Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Electronic Supporting Information

One-Pot Synthesis of Silica Core-Shell Particles with Double Shells and Different Pore Orientations from their Nonporous Counterparts

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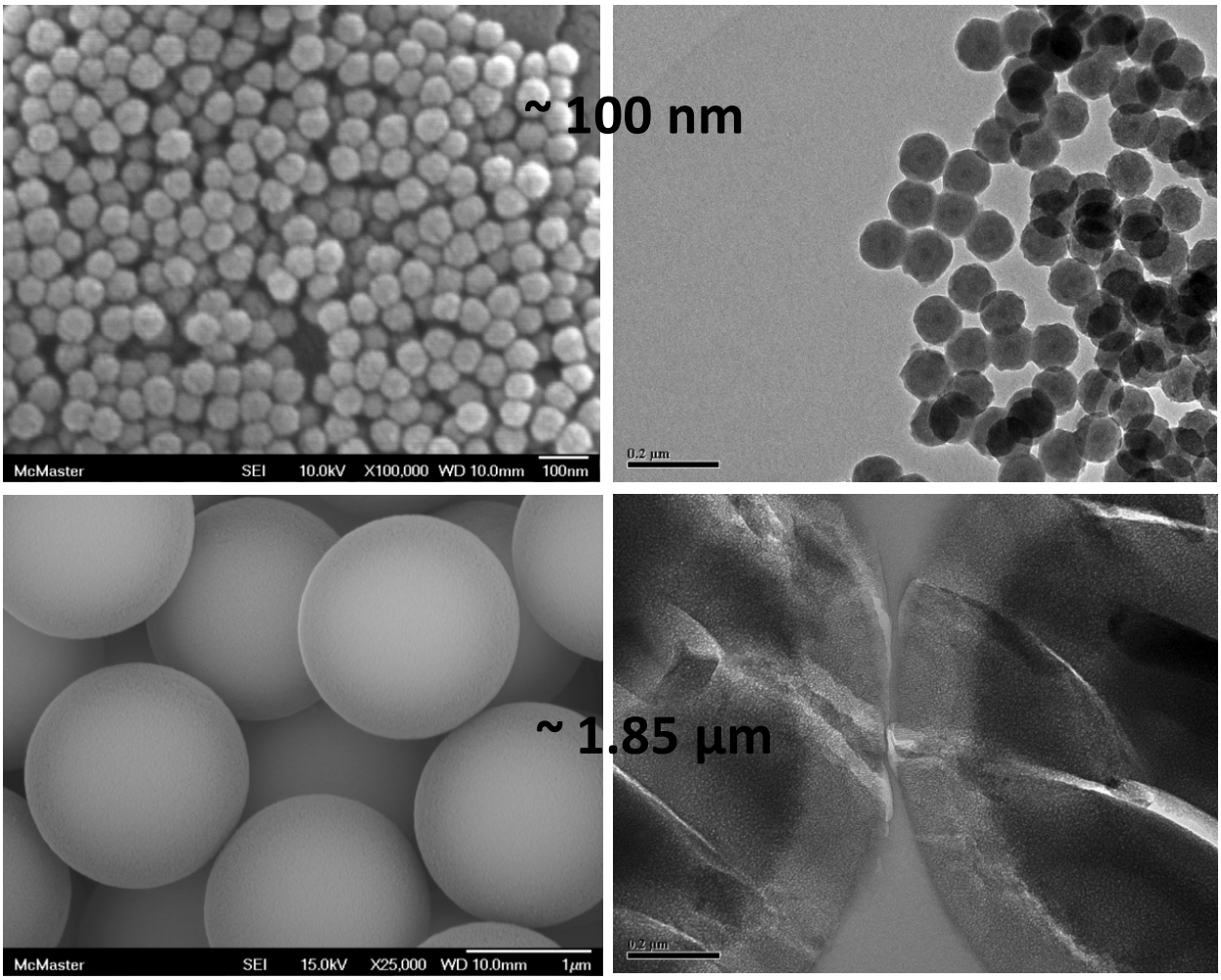


Figure S1. SEM and TEM images of small (~ 100 nm) and large (~ 1.85 µm) CSPs, demonstrating the ability to control particle sizes over a broad range.

