**Supporting Information**

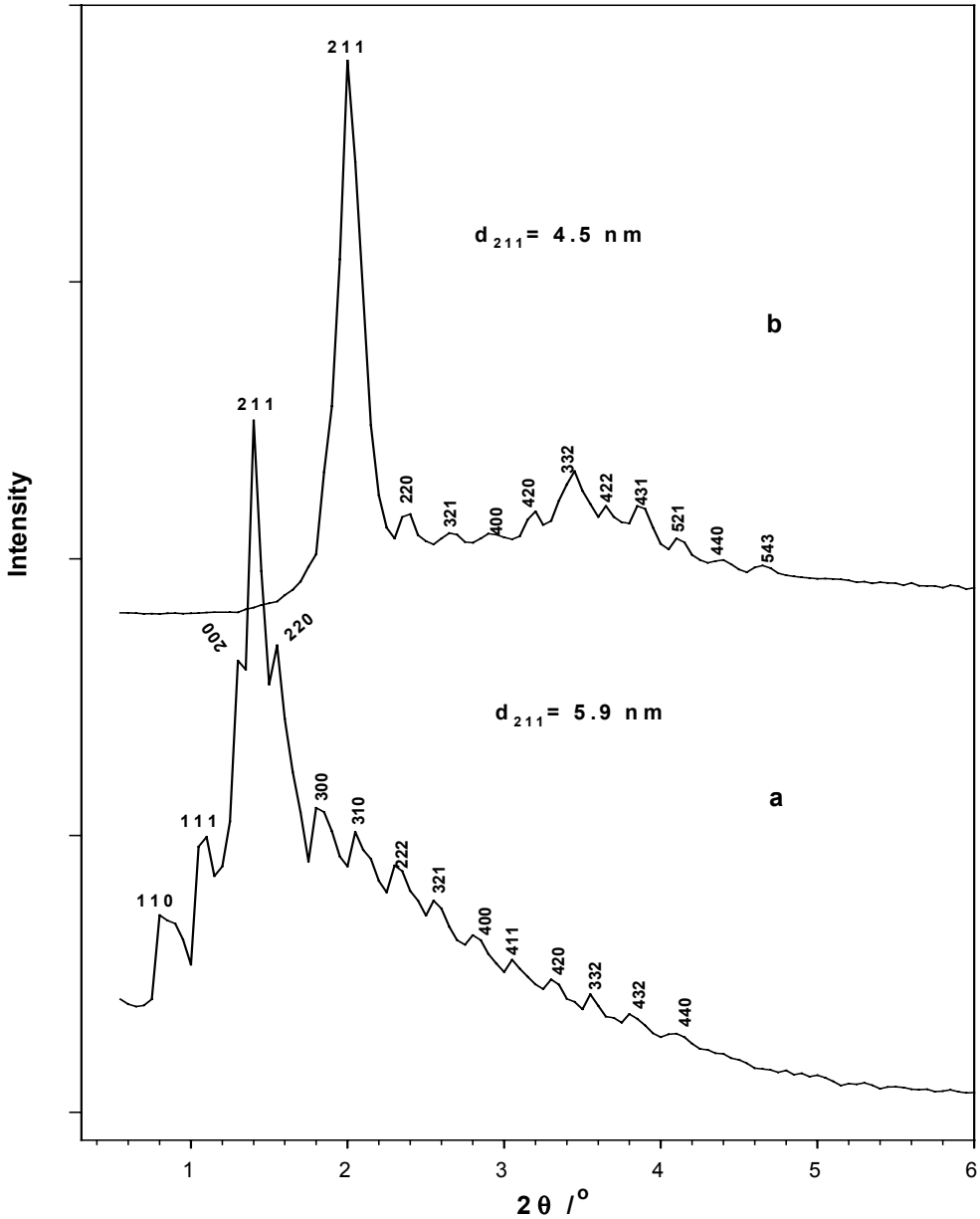


**Fig. 1S** XRD patterns of 3-D mesoporous silica monoliths synthesized in microemulsion liquid crystal phases. (a) Cubic Pn3m (HOM-7) synthesized by incorporation of decane into lyotropic liquid crystal cubic Pn3m mesophase of Brij 56/TMOS at a mass ratio of 85 wt%. (b) Cubic Ia3d (HOM-5) synthesized by incorporation of octane into primary cubic Ia3d mesophases at 70 wt% ratio.

