

**Electrochemical properties of effective catalyst layer structure fabricated by various catalyst coating methods for Proton Exchange Membrane Fuel Cell (PEMFC)**

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Membrane electrode assembly (MEA) consists of three parts which are electrolyte membrane, catalyst layer and gas diffusion layer, determining electrochemical performances. Among those three parts, catalyst layer influences mass transport and proton conduction in fuel cell operation significantly. The structure of catalyst layer can be designed by controlling morphology of polymer electrolyte binder and catalysts with different catalyst coating methods. In this study, the catalyst layers fabricated by spraying coating method and screen printing method are characterized via measuring pore size distributions of catalyst layers and electrochemical performance tests such as EIS (Electrochemical Impedance Spectroscopy) and polarization curves to figure out the effective catalyst structure for PEMFC. Screen printing coating method formed uniform pores with smaller size of 0.23  $\mu\text{m}$  in catalyst layer comparing to spraying method. Consequently, screen printing improved electrochemical performance (1000 mA cm<sup>-2</sup> at 0.6V and 2200mA cm<sup>-2</sup> at 0.4V) by lowering ohmic resistance and mass transfer overpotential.