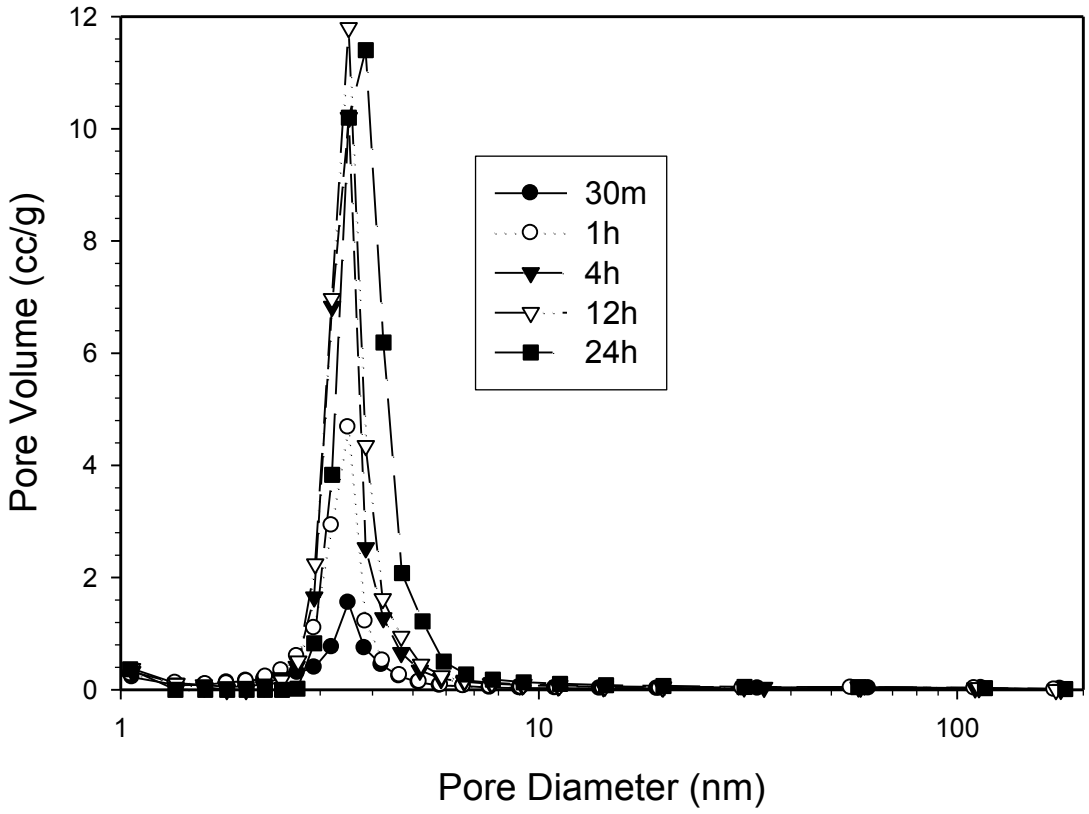


Figure S2. Pore size distribution of CSPs derived from the desorption branch of isotherms.