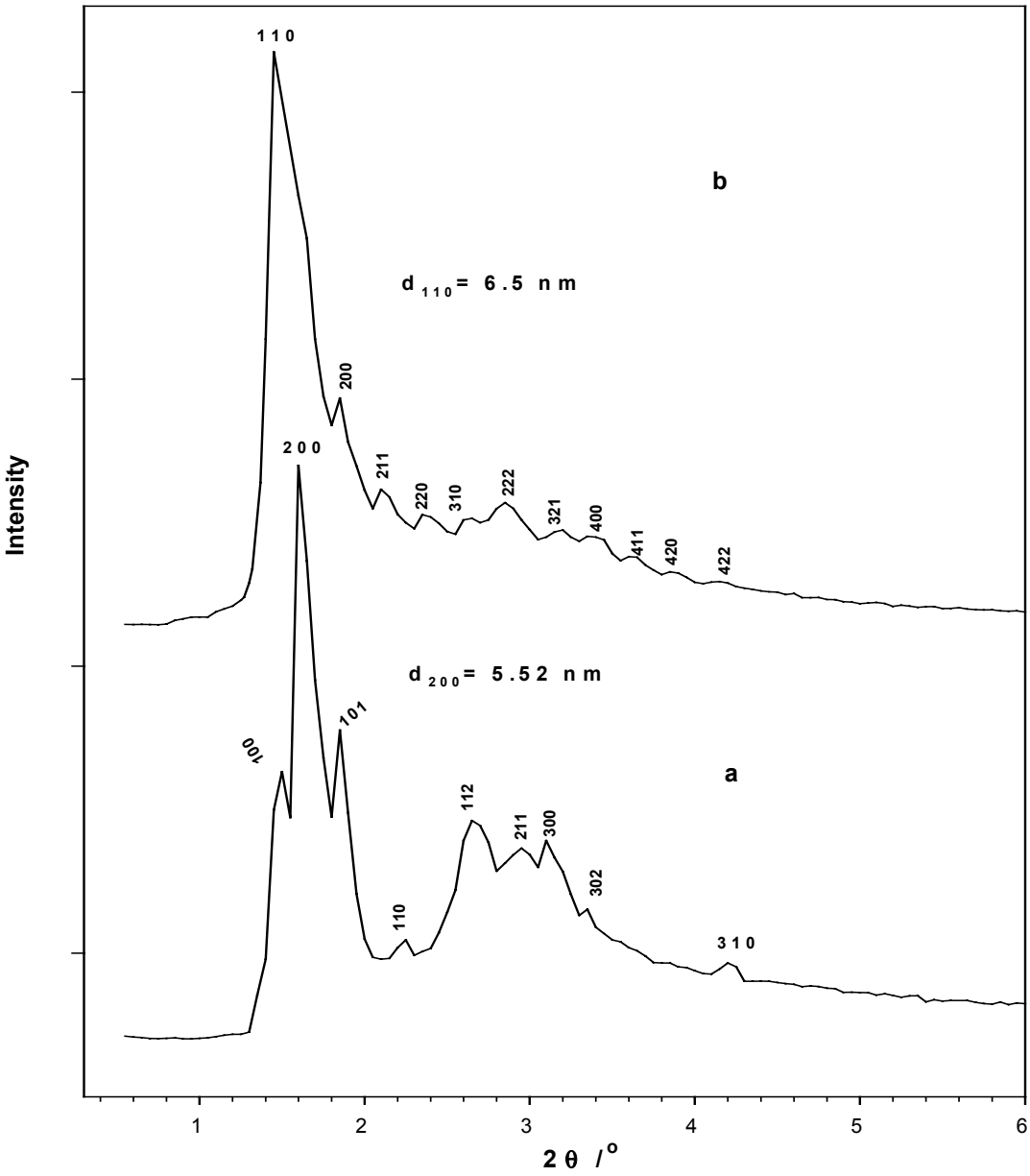


**Fig. 2S** XRD patterns of 3-D mesoporous silica monoliths synthesized in microemulsion liquid crystal phases. (a) 3-D hexagonal $P6_3/mmc$ (HOM-3) synthesized by incorporation of octane into hexagonal P6mm mesophase of 50 wt% ratio. (b) Cubic Im3m (HOM-1) synthesized by incorporation of nonane into primary liquid crystal cubic Ia3d phase at 70 wt% mass ratio.

