The Properties of PdRu /C with respect to the Electro-oxidation of Methanol and Ethanol

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An activated carbon supported PdRu bimetallic nanocatalyst (PdRu/C) was prepared by microwave heating reduction method. TEM results showed that, when Ru was added, the catalyst can get better dispersion and smaller particle radius, the PdRu/C catalysts possess smaller mean grain size. XRD data indicate that the Pd-Ru is supported on the activated carbon as an alloy. The catalytic property was determined by analyzing the oxidation and reduction peaks of methanol and ethanol at different molar ratios of PdRu. The PdRu/C catalyst exhibits a good CO-tolerance. In addition, all the catalysts revealed better electrocatalytic performance towards ethanol oxidation than methanol oxidation under alkaline conditions. The current intensity of the PdRu(1:1)/C catalysts for the ethanol electrooxidation reached about 991 mA mg⁻¹ Pd; while the methanol was only 375 mA mg⁻¹ Pd. Besides, the catalytic property of the PdRu(1:1)/C for the electrooxidation of alcohol was 1.1 times than the Pd/C catalyst synthesized in the same way. The PdRu(1:1)/C has slightly higher current intensity than the Pd/C, and exhibits excellent durability after a long time test to ethanol oxidation. It also has a very fast charge transfer rate as shown in EIS test.

Keywords: PdRu Nano-catalysts, Microwave assisted polyol method, electrocatalytic properties, Methanol Electro-oxidation, Ethanol Electro-oxidation

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