurement.

Sample	Adsorption capacity (mg/g)			
	Tetrahydrofuran		Toluene	
SiO_2@*x*PS	84 [a]	117 [b]	121 [a]	168 [b]
MHMPNS	235	—	285	—

[a] Calculated based on the total weight of SiO_2@*x*PS composite.

[b] Calculated based on the *x*PS weight of SiO_2@*x*PS.

References

1. (a) Z. Li, D. Wu, Y. Liang, R. Fu and K. Matyjaszewski, *Journal of the American Chemical Society*, 2014, **136**, 4805; (b) D. Wu, A. Nese, J. Pietrasik, Y. Liang, H. He, M. Kruk, L. Huang, T. Kowalewski and K. Matyjaszewski, *ACS Nano*, 2012, **6**, 6208.