

Carbon supported PtRh electrocatalysts for dehydrogenative oxidation of cyclohexane to benzene over polymer electrolyte membrane fuel cells

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Electrochemical dehydrogenation of cyclohexane to benzene was studied over a series of carbon-supported PtRh catalysts, which were prepared with different Pt:Rh atomic ratios using an impregnation method combined with the freeze-drying procedure. The catalysts were investigated by employing various physico-chemical analyses such as X-ray diffraction (XRD), transmission electron microscopy (TEM) and extended X-ray absorption fine structure (EXAFS) to investigate structural properties, and X-ray absorption near-edge spectroscopy (XANES) to characterize electronic properties in combination with electrochemical activities. Also, several electrochemical analyses were carried out to compare the performance of the electrocatalysts such as I-V polarization and electrochemical impedance spectroscopy (EIS) over cell test system (Solatron 1400). The Pt₄Rh₁/C showed the best performance for the electrochemical dehydrogenation of the cyclohexane to the benzene among other electrocatalysts tested in this study, resulting in the highest performance in the voltage vs. current (I-V) curve.