

Selected References and Publications

Michael Fowler

mfwler@uwaterloo.ca

Refereed Contributions

13. **R. Suwanwarangkul**, E. Croiset, E. Entchev, S. Charojrochkul, M.D. Pritzker, M.W. Fowler, P.L. Douglas and S. Chewatanakup and H. Mahaudom, "Experimental and Modelling Study of Solid Oxide Fuel Cell", In Press 2006 (NR Can)
12. **R. Suwanwarangkul**, E. Croiset, M.D. Pritzker, M.W. Fowler, P.L. Douglas and E. Entchev, "Mechanistic Modelling of a Cathode-Supported Tubular Solid Oxide Fuel Cell," J Power Sources, 154 (2006) 74-85. (NR Can)
11. **M.B. Stevens, C. Mendes**, M. Fowler, R.A. Fraser Fuel Cell Hybrid Control Strategy Development accepted for SAE Transactions review, 06P-429 (2006) (NSERC / NR Can)
10. **Mali, T.J., Marshall, J., Stevens, M.B., Mendes, C., Shilling, D.M., Tong, K., Wilhelm, E., Beckermann, S.**, Fraser, R.A., Fowler M.W. "Fuel Cell Hybrid Powertrain Design Approach for a 2005 Chevrolet Equinox", accepted for SAE Transactions review, paper # 2006-01-0744 (NSERC / NR Can)
9. **Gostick J**, Fowler M, Ioannidis A, Pritzker M, Volfkovich Y, Sakars A., Capillary pressure and hydrophilic porosity in gas diffusion layers for polymer electrolyte fuel cells. Journal of Power Sources, In Press. (NSERC)
8. **F.Chui**, A. Elkamel, M. Fowler, An Integrated Decision Support Framework for the Assessment and Analysis of Hydrogen Production Pathways, Energy and Fuels, (in Press). (Undergraduate student).
7. **Kundu, S.**, Fowler, M., Simon., L., Grot S., "Morphological Features (Defects) in Fuel Cell Membrane Electrode Assemblies", Journal of Power Sources, -- Accepted December 2005.
6. **S. Kundu**, L. C. Simon, M. Fowler, S. Grot Mechanical Properties of NafionTM Electrolyte Membranes under Hydrated Conditions, Polymer 46, n 25, 11707-11715 (2005).
5. Michael Fowler, **Alfred Lam**, 'PEM Fuel Cell Test Station and Laboratory Experiment, Chemical Engineering Education, Volume 38, Number 3, Summer 2004, page 236 - 241. (Undergraduate)
4. **W.Zhang**, E.Croiset, P.L.Douglas, M.W.Fowler,E.Entchev, Simulation of a tubular solid oxide fuel cell stack using AspenPlus TM unit operation models, Energy Conversion and Management, Volume 46, Issue 2, (2005) 181-196. (NR Can)
3. **Rapepong Suwanwarangkul**, Eric Croiset, Michael W. Fowler, Peter L. Douglas, Evgeniy Entchev, "Performance Comparison of Fick's, Dusty-gas and Stefan-Maxwell Models to predict the Concentration Overpotential in a SOFC Anode", Journal of Power Sources, v. 122 n. 1, (2003), 9-18. (NR Can)
2. M.W. Fowler, John C. Amphlett, Ronald F. Mann, Brant A. Peppley and Pierre R. Roberge, "Issues Associated With Voltage Degradation in a Polymer Electrolyte Fuel Cell Stacks", Journal for New Materials for Electrochemical Systems, 5, 255-262 (2002).

1. M.W. Fowler, R.F. Mann, J.C. Amphlett, B.A. Peppley and P.R. Roberge, "Incorporation of Voltage Degradation into a Generalized Steady State Electrochemical Model for a PEM Fuel Cell", *Journal of Power Sources*, 106 (2002) 274-283.

