

---

# Fuel Cell Seminar & Energy Exposition 2017

---

**Editor:**

**M. C. Williams**



Published by  
**The Electrochemical Society**

65 South Main Street, Building D  
Pennington, NJ 08534-2839, USA

tel 609 737 1902

fax 609 737 2743

[www.electrochem.org](http://www.electrochem.org)

**ecs**transactions™

**Vol. 83, No. 1**

---

Copyright 2018 by The Electrochemical Society.  
All rights reserved.

This book has been registered with Copyright Clearance Center.  
For further information, please contact the Copyright Clearance Center,  
Salem, Massachusetts.

Published by:

The Electrochemical Society  
65 South Main Street  
Pennington, New Jersey 08534-2839, USA

Telephone 609.737.1902  
Fax 609.737.2743  
e-mail: [ecs@electrochem.org](mailto:ecs@electrochem.org)  
Web: [www.electrochem.org](http://www.electrochem.org)

ISSN 1938-6737 (online)  
ISSN 1938-5862 (print)  
ISSN 2151-2051 (cd-rom)

ISBN 978-1-60768-842-6 (PDF)  
ISBN 978-1-62332-520-6 (Softcover)

Printed in the United States of America.

---

*ECS Transactions, Volume 83, Issue 1*  
Fuel Cell Seminar & Energy Exposition 2017

**Table of Contents**

|   |            |
|---|------------|
| <i>Preface</i>  | <i>iii</i> |
| Method of Defect Detection in PEFCs Using Magnetic Sensor<br><i>N. Kojima, Y. Taketani, M. Morita, M. Izumi, Y. Gotoh</i>   | 1          |
| Proposal of Evaluation Method of Power Generation Current and Defect inside MEA<br>by Inverse Problem Analysis Using Static Magnetic Field around PEFC<br><i>D. Nagata, Y. Gotoh, M. Izumi, T. Nara</i> | 13         |
| Development of MEA with Self-Water Management on PEFC to Reduce the<br>Manufacturing Cost<br><i>I. Ota, K. Sugiura, T. Ito, K. Inukai, M. Utaka</i>   | 23         |
| Influence of Each Sub-Material on Thermal Conductivity of Thermal Insulation for<br>ENE-FARM<br><i>K. Sugiura, M. Tanizawa, K. Kimoto, N. Oya, T. Kashiwabara, Y. Imae, K. Imae</i>                     | 31         |
| Improvement of Performance of Selective CO <sub>2</sub> Facilitated Transport Membrane in<br>Hydrogen Station<br><i>R. Yamanaka, K. Sugiura, K. Akiyama, T. Nonouchi, N. Hanai, O. Okada</i>            | 39         |
| Selection of the Optimized Carbon Material for PEFC Separator<br><i>F. Okazaki, K. Sugiura, T. Ito, K. Inukai, M. Utaka</i>   | 45         |
| Basics for Fuel Cell Performance Loss Evaluation<br><i>W. Winkler, M. C. Williams</i>   | 53         |
| Influence of Ionomer Structures and Ratios on Performance and Degradation of PEM<br>Fuel Cells<br><i>S. Shahgaldi, I. Alaefour, X. Li</i>   | 71         |

|  |     |
|--|-----|
| Model of a Fuel Cell System Fueled by Hydrogen Generated from NaBH <sub>4</sub><br>Considering Heat Balance in the Hydrogen Reactor<br><i>Y. Naito, N. Hoshi, K. Uchida</i>                                    | 79  |
| Gradational Structured Catalyst Layer for Proton Exchange Membrane Fuel Cells<br><i>S. Okuno, N. Katayama</i>  | 87  |
| Meeting Cost and Manufacturing Expectations for Automotive Fuel Cell Bipolar<br>Plates<br><i>J. M. Huya-Kouadio, B. D. James, C. Houchins</i>  | 93  |
| Impact of Electrochemical Pre-Treatment Step on Accelerated Ageing of Membrane<br>under OCV Protocol in Polymer Electrolyte Membrane Fuel Cell<br><i>I. Profatilova, P. A. Jacques, D. Thoby, S. Escribano</i> | 111 |
| Transient Impurity Concentration of Absorption and Desorption in Metal Hydride<br><i>S. Ashida, N. Katayama, K. Dowaki, M. Kameyama</i>  | 119 |
| Numerical Study of Droplet Impact on Inclined Surface: Viscosity Effects<br><i>M. Jiang, B. Zhou</i>   | 127 |
| Development of Microbial Fuel Cells Utilizing Glycerol as a Sole Carbon Source<br><i>M. Nishioka, H. Den, T. Noda, K. Sugiura</i>  | 137 |
| Effects of Ionomer to Carbon Ratio and Operation Conditions in Direct Glucose Fuel<br>Cells<br><i>T. Yuki, N. Katayama, M. Takahashi, K. Tsuchiya, H. Sakai, M. Abe</i>  | 145 |
| Fundamental Characteristics of High Functional Direct Carbon Fuel Cell Composed<br>of Tubular Molten Carbonate Fuel Cell<br><i>K. Sugiura, A. Totani, T. Matsuyama, H. Kasai, M. Tamura</i>                    | 151 |
| Introduction of a Low Sealing Stress Vermiculite Based Compression Gasket for<br>SOFCs<br><i>S. Bond, S. Shaw</i>  | 159 |
| Model-Based Approach for Analysis of the Sensitivity of Planar SOEC to Selected<br>Parameters<br><i>J. Kupecki, J. Milewski</i>  | 171 |

|  |     |
|--|-----|
| Alkaline Electrolysis with Overpotential-Reducing Current Profiles<br><i>F. W. Speckmann, S. Bintz, M. L. Groninger, K. P. Birke</i>         | 179 |
| Process Current Source for Investigation on Current Waveform in Electrolysis<br>Process<br><i>S. Bintz, F. W. Speckmann, J. Roth-Stielow</i> | 195 |
| Thermal Behavior and Performance Trajectories of Electrolysers<br><i>H. Zhang, A. Miyamoto, A. Suzuki, H. Wang, M. C. Williams</i>           | 211 |
| Author Index   | 225 |