Supporting Information

A Systematic Study of Long-range Ordered 3D-SBA-15 Materials by Electron Tomography

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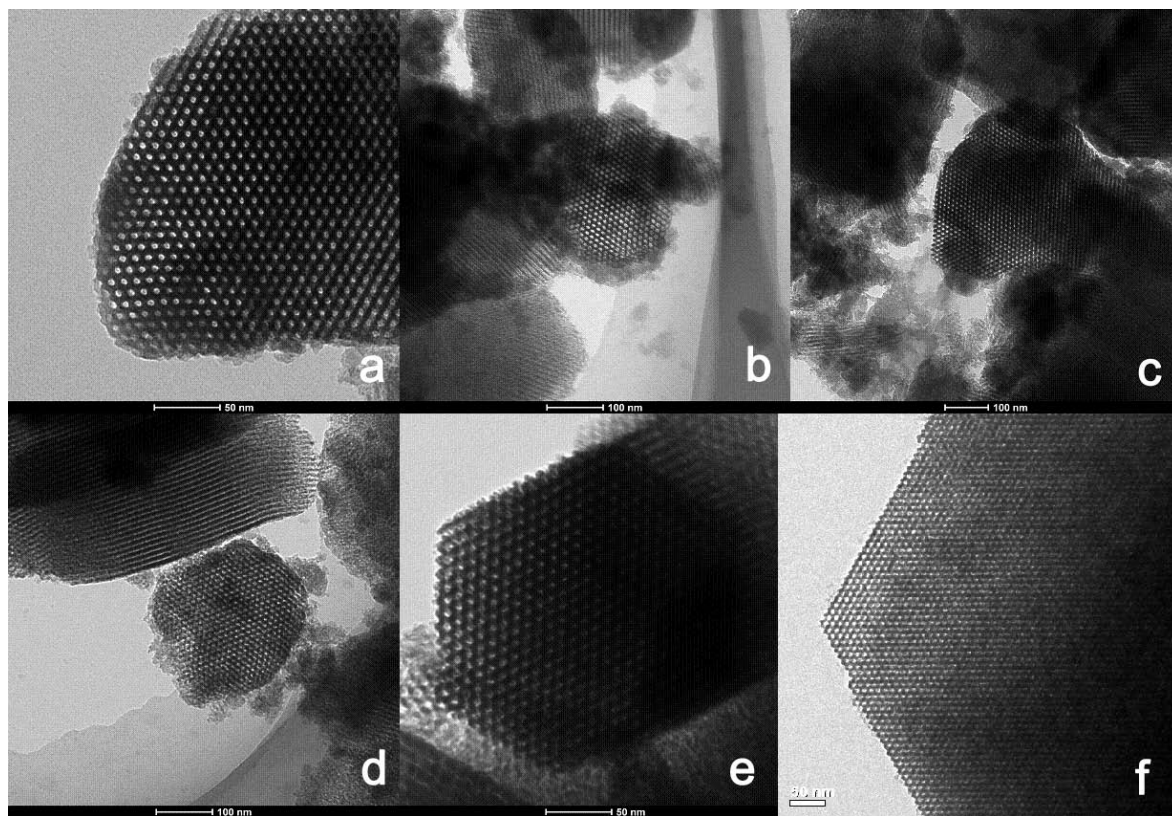
Figure S1. TEM images of the calcined samples synthesized under different hydrothermal temperatures: S-100 (a); S-160 (b); S-170 (c); S-180 (d); S-190 (e); S-200 (f).
