

Growth of cubic Pt nanoparticles in the mesoporous silica support without capping agent

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Mesoporous materials are researched in various fields due to its well-ordered pore structure that is disposable to catalysis, adsorption, ion exchange, and optical science. The supported platinum nanocatalysts have been used extensively in gas phase reaction, electrochemistry as a catalyst. A shaped catalytic nanocrystal's crystalline structure is changed by its shape: for examples, nanoparticles with (111) facets have a hexagonal atomic arrangement, while nanoparticles with (100) facets have a square atomic arrangement. There are different facets according to different particle shapes; catalyst's activity, selectivity, and long term stability will also change. In previous study, mesoporous silica SBA-15 and platinum nanoparticles were synthesized separately, and these materials are mixed to locate platinum nanoparticles inside the mesoporous silica. In this case, surface capping agent which is polyvinyl pyrrolidone(PVP) was used to control the shape of platinum nanoparticles. Because surface capping agent blocks the active sites, reactants cannot reach to active sites. However, in this paper, cubic Pt nanoparticles were synthesized inside the mesoporous silica SBA-15 without surface capping agent. And also, 3-dimensional mesoporous silica SBA-16 was used.