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Performance evaluation of platinum-based catalysts for the development of proton exchange membrane fuel cells

Performance evaluation of platinum-based catalysts for the development of proton exchange membrane fuel cells

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Abstract: Platinum-based catalysts are considered the most efficient catalysts for triggering electrochemical reactions in proton exchange membrane (PEM) fuel cells. In the present study, commercial catalysts containing 10% and 30% Pt supported on Vulcan XC-72 carbon were studied to assess their performance in PEM fuel cells. Both catalysts consisted of Pt particles of almost the same size. The utility of these catalysts in PEM fuel cells was studied by finding the real surface area and rate of electro-oxidation of methanol in 0.5 M H_2SO_4 by using cyclic voltammetry. The methanol oxidation reaction was used for characterization of catalysts of PEM fuel cells due to the liquid nature of methanol and the close resemblance of basic electrochemical features of direct methanol fuel cells and PEM fuel cells. Comparison of

the data of real surface area and rate of electro-oxidation of methanol showed that 30% Pt catalyst having higher Pt loading is more suitable for PEM fuel cells as compared with 10% Pt catalyst. The PEM fuel cell components were designed and fabricated for testing of membrane electrode assemblies (MEAs). The importance of an