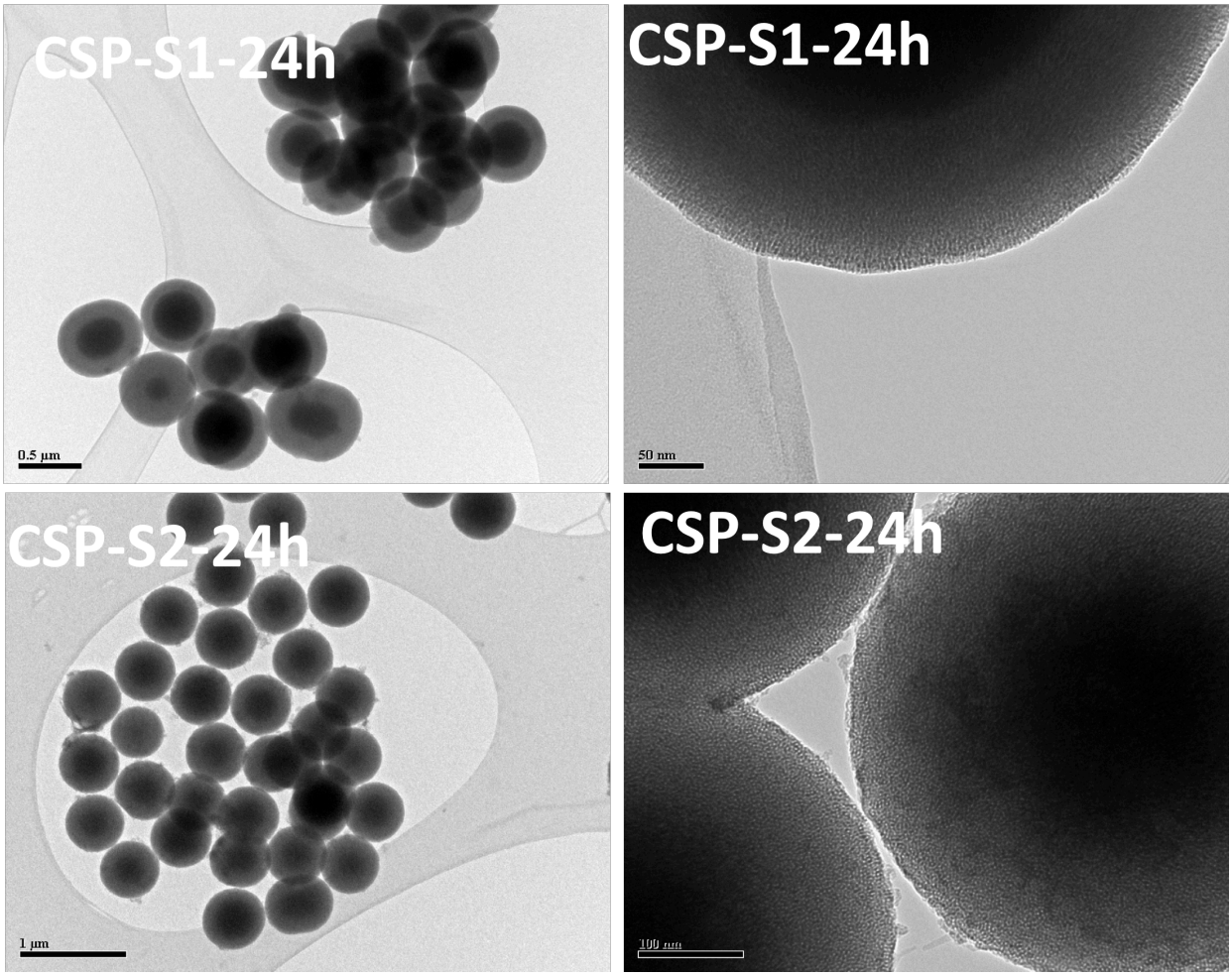
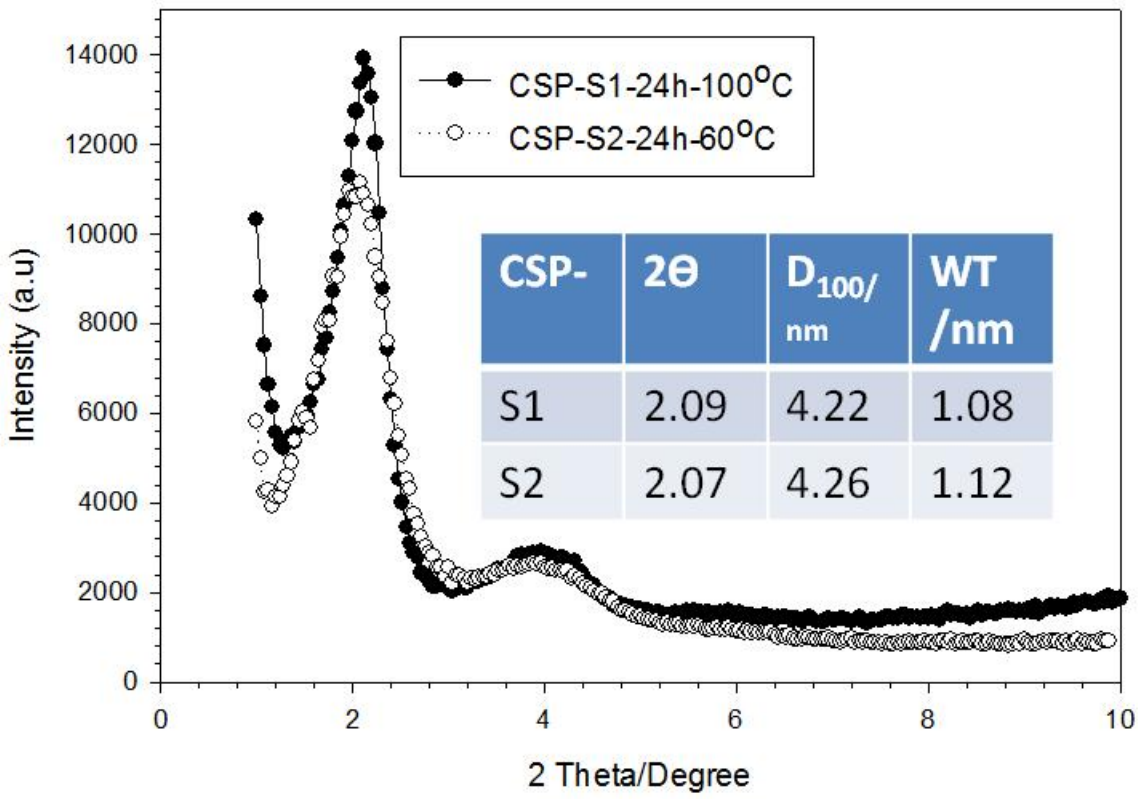


