

Tailored Pd catalysts for structure sensitive reaction

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Shape dependence of noble metal nanoparticles such as Ag, Au, Pt, and Pd is particularly evident. Also, chemical reactivity is highly dependent on surface morphology. Therefore, shape control of noble metal nanocrystals is crucial to their catalytic applications. There have been common ideas that morphology and crystal structure of palladium are important factor determining the activity for structure sensitive reaction. The objective of this work is to synthesize size and morphology controlled Pd nanoparticles, immobilize the nanoparticle. At first, different sized Pd cubes, enclosed by {100} facet of Pd, were synthesized. Secondly, Pd octahedrons enclosed by {111} facets were synthesized from Pd cubes enclosed by {100} facets. Thus, selective exposure of Pd {111} facet by morphological control can be used as a kind of catalyst design strategy. Finally, palladium core-silica shell (Pd@SiO₂) structure was adopted to improve the immobilization efficiency.