Morphology changes of hexagonally ordered mesoporous silica by the metal cations

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This work presented the morphology change of mesoporous silica by added the metal cations, in which the metal cations were mixed at the stage of micelle formation step. The metal cations used in the work are alkali(Li, Na, K, Cs), alkaline earth(Mg, Ca, Sr, Ba), and transition metals(Co, Ni, Cu, Zn). The preparation method was adapted the general sol-gel process. The obtained mesoporous silicas have the different morphology and pore size as a function of added metals. To elucidate the interaction between metal cation and surfactant, solid-state 29Si, 13C-MAS NMR, and XPS were used. The porous characteristics was evaluated by nitrogen adsorbed BET, and morphology of mesoporous particle was characterized by TEM and FE-SEM. One of the remarkable features is the copper added mesoporous silica, where its morphology changed to cubic from the rod. The morphology changes with added metal were exhibited.