

Evaluation of MEAs for DMFC fabricated by a low temperature decal transfer method using various substrates

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Membrane electrode assembly (MEA) is the key component of direct methanol fuel cells (DMFCs). There are several methods to fabricate MEAs. A decal transfer method is used to apply thin-film catalyst/ionomer composite layers to a polymer electrolyte membrane and has benefits for mass production. However, this method involves a step where catalyst layers are transferred to a membrane at high temperature above 180°C. In order to prevent the degradation of the membrane at high temperature, the PFSA membrane has to be converted to H⁺, Na⁺ or TBA⁺ form. In our present investigation, the decal transfer temperature is only 140°C, and hence H⁺ form of Nafion® has been used without employing any modifications. Teflon, Kapton, aluminum foil and polydimethylsiloxane(PDMS) were used as decal substrates. The fabricated MEAs were compared to the MEAs fabricated by a direct coating method and a conventional high temperature decal method. Contact angle, SEM, polarization curve and peel-off test were carried out for characterization of the MEAs prepared by a low temperature decal method.