

### A Study on Mechanism of Alkaline Membrane Fuel Cell by Using Electrochemical Characterization Techniques

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The development of alkaline membrane fuel cells (AMFCs) enables the adoption of non-platinum catalysts, which are intrinsically stable and have an activity similar to platinum in an alkaline environment for the oxygen reduction reaction (ORR). Unlike PEMFCs, only a few preliminary results of the AMFCs have been reported about the electrochemical reaction mechanism. In this regard, it is necessary to understand the reaction mechanism by in-situ electrochemical characterization techniques. Electrochemical impedance spectroscopy (EIS) has the capability to distinguish between the influence of various processes, especially when the system involves multi-step reactions. In this respect, EIS and polarization curve were introduced to study the mechanism of AMFCs. MEAs with Pt/C and/or Cu-Fe/C were analyzed by various operation conditions; H<sub>2</sub> flow rate, H<sub>2</sub> relative humidity, O<sub>2</sub> concentration and O<sub>2</sub> relative humidity. Different resistances (ohmic, contact, charge transfer and diffusion resistance) from EIS results were compared in detail to understand the mechanism and characteristics in AMFCs.