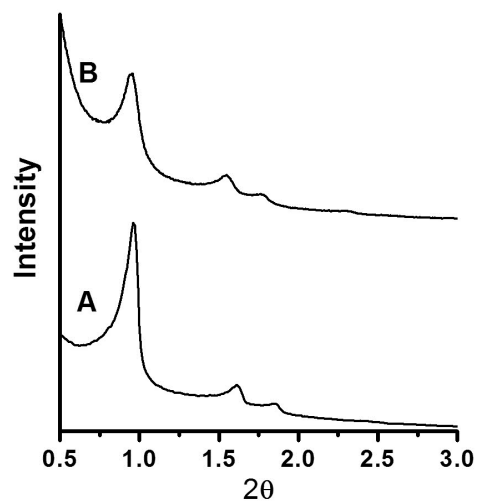


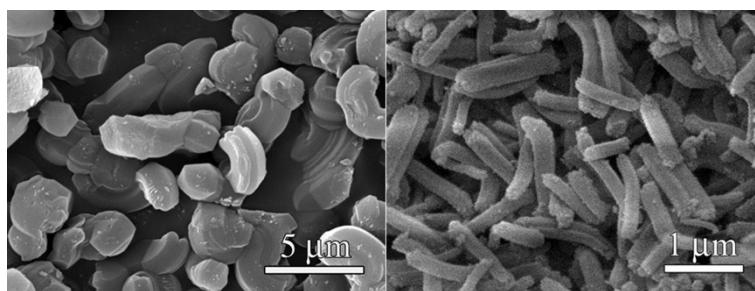
### Supporting Information



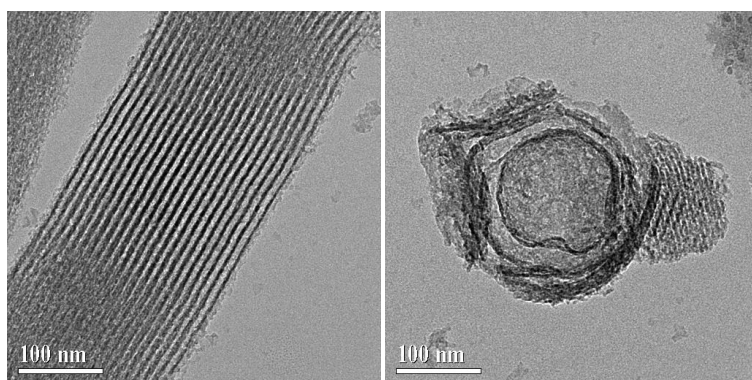
**Scheme S1** Evolution of siliceous structures with different pore diameters as a function of synthesis temperature when the other reaction conditions are exactly the same. The illustrated models are not to scale.



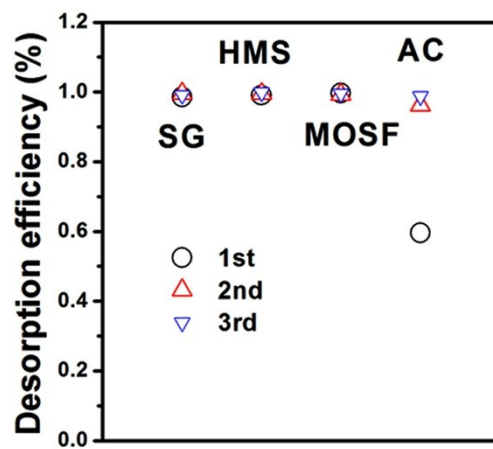
**Fig. S1** XRD patterns (A, B) of siliceous materials synthesized at 5 and 20 °C, respectively.



