

Supplementary information

Synthesis of Hollow Doughnut Shape Mesoporous Silica Nanoparticle: a Case of Self-assembly Composite Templates

Nhat Tri Vo, Astam K. Patra and Dukjoon Kim*

School of Chemical Engineering, Sungkyunkwan University, Suwon, Gyeonggi, 16419 (Republic of Korea), E-mail: djkim@skku.edu

Table S1. TEM element mapping of the connection line between two MS₃_as-synthesized particles.

Element	Wt%	Wt% Sigma	Atomic %
O	42.07	0.59	57.16
Si	54.88	0.61	42.48
W	3.04	0.46	0.36
Total:	100.00		100.00

Table S2. TEM element mapping of MS₃_as_synthesized particles.

Element	Wt%	Wt% Sigma	Atomic %
O	49.75	0.63	71.23
Si	32.58	0.52	26.57
W	17.68	0.66	2.20
Total:	100.00		100.00

Table S3. TEM element mapping of MS₃_after template removal.

Element	Wt%	Wt% Sigma	Atomic %
O	52.46	0.70	65.95
Si	47.54	0.70	34.05
W	0.00	0.00	0.00
Total:	100.00		100.00

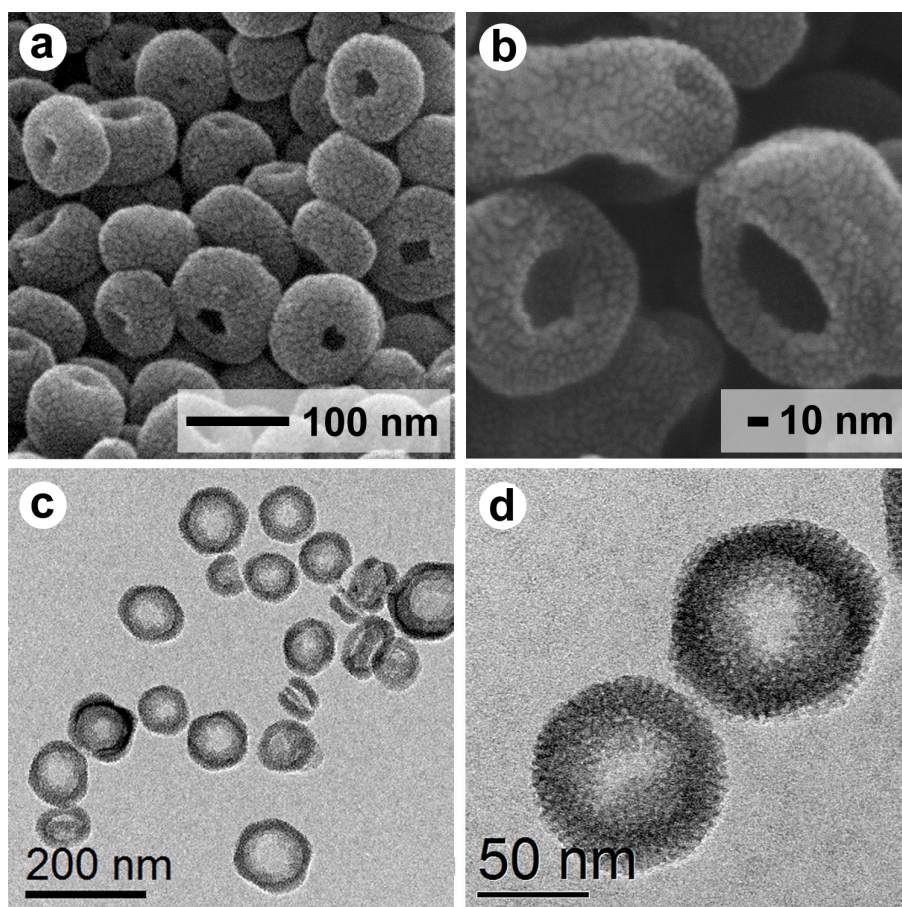


Figure S1. FESEM images (a, b) and HRTEM images (c, d) of MS₃ at different magnification showing the hollow doughnut shape more clearly. (Change the order from small to large one)