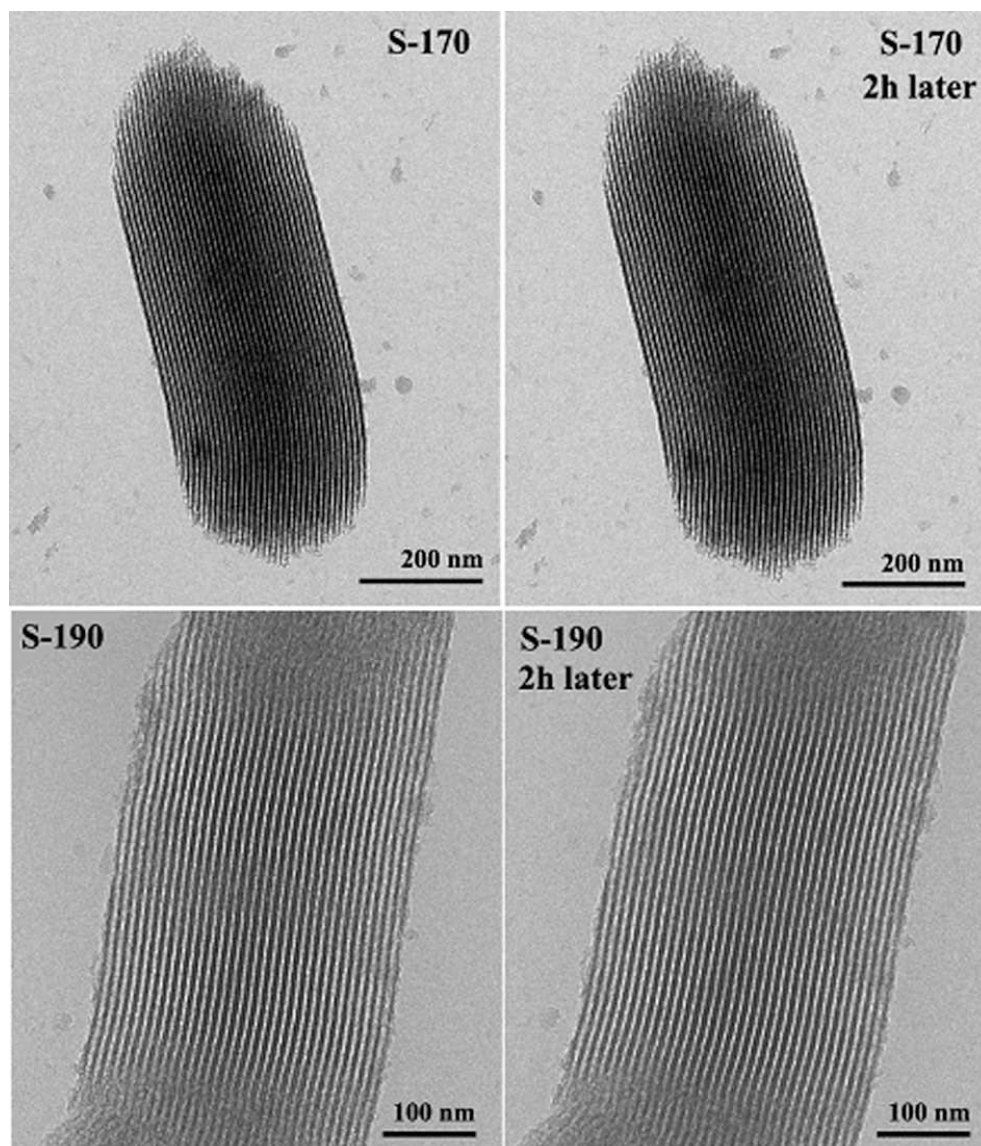
Figure S2. TEM images of two typical rods from S-170, S-190, respectively, taken before and after 2h exposure under the electron beam with the same microscopy condition.
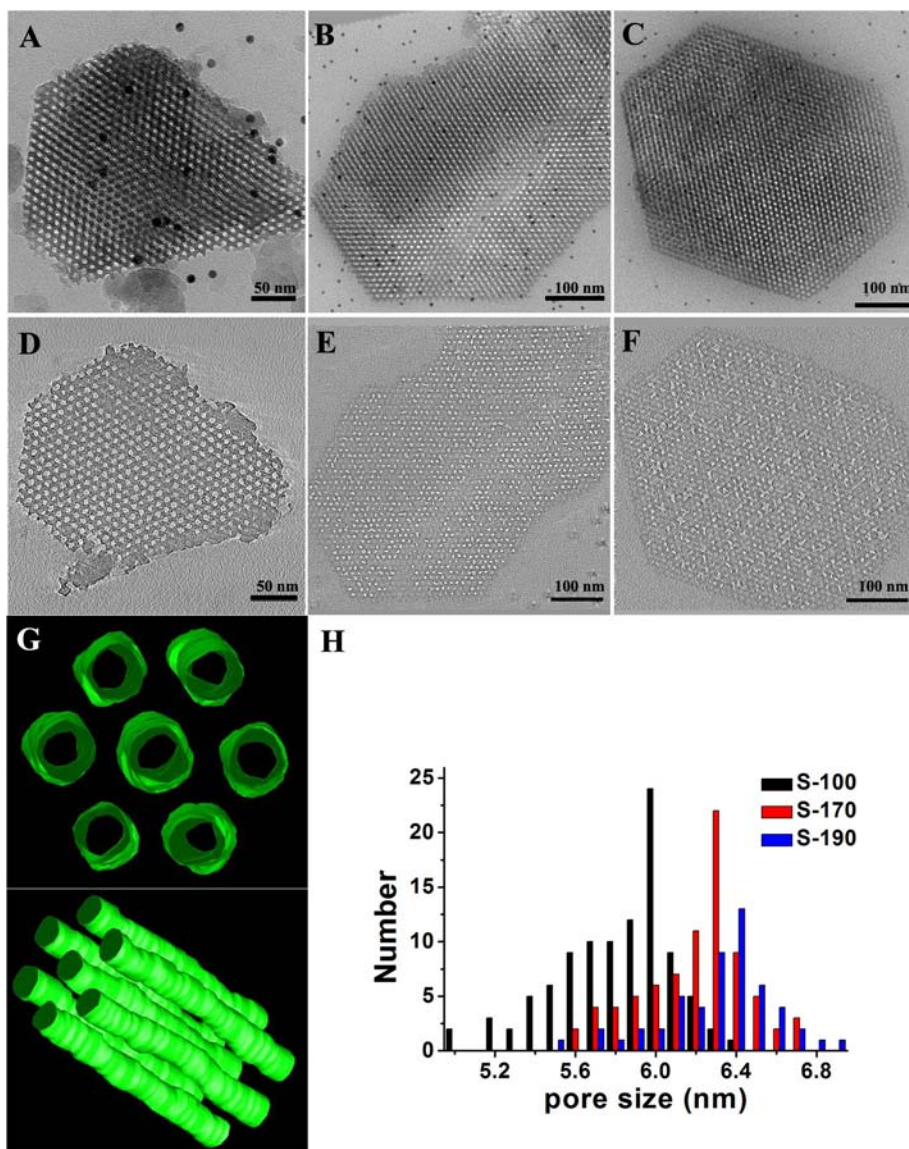
Figure S3. The TEM images taken along [001] direction and their corresponding ET slice images for the calcined samples synthesized under different hydrothermal temperatures: 100 °C (A, D); 170 °C (B, E); 190 °C (C, F), respectively. The size of gold fiducial markers in (A) is 10 nm and in (B, C) is 5 nm. (G) is the reconstructed models for S-100 showing the regular