X-ray Photoelectron Spectroscopy Study of Nanocatalyst Coated Gas Diffusion Electrodes for Dimethyl Ether Fuel Cell Application

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Abstract. Dimethyl ether (DME), is viewed as potential alternative fuel source to hydrogen in low temperature proton exchange membrane fuel cells due to advantages such as low toxicity, high energy density, and low crossover through the Nafion® proton exchange membrane[1]. The practical energy density attained by state-of-the-art anode catalysts in fuel cell operated with dimethyl ether is rather low due to the unavailability of efficient electrocatalyst [2-3]. Carbon supported ternary alloy nanoparticles composed of Pt, Pd and Sn are found to electrochemically activate dimethyl ether at low temperature. Recently, we have studied the change in the surface properties of these ternary alloy nanoparticles during prolonged electrochemical cycling in presence of dimethyl ether containing acidic electrolyte. The preparation and surface properties of these ternary alloy nanoparticles, fabrication of electrode and X-ray photoelectron spectroscopy data of the catalytic electrodes will be presented. Further, the change in the oxidation state and surface composition of Sn in the samples and its implications on the stability of this nanocatalyst will be summarised in the poster.

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3. Kashyap, D., Teller, H., & Schechter, A. (2018). Highly active PtxPdy/SnO2/C catalyst for dimethyl ether oxidation in fuel cells. Journal of Power Sources, 396, 335–344