Other Refereed Contributions

12. **M.B. Stevens, C. Mendes**, M.W. Fowler, R.A. Fraser "Fuel Cell Hybrid Control Strategy Development", 2006-01-0214 for SAE World Congress 2006, Detroit, Michigan, April 3-7, 2006.
11. **T.J. Mali , J. Marshall, M.B. Stevens, C. Mendes, K. Tong, E. Wilhelm, S. Beckermann**, R.A. Fraser, M.W. Fowler, "Fuel Cell Hybrid Powertrain Design Approach for a2005 Chevrolet Equinox ", paper accepted as 2006-01-0744 for SAE World Congress 2006, Detroit, Michigan, April 3-7, 2006.
10. F. Chui, A. Elkamel, and M. Fowler, Analytic Hierarchy Process and Life Cycle Analysis for the Assessment of Hydrogen Production Pathways Proceedings International Hydrogen Energy Congress and Exhibition IHEC 2005 Istanbul, Turkey, 13-15 July 2005
9. **T.J. Mali**, M.W. Fowler, **M.B. Stevens**, C. Tzoganakis, L. Simon "Thermoplastic Composite Bipolar Plates for Polymer Electrolyte Membrane Fuel Cells (PEMFC)", 1st International Green Energy Conference, Waterloo, Ontario, June 12-16, 2005.
8. **M.B. Stevens , C. Mendes, T.J. Mali**, M.W. Fowler, R.A. Fraser "Optimization of a Fuel Cell Powertrain for a Sport Utility Vehicle", 1st International Green Energy Conference, Waterloo, Ontario, June 12-16, 2005.
7. **Lin Qui**, Michael Fowler, Gas Infusion Fuel Cell System1st International Green Energy Conference, Waterloo, Ontario, June 12-16, 2005.
6. **Sumit Kundu, Taylor Mali**, and Michael Fowler, Partially Hydrogen-ated – Development of Hydrogen Infrastructure, *Alternatives Journal* 31:4, 2005.
5. M.W. Fowler, R.F. Mann, J.C. Amphlett, S. Kundu, I. Wheeldon, and B.A. Peppley, Issues Associated with Material Characteristics in PEM Fuel Cells, *Fuel Cells for Automotive Applications*, ed. Thring, R.H., The Institution Mechanical Engineers, pp. 135 – 157, (2004).
4. R.F. Mann, M.W. Fowler, J.C. Amphlett, B.A. Peppley and C. P. Thurgood, Modeling of PEM Fuel Cells, "Fuel Cells for Automotive Applications", *Fuel Cells for Automotive Applications*, ed. Thring, R.H., The Institution Mechanical Engineers, pp. 113 – 133, (2004).
3. **Michael Ajersch**, Michael Fowler, Kunal Karan and Brant Peppley, "PEM Fuel Cell And Bipolar Plate Reliability: A Review, First International Conference on Fuel Cell Science, Engineering and Technology, American Society Mechanical Engineers, April 21-23, 2003. p 253-260
2. Michael Fowler, Ronald F. Mann, John C. Amphlett, Brant A. Peppley and Pierre R. Roberge, Chapter 56 Conceptual reliability analysis of PEM fuel cells, *Handbook of Fuel Cells – Fundamentals, Technology and Applications - Volume 3: Fuel Cell Technology and Applications*, Edited by Wolf Vielstich, Hubert Gasteiger, Arnold Lamm., John Wiley & Sons Ltd., (2003).

1. M.W. Fowler, Degradation and Reliability Modelling of PEM Fuel Cells, Ph.D. Thesis, Royal Military College of Canada, May 2003.

Conference Proceedings and Non-Refereed Journals

21. **T.J. Mali**, M.W. Fowler, C. Tzoganakis, Z.S. Ng, **M.B. Stevens** “Rheology of Thermoplastic Composite Blends for Polymer Electrolyte Membrane Fuel Cells (PEMFC)”, oral presentation Polymer Processing Society America’s Regional Meeting, Quebec City Quebec, August 14-17, 2005.
20. **F.Chui**, A. Elkamel, M. Fowler, Combining the Analytical Hierarchy Process and Life Cycle Analysis for the Assessment of Hydrogen Production Pathways, Canadian Society of Chemical Engineering 2005 Conference, Toronto, October 2005.
19. **T.J. Mali**, **M.B. Stevens**, M.W. Fowler, C. Tzoganakis, L Simon “Advanced Material Testing of Composites for Hydrogen Fuel Cells”, poster and oral presentation at the Society of Plastic’s Engineers – 7th Annual University-Industry Night, Mississauga, Ontario, March 17, 2005.
18. **T.J. Mali**, **M.B. Stevens**, M.W. Fowler, C. Tzoganakis “Thermoplastic Composite Bipolar Plates for Polymer Electrolyte Membrane Fuel Cells”, oral presentation at the 54th Canadian Chemical Engineering Conference, Calgary, Alberta, October 3-6, 2004.
17. **M.B. Stevens**, **N. Farooqui**, **T.J. Mali**, M.W. Fowler “Thermoset Bipolar Plates for Fuel Cells”, oral presentation and poster at the MMO Partnerships 2004, Toronto, Ontario, June 22, 2004.
16. **Taylor J. Mali**, Dr. Michael W. Fowler, Matthew B. Stevens, Dr. Costas Tzoganakis, Thermoplastic Bipolar Plates for Polymer Electrolyte Membrane Fuel Cells (PEMFC) Canadian Society of Chemical Engineering 2004 Conference, Calgary, October 2004.
15. **Lin Qiu**, Dr. Michael Fowler, Dr. Mario Ioannidis, Potential Integration of Gas Infusion into a Fuel Cell System, Canadian Hydrogen Conference, Toronto, September 24-29 2004.
14. **Sumit Kundu**, Dr. Michael Fowler, Morphology and Degradation of Fuel Cell Membranes, Canadian Hydrogen Conference, Toronto, September 24-29 2004.
13. **Michael Fowler**, Fuel Cell Testing Workshop, Kasetsart University, Bangkok Thailand, August 25-26, 2004.
12. **Michael Fowler**, ‘Electrochemical Techniques in Fuel Cells’, Brinkman Seminar Series Fuel Cell Workshop, Waterloo, 4 December 2004.
11. **W. Zhang**, E. Croiset, P.L. Douglas, M.W. Fowler, E. Entchev, Simulation of a Tubular Solid Oxide Fuel Cell Using AspenPlusTM Unit Operation Models, Combustion Canada ’03, Calgary, September 22 -25, 2003.
10. **I.R. Wheeldon**, J.C. Amphlett, M. Fowler, R.F. Mann, M. Hooper, B.A. Peppley* and C.P. Thurgood, Operational Strategies for a Steam-Methanol, Membrane Reformer in a PEM Fuel Cell System, First International Conference on Fuel Cell Science, Engineering and Technology, American Society Mechanical Engineers, April 21-23, 2003.

