

Delineating role of surfactant in simple soft-templated synthesis of hundreds micrometer-sized spherical hollow mesoporous silica

김경환¹, 이창수¹, 강경구^{1,2,†}

¹충남대학교; ²동의대학교

(zeolyst@gmail.com[†])

This study presents roles of triblock copolymer, P123, and formation pathway of mesopore during the synthesis of ultra-large hollow sphere mesoporous silica based on various observations depending on synthesis time. In the early stage of synthesis, the P123 participates in generating large droplets composed of a mixture of tetraethyl orthosilicate (TEOS) and butanol. As TEOS is hydrolyzed, the soft gel-like composite observes, and the added butanol disappears. As the synthesis further progresses, new droplets, which seemed to be formed by butanol, appear and stably maintain inside of the soft complex. Resulting hollow sphere particles have hollow space, uniform mesopore, and high surface area. Based on our investigations, P123 plays two roles, a surfactant for the generation of droplets and structure directing agent for the formation of mesopores, respectively. In addition, the mesopores form after the complex. Particularly, the formed pore array shows a radial direction, compared to hexagonal array of typical SBA-15, that gradually merged toward the center of the sphere. These can be the indirect evidence of mesopore formation pathway.