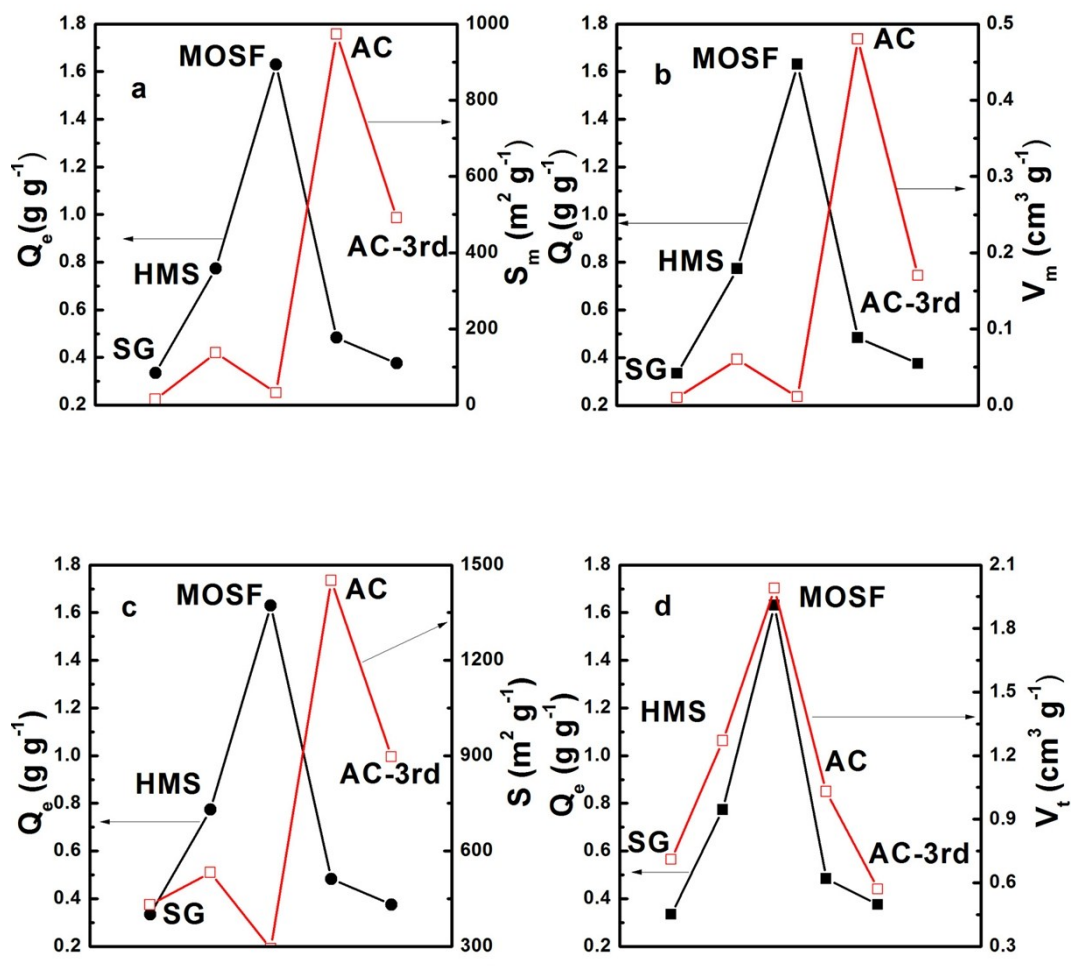
**Fig. S2** SEM images of siliceous materials synthesized at (left) 5 and (right) 20 °C, respectively.



**Fig. S3** TEM image of siliceous materials synthesized at 20 °C.



**Fig. S4** The comparison of desorption efficiencies of the three times of different samples.



**Fig. S5** Relationship between dynamic n-hexane adsorption capacity and structure parameters of different adsorbents, micro surface area (a), micro pore volume (b), surface area (c) and pore volume (d), respectively.

**Tab. S1** Structural parameters of the different samples.

| Sample | $S_{\text{BET}}$<br>( $\text{m}^2 \text{g}^{-1}$ ) | $S_{\text{m}}$<br>( $\text{m}^2 \text{g}^{-1}$ ) | $V_{\text{t}}$<br>( $\text{cm}^3 \text{g}^{-1}$ ) | $V_{\text{m}}$<br>( $\text{cm}^3 \text{g}^{-1}$ ) |
|--------|--|--|---|---|
| SG     | 430  | 15   | 0.71  | 0.010   |
| HMS    | 532  | 137  | 1.27  | 0.060   |
| MOSF   | 293  | 32   | 1.99  | 0.011   |
| AC     | 1451   | 973  | 1.03  | 0.48  |
| AC-3rd | 896  | 491  | 0.57  | 0.17  |

Note: AC-3rd is after the 3rd dynamic adsorption-desorption cycle.  $S_{\text{BET}}$ : BET surface area,  $S_{\text{m}}$ :

Micropore surface area,  $V_{\text{t}}$ : Total pore volume,  $V_{\text{m}}$ : Micropore volume.