

Platinum Dendrites with Controlled Sizes for Electrocatalysts

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Shape-controlled platinum nanoparticles 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 platinum dendritic nanoparticles of various sizes changing the reduction temperature. These nanoparticles were deposited on a carbon support and their electrocatalytic properties were evaluated for oxygen reduction reaction (ORR) and methanol oxidation reaction (MOR). Pt dendrites had higher activity for oxygen reduction and better selectivity for the production of H₂O than commercial platinum catalysts (E-TEK). From durability test, large dendrites showed small decreasing rate of active surface area compared to small dendrites or an E-TEK catalyst. Dendrites also had higher activity for methanol oxidation due to weaker interactions between surface poisoning species such as OH or CO and platinum surface. XPS results indicated that electrons on dendrites have less binding energy than on an E-TEK catalyst, which results in better catalytic properties.