Figure S3. TEM images of silica core-shell particles prepared by using silica/CTAC/NH_4OH system reacted for 24 hrs at 100°C and 60°C, resepctively.

Figure S3 shows TEM images of CSP-S1-24h-100°C and CSP-S2-24h-60°C, which were obtained in using the silica/CTAC/NH_4OH system (no tridecane and NH_4F) after a 24 h reaction time but at different temperatures of 100 °C and 60 °C, resepctively. Compared to Figure 1 in the paper, several differences can be clearly observed from Figure S3 when the formulation without adding NH_4F and tridecane was used to prepare core-shell particles. Firstly, the core-shell particles have non-uniform shell thicknesses. Secondly, these particles have very thin shells at high temperature (CSP-S1-24h-100°C) and almost no shells with radial pores at low temperature (CSP-S2-24h-60°C). Thirdly, particle sizes remain similar when no radial shells are

formed and increase in size by approximately 9% when only thin shells with radial pores are formed. This is in contrast with the particles discussed in the text, whose diameters increase more than 40 % after a 24 h reaction time (CSP-24h). Finally, secondary nucleation is more difficult to avoid.



CSP-	2θ	D_{100}/ nm	WT /nm
S1	2.09	4.22	1.08
S2	2.07	4.26	1.12

Figure S4. Powder XRD patterns of CSP-S1-24h-100°C and CSP-S2-24h-60°C.

Figure S4 shows that the absence of the swelling chemical tridecane clearly resulted in a much stronger, though still overlapped and broad, diffraction peak (diffraction pattern from a combination of (110) and (200) planes) and a narrower and stronger peak (from (100) plane), indicating the presence of a more ordered hexagonal mesostructure in CSP-S1-24h-100°C and CSP-S2-24h-60°C compared to CSP-24h. From the inset table, one can also observe that CSP-S1-24h-100°C and CSP-S2-24h-60°C have similar but larger max. 2θ values than CSP-24h. However, all these samples (CSP-S1-24h-100°C, CSP-S2-24h-60°C, and CSP-24h) have a very similar wall thickness. These results strongly suggest that the warmhole-like pores have a pore ordering that is similar tot hat of radially oriented pores.