

One-Pot Synthesis of Pt Nanocubes Directly Overgrown on Carbon Supports

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Catalytic reactivity, selectivity and durability can be modulated by using shape-controlled platinum nanoparticles. In general, surface-capping agents stabilizing the nanoparticle surface for dispersion in the solution are used for the synthesis of the shaped nanoparticles. However, the residual capping agent on platinum surface should be removed before the catalytic reactions because clean metallic surface with catalytically active sites are required. In this study, Pt cubes immobilized on the carbon supports were synthesized by one-pot process without the surface-capping agents. Pt precursors were reduced in the presence of carbon supports and anchoring agents. Cysteamine ($\text{NH}_2\text{CH}_2\text{CH}_2\text{SH}$) provides nucleating site for Pt nanoparticles on the carbon surface, and also acts as shape-controlling agents inducing cubic shapes. The prepared cubic Pt/C showed a superior specific activity and long-term stability for oxygen reduction reaction without any additional process for the organic removal.