9. **R. Suwanwarangkul**, E. Croiset, M.W. Fowler, P.L. Douglas, E. Entchev and M.A. Douglas, "Modeling of Anode-supported SOFCs Operating with H₂ and CO Mixtures", in Proceeding of 8th international symposium on Solid Oxide Fuel Cells (SOFC-VIII), S.C. Singhal and M. Dokiya (Eds.), Pennington, NJ., pp. 1348-1357 (2003).
8. R.F Mann, **I. Wheeldon**, M.W.Fowler, J.C.Amphlett, B.A.Peppley and C.P. Thurgood, Concentration Polarization in PEM Fuel Cell Modelling, 2002 Fuel Cell Seminar, 2002 Fuel Cell, Palm Springs, CA, November 18-21, 2002.
7. R.F. Mann, M.W. Fowler, J.C. Amphlett, C.P. Thurgood and B.A. Peppley, "Modelling the Catalytic Kinetics of Electrodes in PEM Fuel Cells", Conference Proceedings - 17th Canadian Symposium on Catalysis, Toronto, June 1-5 2002.
6. R.F. Mann, J.C. Amphlett, M.W. Fowler, B.A. Peppley and C.P. Thurgood, "Correlation and Prediction of Water Content in Nafion Membranes for PEM Fuel Cell Modelling" Topical Conference Proceedings, AIChE New Orleans, March 2002.
5. R.F. Mann, M.W. Fowler, J.C. Amphlett, **M.A.I. Hooper**, B.A.Peppley and P.R. Roberge. "Further Development of the Generalized Steady-State Electrochemical Model for PEM Fuel Cells", Recent Advances in Fuel Cells" Symposium, 22nd National ACS Meeting, Chicago, August 26-30, 2001.
4. M.W. Fowler, "Demonstration of the Generalized Steady-State Electrochemical Model for a PEM Fuel Cell", Proceedings of the Canadian Hydrogen Conference, Victoria, British Columbia, July 2001.
3. R.F Mann, J.C.Amphlett, M.W.Fowler, **M.A.I. Hooper**, B.A.Peppley and C.P. Thurgood, "A Generalized Steady-State Electrochemical Model for a PEM fuel cell", Proceedings of Computational Fluids Dynamics – CFC 2001, Waterloo, Ontario, June 2001.
2. M.W. Fowler, Risk Based Options for the Management of PCB Painted Materials, "Proceedings of the Workshop on the Management of PCB Solid Wastes in Canada", July 1999.
1. R.P. Pelot, M.W. Fowler, Cost/Risk Assessment of Contaminated Military Sites, Proceedings - Symposium on Risk Assessment, May 1994.