and well-arranged mesopores with ordered hexagnal mesostructure. The average size of regularly arrayed channels without obvious merging measured from the ET slices for S-100 (black), S-170 (red), and S-190 (blue) is ~ 6.0, 6.3, and 6.4 nm, respectively (G). The numbers of pores are 100, 80, and 53 for S-100, S-170, and S-190, respectively.
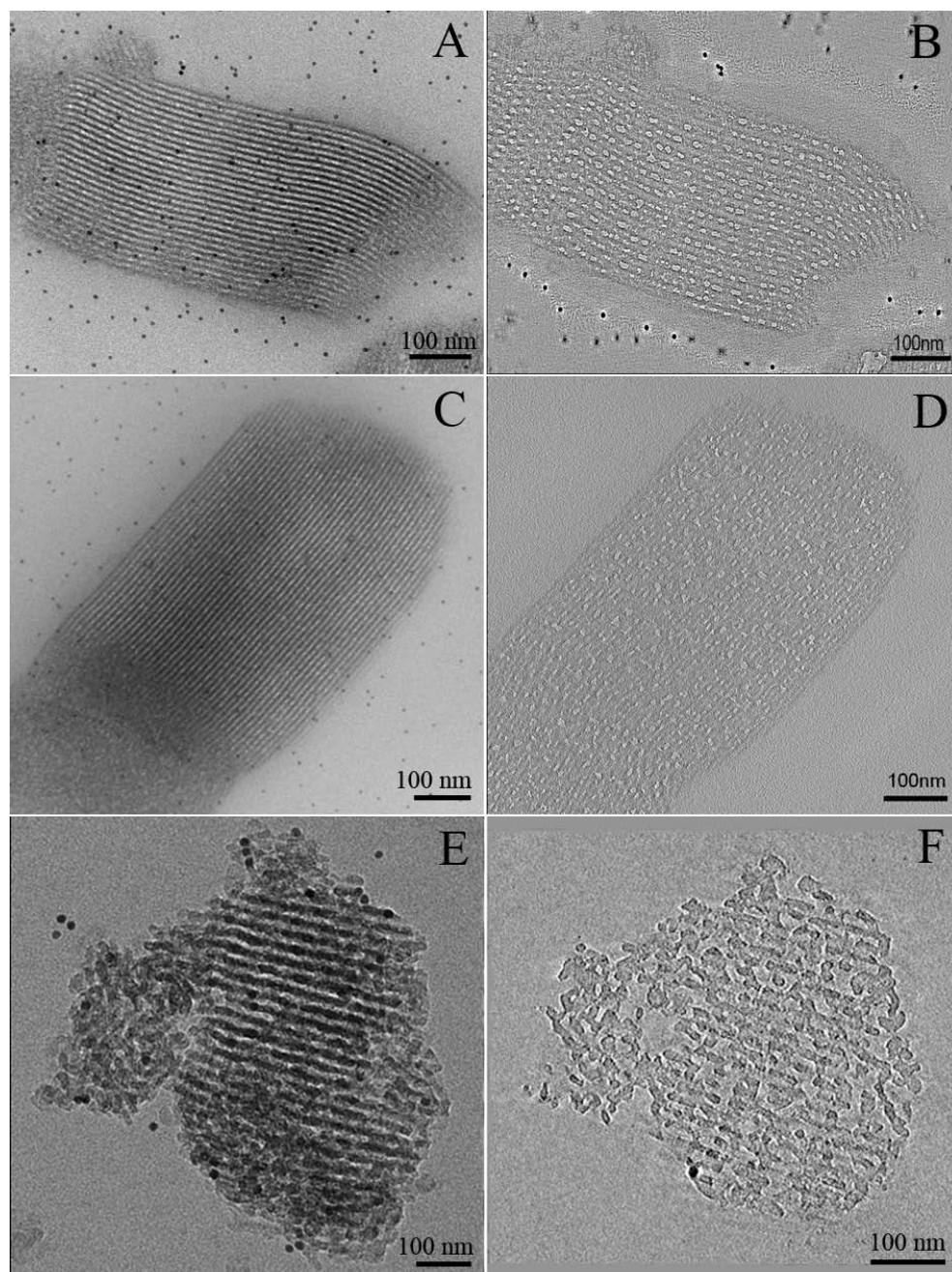
Figure S4. The TEM images taken along [110] direction and their corresponding ET slice images for the calcined samples synthesized under different hydrothermal temperatures: 170 °C (A, B); 190 °C (C, D); 200 °C (E, F), respectively.

