Effect of Synthesis Procedures on Physical and Electrochemical Properties of Carbon Supported Pt/Ru Nanophase Electrocatalyst for Fuel Cell Applications

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The carbon supported Pt/Ru is found to be most commercially used anodic electrocatalyst for direct methanol fuel cell applications; however, there are ternary and quaternary metallic based catalysts also available. Here we report on the outcome of the synthetic procedures on properties of carbon supported Pt/Ru catalysts. Different electrocatalysts were synthesized by using propylene glycol, ethylene glycol, glycerin, polyvinylpyrrolidone (PVP) ethylene glycol methodology, hydrazine, sodium borohydride, formic acid, sodium formate as reducing agents and electrochemical reduction of metals on carbon supported electrode. The synthesized electrocatalysts were characterized by; powder XRD, electron microscopic techniques like SEM, EDS, and TEM, Brunauer-Emmett-Teller (BET) for surface area analysis, and finally electrochemical discharge testing (EDT) was carried out to examine performance and durability of synthesized electrocatalyst (open circuit and on load voltages, current density and power density). The synthesized catalysts had shown high catalytic activity and CO tolerance in direct methanol fuel cell applications, higher activity is achieved by those electrocatalysts which are synthesized by using weak reducing agents as examined by electrochemical discharge testing methodology.

Keywords: Direct Methanol Fuel Cell, Pt-Ru electrocatalyst, Carbon black, Electrochemical Discharge Testing

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