Supervised Theses

4. **Lin Qiu**, Integration of Gas Infusion into a Polymer Electrolyte Membrane Fuel Cell System, Thesis - Master of Applied Science in Chemical Engineering, University of Waterloo, Sept, 2005. (NSERC)
3. **Kwok Wai Chan**, Performance, Diagnostics, and Forensic Analyses of Polymer Electrolyte Membrane Fuel Cells in Dry Cathode Operation, Thesis - Master of Applied Science in Chemical Engineering, University of Waterloo (Confidential), Sept, 2005. (NSERC)
2. **Rapeepong Suwanwarangkul**, Model Development and Validation of Solid Oxide Fuel Cells (SOFCs) Using H₂-H₂O-CO-CO₂ Mixtures: From Button Cell Experiments to Tubular and Planar Cells Thesis – Doctorate in Philosophy in Chemical Engineering, University of Waterloo , April, 2005. (NR Can)

1. **Sumit Kundu**, Structure-Property-Performance Relationships in Fuel Cell Materials Thesis - Master of Applied Science in Chemical Engineering, University of Waterloo (Confidential), Sept, 2004. (NSERC)

Recent Presentations and Posters

17. Fowler, M, Ioannidis, **M, Qiu**, L, Archibald, J, Assignee InVenture Technologies Inc, Patent Application 04737870.8 - 2119 , Gas Infusion Fuel Cell System.
16. **Michael Fowler**, Poster, Materials Testing for PEM Fuel Cell, MMO Partnership 2004, Toronto June 22, 2004.
15. **Sumit Kundu**, Michael W. Fowler, Leonardo Simon, Alfred Lam
Characterization and Performance of Aged Fuel Cell Materials, Presented at 53rd CSCHE Conference, 26th-29th October, 2003, Hamilton, Canada.
14. **R. Suwanwarangkul**, E. Croiset, M. Fowler, M. Pritzker, P. Douglas, E. Entchev, "Mechanistic Model of Anode-supported Solid Oxide Fuel Cells Operating with Syngas", Presented at 53th CSCHE Conference, 26th-29th October, 2003, Hamilton, Canada.
13. **Michael Fowler**, Presentation, Microstructure and Reliability Analysis of Membrane Electrode Assembly, Fuel Cell Seminar 2003 - Centre of Automotive Materials and Manufacture (CAMM), September 5, 2003.
12. **Kundu, S.**, Fowler, M.W., Simon, L.C. (2003), "Materials and Performance of Fuel Cells", poster presented at the Gordon Research Conference, July 27 – August 1, 2003.
11. **Kundu, S.**, Fowler, M.W., Simon, L.C. (2003), "Characterization of Polymeric Materials in Fuel Cells", poster presented at MMO Partnerships 2003, June 19, 2003.
10. **Kundu, S.**, Fowler, M.W., Simon, L. C., Grot S. (2003), "Characterization of Morphology in the Catalyst Layer of Membrane Electrode Assemblies", oral presentation at the New Materials for Electrochemical Systems 5th International Symposium, July 6 – 11, 2003.
9. Fowler, M.W., **Kundu, S.**, (2003), "Fuel Cell Material Defects and Reliability", Invited Presentation at King Mongkut's University of Technology Thonburi (KMUTT), Chemical Engineering Practive School (CHEPS), Bangkok, Thailand.
8. **Kundu, S.**, Fowler, M.W., Simon, L.C. (2003), "Characterization of Polymeric Materials in Fuel Cells", poster presented at Society of Plastics Engineers University/Industry Seminar, April 2003.
7. **Kundu, S.**, Fowler, M.W., "Fuel Cells in Developing Countries", oral and poster presentation at the 2nd Annual Engineers Without Borders National Conference (2003).
6. Michael Fowler, Poster - Reliability Modeling of PEM Fuel Cells, accepted for the Gordon Research Conference, Roger Williams University, Bristol, Rhode Island, July 29 - August 3 2001.
5. Michael Fowler, Presentation - Issues Associated With Voltage Degradation in a Polymer Electrolyte Fuel Cell Stack, 4th International Symposium on New Materials for Electrochemical Systems, Montreal, July 9-13 2001.
4. Michael Fowler, Presentation - Demonstration of the Generalized Steady-State Electrochemical Model for a PEM Fuel Cell, Canadian Hydrogen Conference,

- Victoria, British Columbia, 19 – 22 July 2001.
3. Michael Fowler, Poster - Reliability and Voltage Degradation in Fuel Cell, Canadian Hydrogen Conference, Victoria, British Columbia, 18-20 July 2001.
 2. Michael Fowler, Poster - Performance and Reliability of Project Tool to Support PEM Fuel Cell Life Cycle Analysis, Fuel Cells 2001 - Overcoming the Challenges to Commercialization, Toronto, April 17-18 2001.
 1. Michael Fowler, Presentation - Risk Based Options for the Management of PCB Painted Materials, Workshop on the Management of PCB Solid Wastes, Edmonton, Alberta, July 1999.