Short Communication

A Novel Synthesis of triangular Pt Nanosheets on Pd surface with a Strong Electrocatalytic Activity for Oxidation of Methanol

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The study presents three-dimensional Pd/Pt triangular nanosheets with controlled shape and composition synthesized by a novel approach that uses lemon extract as a biological reducing agent coupled with a microwave treatment at 80 W (~64°C) for 30 min, which proved to be a simple, rapid, and environmentally-friendly method. The morphology, structure, and composition of prepared Pd/Pt triangular nanosheets were identified by transmission electronic microscopy (TEM), X-ray diffraction (XRD), and energy-dispersive X-ray (EDX) techniques. Moreover, the electrocatalytic properties of these synthesized Pd/Pt triangular nanosheets (Pd/Pt TANSs), and Pd@Au core/shell nanosheet (Pd@Au NS), and Pd nanosheet (Pd NS) electrocatalysts for methanol oxidation reaction (MOR) were systematically researched using the cyclic voltammetry method. The results showed that Pd/Pt triangular nanosheet (Pd/Pt TANS) electrocatalysts provided a stronger catalytic activity of about ~2.4 and ~1.4 times that of Pd NS and Pt@Au NS catalysts for MOR. In addition, these new triangular nanosheet electrocatalysts achieved a higher MOR performance with decreased use of Pt. This method can create a general approach for the shape-controlled synthesis of bimetallic Pt/M (M = Pd, Cu, Au, Mo, Mn, etc.) triangular nanocatalysts for promising applications in fuel cells in the future.

Keywords: Pd/Pt triangular nanosheets (Pd/Pt TANSs); novel synthesis; catalytic activity; methanol oxidation reaction (MOR); Pt nanotriangles (Pt NTAs).

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