Calculation of the Φ value

Φ is the percentage of the pore volume of pores with pore size (P_a) larger than a_0 versus the total pore volume (V_T), which is calculated from the cumulative pore volume curve. Taken S-190 for example, Figure S5 shows the cumulative pore volume curve (red) and pore size distribution (blue) obtained from the BJH model. When P_a is equal to a_0 (11.2 nm) where the cumulative pore volume is V' (0.36), the pore volume of pores with P_a larger than a_0 is V_T-V' = 0.46 (V_T is 0.82), so Φ = 0.46/0.82 = 0.56.
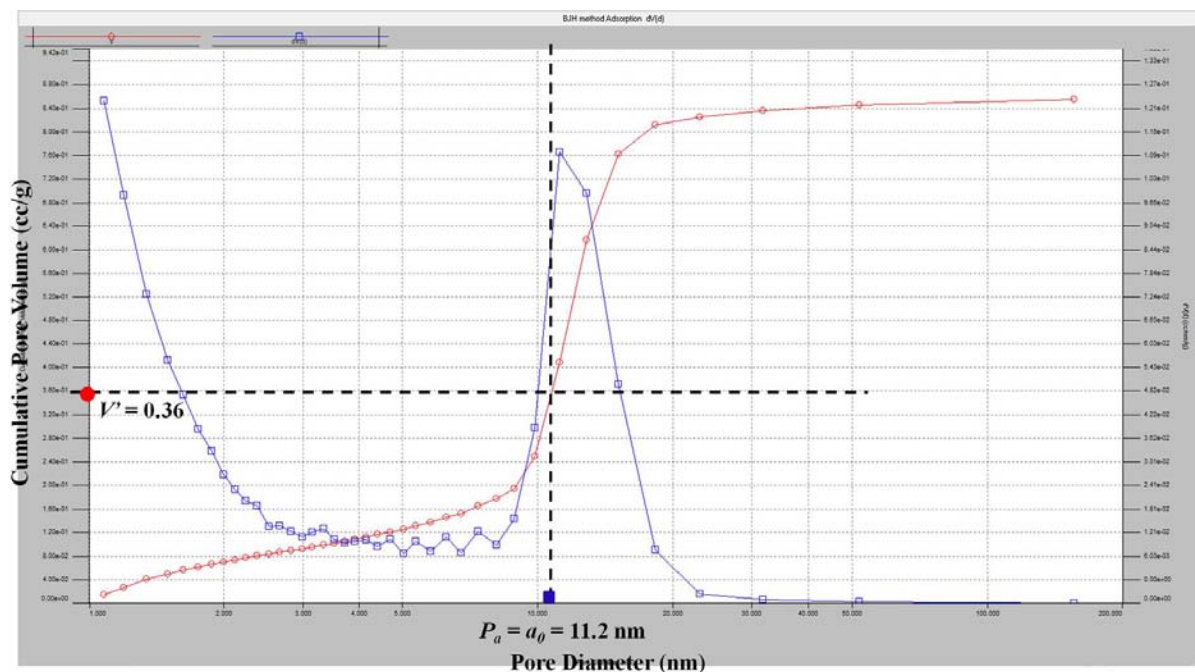

Figure S5. BJH model adsorption from nitrogen sorption of S-190: cumulative pore volume curve (red) and pore size distribution (blue). The blue square (solid) in x-axis is the point where $P_a = a_0 = 11.2$ nm and the red circle (solid) in left y-axis is the cumulative pore volume when the pore size reaches 11.2 nm.