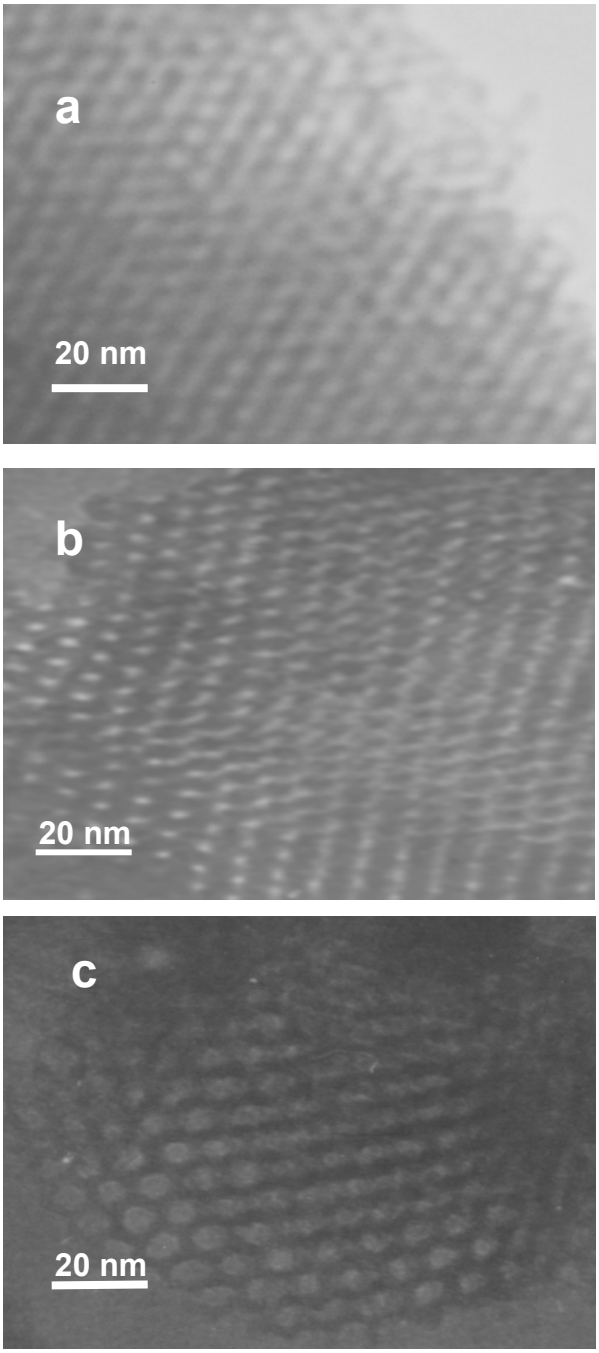


**Fig. 3S** Representative TEM micrographs of 3-D mesoporous silica monoliths. Viewed down the (a) [110], and (b) [111] directions of cubic Pn3m (HOM-7) synthesized in microemulsion liquid crystal phase formed by addition of heptadecane into hexagonal P6mm phase (Brij 56/TMOS at a mass ratio of 50 wt%). Viewed along the (c) [110] direction of HOM-5 (cubic Ia3d) synthesized by the incorporation of heptane into the liquid crystal cubic Ia3d phase of the Brij 56/TMOS at a mass ratio of 70 wt% in the microemulsion systems.

