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Post-synthesis of Thick Wall Mesoporous Silica with Wormhole Framework Structure Using Surfactant Micelles and Silica Source Incorporated Inside the Channels of Silica Precursor with Large-mesopores

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Thick wall mesoporous silica molecular sieves with wormhole pore structure (MPS-TW) were prepared post-synthetically using cetyltrimethyammonium bromide (CTMABr) surfactant micelle solution and tetratethyl orthosilicate (TEOS) incorporated inside the channels of large-pore mesoporus silica (LP-MPS), followed by hydrolysis/condensation of TEOS. XRD spectra, N_2 adsorption isotherms and TEM images of the resultant materials exhibited that average wall thickness of the materials increased in the range of 1.2-2.2 nm, depending on the preparation conditions in the present study. It was found that molar ratio of CTMABr to TEOS as well as volume ratio of the micelle solution to the total pore volume of LP-MPS were key parameters affecting the wall thickness of MPS-TW samples.

Key Words : large-pore mesoporous silica, micelle solution, pore-filling impregnation, thickening the mesopore walls, wetting stability of mesoporous silica