

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 characterized by transmission electronic microscopy (TEM), induced coupled plasma elemental analysis (ICP) and x-ray photoelectron spectroscopy (XPS) techniques. Their size effect was observed by investigating electrocatalytic properties for oxygen reduction reaction (ORR) and methanol oxidation reaction (MOR). 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. Dendrites also had higher activity for methanol oxidation due to weaker interactions between surface poisoning species such as OH or CO and platinum surface.