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APXPS study on Pt3Pd3Sn2/C catalyst for dimethyl ether oxidation

Content

Recently, direct methanol fuel cells, have drawn lots of attention from researchers due to their potential applications with a target to replace lithium batteries. In this work we focused on fuel cells using dimethyl ether (DME) oxidation reaction on platinum and its alloys such as PtPdSn, which shows higher specific power density. DME has several advantages over other fuels, including high energy density, pumpless fuel delivery, liquefied storage, or low toxicity [1,2]. Because of the possible near-surface effects occurring in the catalysts during activation or operation we investigated the materials using various surface techniques such as ambient pressure X-ray photoelectron spectroscopy (APXPS) which help us provide valuable information about the role of each element in the reaction mechanism of DME oxidation.
In our experiments Pt3Pd3Sn2/C nanoparticles were synthesized and drop casted on carbon fiber paper and silicon substrates. The oxidation states and binding energies of each element were then studied in various environment such as H2, DME or DME + H2O.

[1] T.A. Semelsberger, R.L. Borup, H.L. Greene, Dimethyl ether (DME) as an alternative fuel, J. Power Sources. 156 (2006) 497–511.
[2] Q. Li, X. Wen, G. Wu, H.T. Chung, R. Gao, P. Zelenay, High-Activity PtRuPd/C Catalyst for Direct Dimethyl Ether Fuel Cells, Angew. Chemie Int. Ed. 54 (2015) 7524-528.

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