Electronic Supplementary Material (ESI) for RSC Advances.


# Supplementary Information

## Mesoporous titanosilicate nanoparticles: facile preparation and application in heterogeneous epoxidation of cyclohexene

Yanqiu Jiang,[a,†] Yong Zhao,[a,†] Xianzhu Xu,*[,a] Kaifeng Lin*[,a] and Dan Wang[b]

[a] MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, School of Chemistry and Chemical Engineering, Harbin Institute of Technology, 150080 Harbin, China.

[b] State Key Laboratory of Multi-phase Complex Systems, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, China.

[†]These authors have contributed equally to this study.

* Corresponding authors. Email: linkaifeng@hit.edu.cn; xuxianzhu@hit.edu.cn.

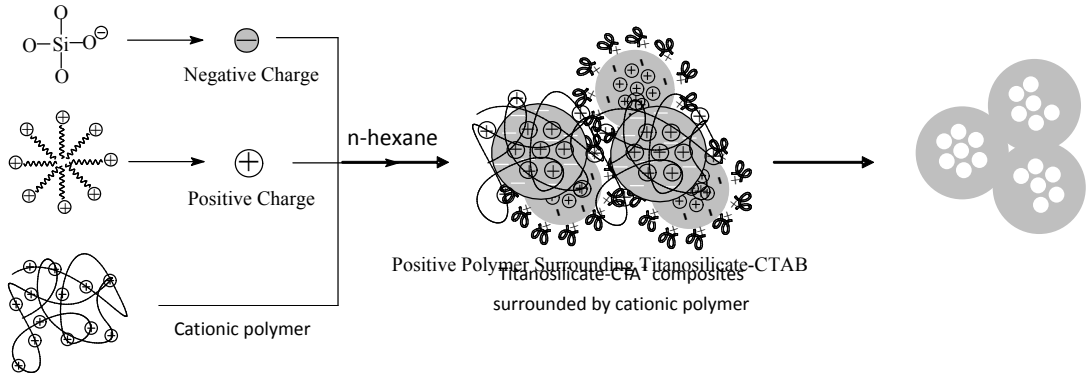
Table S1 Textural properties of the materials

| | $d_{100}$ (nm) [a] | Unit cell ($a_0$, nm) [b] | Wall thickness (nm)[c] |
|---|---|---|---|
| Ti-MCM-41 | 3.96 | 4.57 | 1.27 |
| Nano-MesoTS(0.18) | 4.12 | 4.76 | 1.86 |
| Nano-Ti-MCM-41 | 4.24 | 4.90 | 1.90 |

[a] Calculated from XRD results.

[b] $a_0=2\times d(100)/3^{1/2}$.

[c] The wall thickness was calculated as: $a_0$-pore size.




Scheme S1. Proposed path for the formation of mesoporous titanosilicate nanoparticles in the presence of cationic polymer.

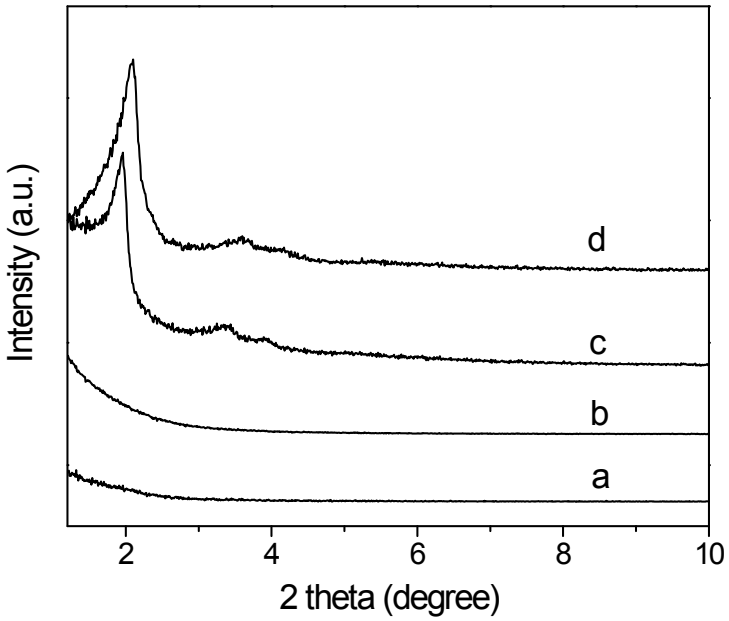



Figure S1 XRD patterns of C-hex-Nano-Ti-MCM-41-3 (a), C-hex-Nano-Ti-MCM-41-5 (b), Nano-Ti-MCM-41-5 (c) and Nano-Ti-MCM-41-3 (d).

As we described in the main text, the material of Nano-Ti-MCM-41 was prepared as follows: under the given preparation conditions for Nano-MesoTS(1), n-hexane and aqueous $H_2O_2$ (30%) were added to the preparation process, obtaining a novel sample of mesoporous titanosilicate nanoparticles (Nano-Ti-MCM-41), in which molar ratio between hexane and CTAB is 2 and the value between $H_2O_2$ and TBOT is 238. When different molar ratios of hexane to CTAB at 3 and 5 were applied for Nano-Ti-MCM-41, obtained materials were denoted as Nano-Ti-MCM-41-3 and Nano-Ti-MCM-41-5, respectively. For comparison, other titanosilicate samples were prepared as the same procedure used for Nano-Ti-MCM-41, but without using hydrogen peroxide (C-hex-Nano-Ti-MCM-41-x), where x refers to the molar ratio of hexane to CTAB is 3 and 5.

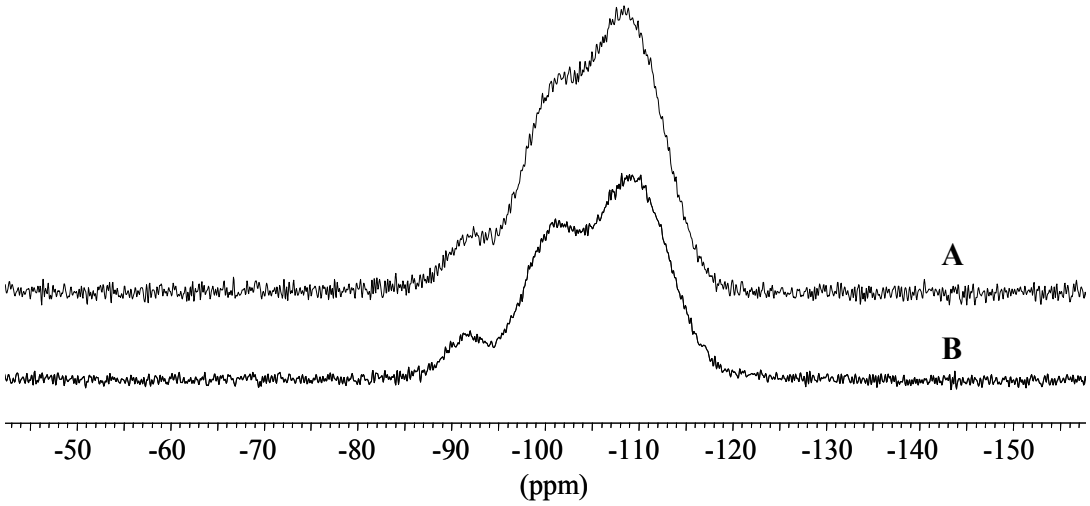



Figure S2 $^{29}$Si MAS NMR spectra of Ti-MCM-41 (A) and Nano-Ti-MCM-41 (B).