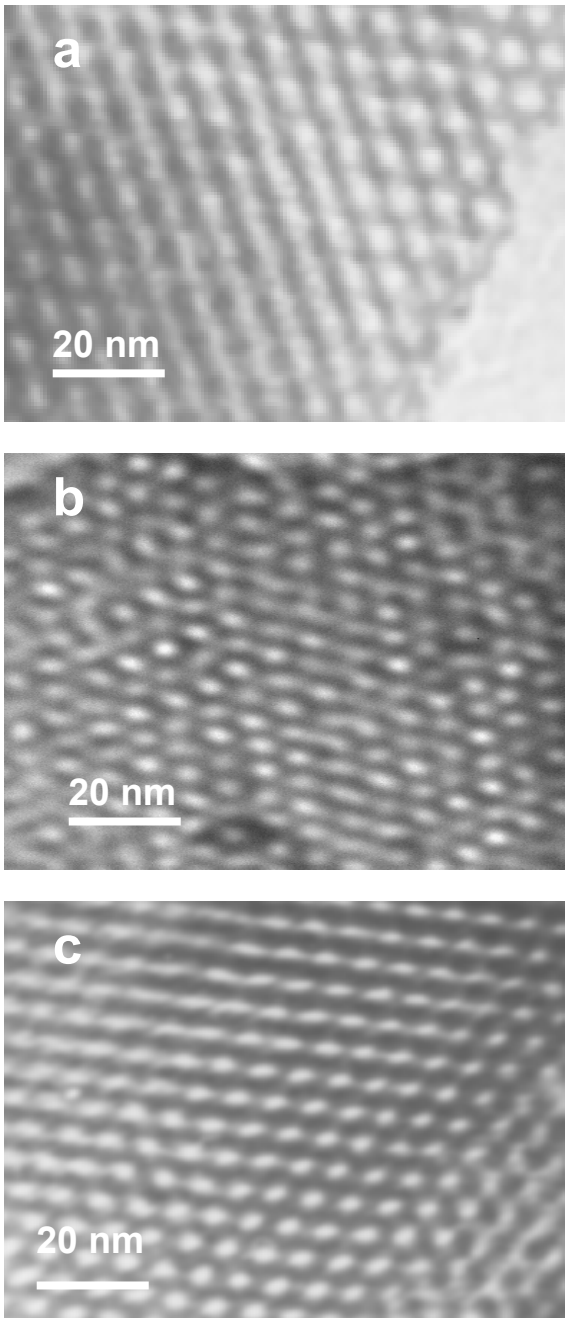


**Fig. 4S** Representative TEM micrographs of 3-D mesoporous silica monoliths. Viewed along the (a) [0111] and (b) [0001] directions of 3-D hexagonal $P6_3/mmc$ synthesized by the incorporation of octane into hexagonal phase of the Brij 56/TMOS at a mass ratio of 50 wt%. Viewed along the (c) [100] direction of HOM-1 (cubic Im3m) synthesized by the incorporation of nonane into the liquid crystal 3-d hexagonal $P6_3/mmc$ phase of the Brij 56/TMOS at a mass ratio of 69 wt% in the microemulsion systems.

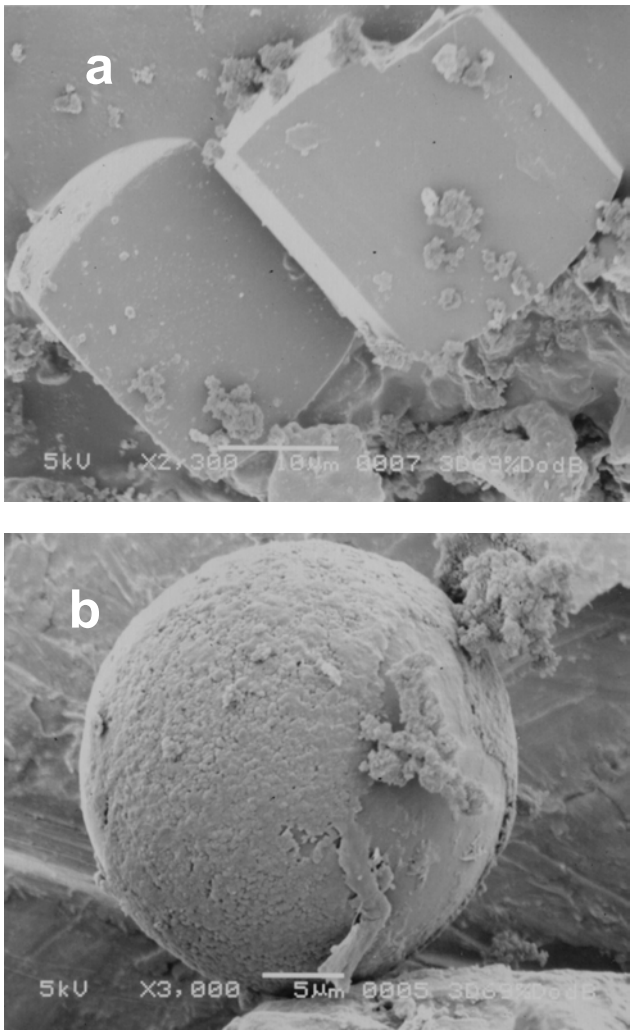


**Fig. 5S** Representative SEM images of particle morphologies for (a) cubic Fm3m (HOM-10) synthesized by incorporating dodecane in microemulsion systems with 3-D hexagonal $P6_3/mmc$ liquid crystal phase at of Brij 56/TMOS (69 wt%), (b) cubic Im3m (HOM-1) synthesized by incorporating nonane in microemulsion systems with 3-D hexagonal $P6_3/mmc$ liquid crystal phase of Brij 56/TMOS (69 wt%),