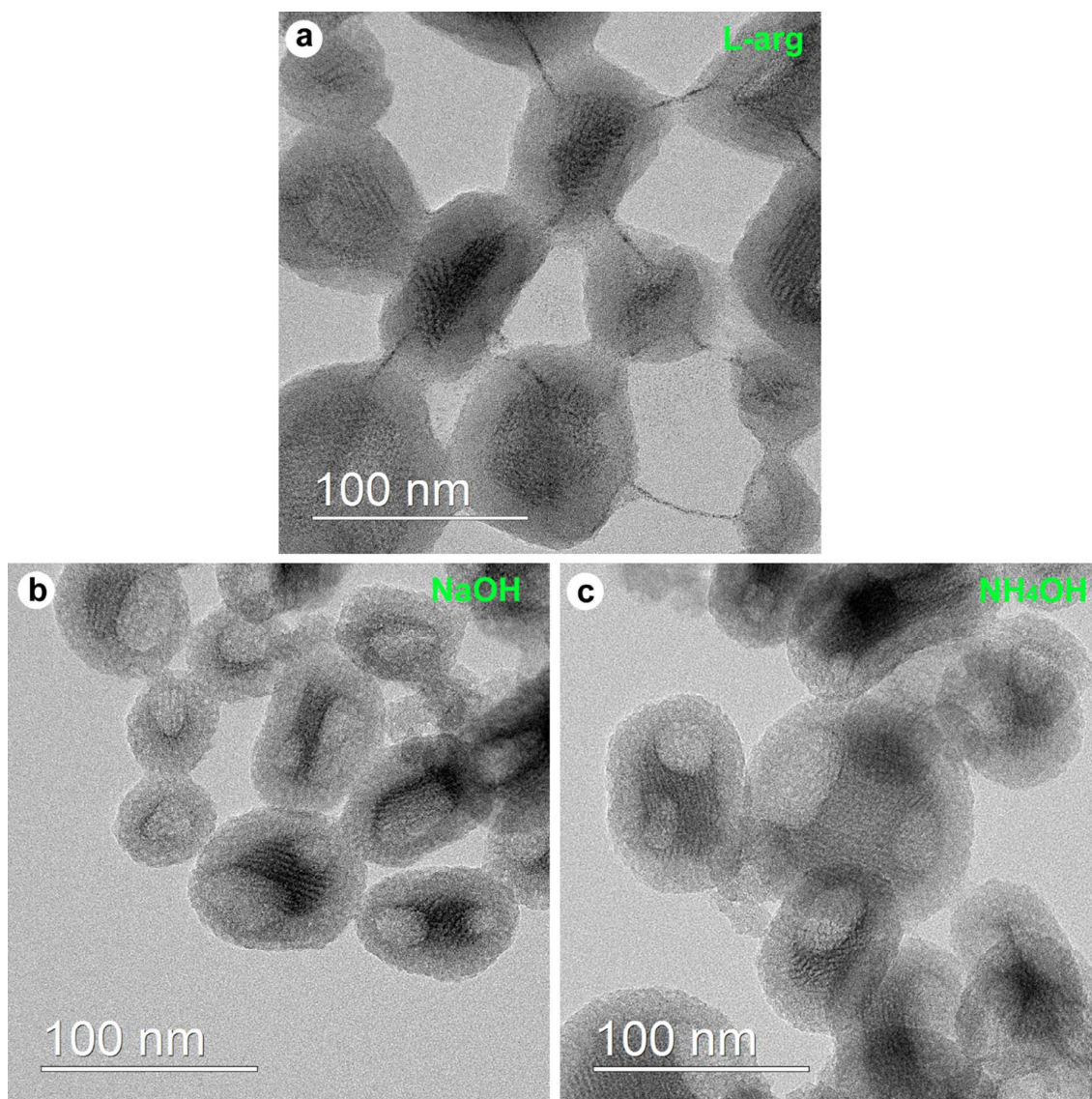


Figure S2. HRTEM images of the (a) MS₃, (b) MS₇ and (c) MS₈ as-synthesized particles.

