Investigation PEMFC electrodes and MEAs using electrochemical techniques

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The performance of porous electrodes and Membrane Electrode Assemblies (MEAs) in a fuel cell depends on a combination of intrinsic material properties, electrode and MEA design and operating conditions. Intrinsic properties include for example catalytic activity for a given composition of a catalyst, while electrode porosity, surface area of the catalyst or effective transport properties in the gas phase or ionomer can be affected by the design. Operating conditions will in the end influence all these parameters.

We have for a long time developed techniques that can be used to evaluate electrodes and MEAs at well-controlled fuel cell working conditions [1-8]. By using a combination of mathematical modelling, electrochemical measurements and ex-situ techniques for determination of the electrode morphology it is possible to discriminate between intrinsic properties and the influence of design and operating conditions. This makes it possible to extract parameters and identify rate-limiting processes for different materials, designs and operating conditions. Some example of this for the oxygen reduction reaction and the hydrogen oxidation reaction will be given in this presentation.

References:

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