Bimetallic nanowires of PtRh and PtRu electrocatalysts for methanol electrooxidation

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Binary metallic nanowires (NWs) of platinum-rhodium (PtRh) and platinum-ruthenium (PtRu) were synthesized by electrospinning of a versatile method with compositional variation from 1:3 to 2:1, and then were characterized by FESEM, HRTEM, XRD, and XAFS for structural properties. The electrospun bimetallic NWs were highly alloyed with diameters smaller than 60 nm. The PtRh and PtRu NWs with 1:1 atomic ratio resulted in the higher catalytic mass activity over the methanol electrooxidation than those with the different atomic ratios, and the mass activity of Pt1Ru1 NWs was superior to the other NWs and even better than the commercial catalyst of the highly dispersed Pt1Ru1 nanoparticles on carbon (E-TEK) in cyclic voltammetry measurements. Moreover, the bimetallic NW electrocatalysts showed the better stability than the bimetallic nanoparticles using chronoamperometry tests. The enhancements of electrocatalytic properties for the Pt1Rh1 and Pt1Ru1 NWs could be attributed to their one-dimensional features, which can outperform on the electro-oxidations over the fuel cell electrodes [1].

[1] Y. S. Kim, S. H. Nam, H. -S. Shim, H. -J. Ahn, M. Anand, W. B. Kim, Electrochem. Commun. 10 (2008) 1016-1019