

Platinum Nanocrystals with Controlled Shapes for Catalytic Applications

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Shape-controlled platinum nanocrystals have different surface atomic structure. For example, cubic nanoparticles have only (100) surfaces while octahedral or tetrahedral nanoparticles are fully bound by (111) surfaces. Cuboctahedral nanoparticles have both (100) and (111) surfaces. In addition, platinum nanocrystals can offer enhanced catalytic properties. Especially, dendritic shape has attracted interests for electrocatalytic application due to its considerable advantages of high surface area. Here, we synthesized cubic, cuboctahedra, and dendritic Pt nanoparticles and investigate the effect of shape on selectivity for electrocatalytic reaction. Furthermore, the dendritic Pt nanoparticles were tested for oxygen reduction reaction (ORR), their activity and durability were evaluated. These results were compared with commercial platinum catalysts (E-TEK). Pt dendrites had higher activity for oxygen reduction and better selectivity for the production of H₂O than E-TEK catalyst. The durability was improved for the large dendrites compared to E-TEK catalyst.