Performance Improvement of Direct Methanol Fuel Cells by Anodic Treatment

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Anodic treatment of DMFC single cells was carried out at anode potentials of 0.1, 0.4, 0.7 and 1.0 V (vs DHE). The anodic treatment was performed flowing 1.0 M sulfuric acid (anode) and hydrogen (cathode) at 55 °C for 30 min. Increase of maximum power density by 48 % was achieved after anodic treatment at 0.7 V. Electrochemical impedance spectroscopic study showed that methanol electro-oxidation activity of PtRu catalyst was promoted by the anodic treatment. Oxidation states of Ru changed from Ru metal (43 %) and RuO_2 (57 %) to RuO_2 (33 %) and RuO_xH_y (67 %) after anodic treatment at 0.7 V, which were studied by X-ray photoelectron spectroscopy. The results showed that formation of RuO_xH_y was occurred at a potential range of 0.4 ~ 0.7 V.