Modified Electronic Structure of Pt Nanoparticle on TiN Support : Enhanced ORR Activity and Durability

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Platinum nanoparticles of ~ 1.7nm size are deposited on titanium nitride nanoparticle support. Pt/TiN catalyst was tested to be used as a fuel cell catalyst. TiN nanoparticle has TiN crystal structure with some oxidized surface. X-ray photoelectron spectroscopy (XPS) and X-ray absorption near edge structure (XANES) characterization indicated electron transfer from TiN to Pt. Pt/TiN catalyst showed improved oxygen reduction reaction (ORR) activity and durability. Modified electronic structure was a main reason for improved activity and durability. Also Pt/TiN catalyst showed improved catalytic activity for formic acid oxidation reaction.