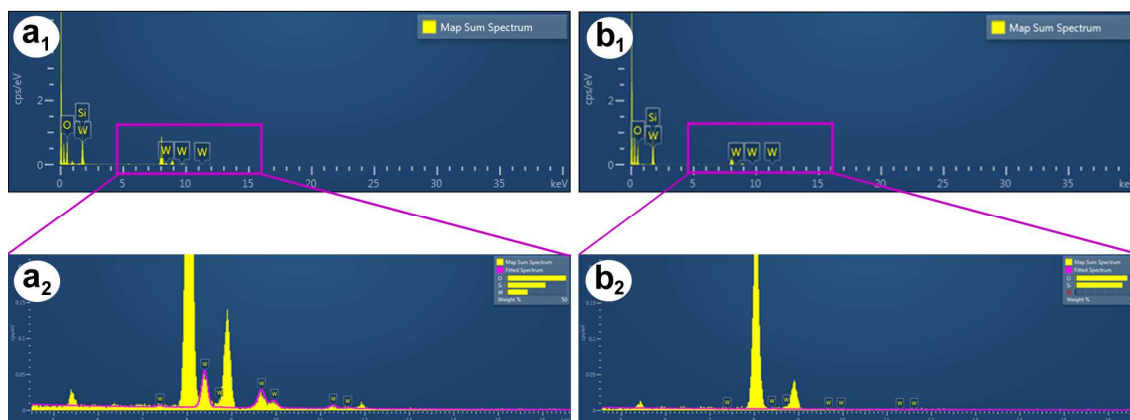


Figure S3. EDX spectra of the hd-MSNs (a) MS₃_as-synthesized for 24 h and (b) MS₃_after template removal. Subscript (1) represent EDX spectrum and (2) enlarge EDX spectrum.

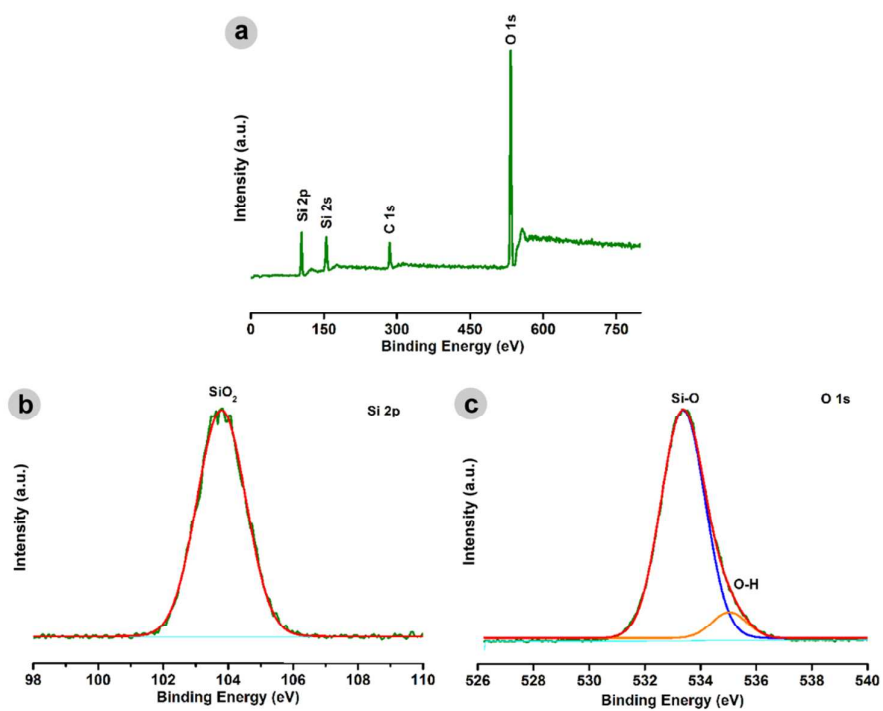


Figure S4. XPS analysis of MS₃ after template removal: (a) survey XPS and High resolution XPS of (b) Si 2p and (c) O 1s.