Three-Dimensional Cubic ($Im3m$) Periodic Mesoporous Organosilicas with Benzene- and Thiophene-Bridging Groups

Eun-Bum Cho,† Dukjoon Kim,†* Joanna Gorka,‡ and Mietek Jaroniec‡*

†Polymer Technology Institute, Department of Chemical Engineering, Sungkyunkwan University, Suwon, Gyeonggi-do 440-746, Korea
‡Department of Chemistry, Kent State University, Kent, Ohio, 44240 USA

Fig. S1. WAXS image and data for cubic structured benzene-PMO prepared using F127 triblock copolymer under acidic conditions.
**Fig. S2.** SEM image for cubic structured benzene-PMO prepared using F127 triblock copolymer under acidic conditions.
**Fig. S3.** Thermogravimetric profiles recorded in flowing nitrogen for the cubic benzene-PMO sample before (CBS_S) and after (CBS_S_T) calcination in nitrogen (panels A and B) and the thiophene-PMO sample before (CTS_S) and after (CTS_S_T) calcination in nitrogen (panels C and D). Green circles with line represent the TG and DTG profiles for the CBS_S and CTS_S samples, whereas the blue circles with line denote the corresponding TG and DTG curves for those samples subjected to an additional calcination in flowing nitrogen at 400 and 375 °C, respectively. As can be seen from these figures the DTG profiles for the CBS_S and CTS_S samples (extracted only; green circles) exhibit peaks before 400°C reflecting the removal of polymeric template; these peaks disappear for the corresponding samples subjected to additional calcination in flowing nitrogen (blue circles). While the polymer residue is relatively small in the case of benzene-PMO samples, it is significant in the case of thiophene-PMO sample; in the later case an additional calcination is needed to make cubic mesoporous structure accessible for nitrogen adsorption.
Fig. S4. Pore size distributions for cubic structured benzene-PMO (a) and thiophene-PMO (b) prepared using F127 triblock copolymer under acidic conditions.

Fig. S5. Solid state $^{13}$C CP-MAS NMR spectra for cubic structured benzene-PMO (a) and thiophene-PMO (b) prepared in this study. Samples were washed four times using a mixed solvent with ethanol and HCl as described in Experimental Section.
**Fig. S6.** Solid state $^{29}\text{Si}$ MAS NMR spectra for cubic benzene-PMO (CBS_S) (a) and thiophene-PMO (CTS_S) (b) prepared in this study.