

Accepted Manuscript

Optimisation of Electrophoretic Deposition Parameters for GDEs in High Temperature PEMFCs

Cecil Felix, Ting-Chu Jao, Sivakumar Pasupathi, Bruno G. Pollet



PII: S0378-7753(13)00982-8

DOI: [10.1016/j.jpowsour.2013.06.006](https://doi.org/10.1016/j.jpowsour.2013.06.006)

Reference: POWER 17512

To appear in: *Journal of Power Sources*

Received Date: 5 March 2013

Revised Date: 14 May 2013

Accepted Date: 1 June 2013

Please cite this article as: C. Felix, T.-C. Jao, S. Pasupathi, B.G. Pollet, Optimisation of Electrophoretic Deposition Parameters for GDEs in High Temperature PEMFCs, *Journal of Power Sources* (2013), doi: 10.1016/j.jpowsour.2013.06.006.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Optimisation of Electrophoretic Deposition Parameters for GDEs in High Temperature PEMFCs

Cecil Felix*, Ting-Chu Jao, Sivakumar Pasupathi, Bruno G. Pollet

HySA Systems Competence Centre, South African Institute for Advanced Materials Chemistry

(SAIAMC), University of the Western Cape, Modderdam Road, Bellville 7535,

Cape Town, South Africa

Abstract: Electrophoretic deposition (EPD) method was used to fabricate Gas Diffusion Electrodes (GDE) for High Temperature Polymer Electrolyte Membrane Fuel Cells (HT PEMFC). Parameters related to the catalyst suspension and the EPD process was studied. Optimum suspension conditions are obtained when the catalyst particles are coated with Nafion® ionomer and the pH is adjusted to an alkaline range of about 8 to 10. These suspensions yield good stability with sufficient conductivity to form highly porous catalyst layers on top of the Gas Diffusion Layers (GDLs). GDEs were fabricated by applying various electric field strengths of which 100 V cm^{-1} yields the best Membrane Electrode Assembly (MEA) performance. Compared to an MEA fabricated by the traditional Hand Sprayed (HS) method, the EPD MEA shows superior performance with a peak power increase of about 73% at similar platinum (Pt) loadings. Electrochemical Impedance Spectroscopy (EIS) analysis shows lower charge transfer resistance for the MEA fabricated *via* the EPD method compared to the HS MEA. The EPD GDE exhibits a greater total pore area ($22.46 \text{ m}^2 \text{ g}^{-1}$) compared to the HS GDE ($13.43 \text{ m}^2 \text{ g}^{-1}$) as well as better dispersion of the Pt particles within the catalyst layer (CL).

Download English Version:

<https://daneshyari.com/en/article/7739206>

Download Persian Version:

<https://daneshyari.com/article/7739206>

[Daneshyari.com](https://daneshyari.com)