

Structural characterization on the catalyst layer of Proton Exchange Membrane Fuel Cell with respect to variation of solvent composition in the catalyst ink

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In the development of high efficiency catalyst layer porous morphology, the distribution of ionomers plays a significant role since the transport of protons and oxygen are primarily controlled by the continuity of the ionomer, ionomer thickness on the catalyst surface and the gas networks in the catalyst layer. In this study, the effect of solvents in ionomer dispersions on the morphology of catalyst layer is investigated. The catalyst layer fabricated with different percent of isopropanol (IPA) and N-methylpyrrolidone (NMP) can be compared their morphologic surface by using SEM image and measured by polarization curve and electrochemical impedance spectroscopy. Four different composition of catalyst inks were synthesized via electrostatic spray deposition (ESD) namely (i) NMP 100% (ii) IPA 100%, (iii) NMP 50% IPA 50%, (iv) NMP 75% IPA 25%. The membrane-electrode assembly prepared lower IPA content, showed a larger and higher Nafion agglomerated particles.