Brenda L. García-Díaz, Ph.D.

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EDUCATION

May 2007 — **Ph.D. in Chemical Engineering**
Columbia, SC — UNIVERSITY OF SOUTH CAROLINA (ADVISOR: JOHN WEIDNER)
Dissertation: Kinetics and Mass-Transfer in a Direct Methanol Fuel Cell (DMFC)

July 2003 — **M.S. in Environmental Engineering**
Mayagüez, PR — UNIVERSITY OF PUERTO RICO-MAYAGÜEZ
Thesis: The Use of Electrowinning for Removal of Heavy Metals from Groundwater.

December 2000 — **B.S. in Chemical Engineering** (with Environmental Engineering Certificate)
Mayagüez, PR — UNIVERSITY OF PUERTO RICO-MAYAGÜEZ

HONORS

- 2015 South Carolina Governor's Young Scientist Award
- 2014 President of Aiken Chapter of ASM International
- 2012 SRNL Early Career Award
- 2007 H. H. Dow Memorial Student Award of the Industrial Electrolysis and Electrochemical Engineering Division of The Electrochemical Society
- 2007 University of South Carolina Department of Chemical Engineering Outstanding Graduate Student.
- Magna Cum Laude Distinction, University of Puerto Rico, 2000
- Engineering Honor Student Roll, University of Puerto Rico, 1996-2000

CERTIFICATIONS

Engineer-In-Training (EIT) Licensed (Puerto Rico)

EXPERIENCE

Oct. 2008 – Present — **Principal Engineer in Energy Materials and Corrosion Technologies**
Columbia, SC — SAVANNAH RIVER NATIONAL LABORATORY

- *Principal Investigator on a DOE SunShot Program to characterize and mitigate high temperature corrosion in concentrating solar power applications*
- *PI on an SRNL strategic initiative project to develop electrochemical fluorination for used nuclear fuel reprocessing*
- *PI on a DOE project to develop Accident Tolerant Nuclear Fuel with AREVA*
- *PI on a project with LLNL to develop improved molten salts for LiT recovery in fission reactors*
- *PI on a project with Celgard to improve battery separator characterization methods*
- *PI on an SRNL project to develop vapor feed direct methanol fuel cells*
- *PI on a project with LLNL for high accuracy sputtering of novel waveguides*
- *Co-PI and inventor of an electrodialysis method for Pu separation*
- *Co-PI and inventor of a method to directly separate tritium from a lithium cooling blanket for fusion applications*
- *Technical lead on a project to investigate corrosion in nanoparticle enhanced ionic liquids (NEILs) for heat transfer fluids*
- *Technical lead for the development of stochastic corrosion models for waste tank closure*
- *Developed multiple novel electrochemical methods to reprocess nuclear materials and reduce waste generation*
- *Co-author on over 10 patent disclosures and applications*
- *Chaired, organized, and presented at multiple technical sessions for at technical society*
- *Managed multi-disciplinary projects involving unique and integrated innovations*

Oct. 2007 – Oct. 2008 **Post-Doctoral Research on Electrochemical Alane Generation**
Columbia, SC SAVANNAH RIVER NATIONAL LABORATORY

- *Electrochemistry Subject Matter Expert (SME) on DOE alane production project*
- *Calculated and analyzed thermodynamic equilibrium potentials for alane production pathways*
- *Designed electrochemical cells for Schlenk line testing and conducted experiments with air-sensitive reactants and products*
- *Analyzed reaction products using XRD and NMR techniques*

May 2007 – Present **Electrochemical Engineering Consultant**
Columbia, SC GREENWAY ENERGY LLC

- *Led Greenway Energy contract with USC for SME services on an NSF project for the electrochemical generation of the superoxide ion in ionic liquids.*
- *Designed and directed laboratory experiments for graduate students.*
- *Analyzed and interpreted spectroscopic, analytical, and electrochemical data to determine degradation of the ionic liquids by superoxide ions.*
- *Suggested novel ionic liquids for superoxide oxidation reactions.*

Aug 2003 – Oct 2007 **DMFC Research Assistant & Post-Doc**
Columbia, SC UNIVERSITY OF SOUTH CAROLINA

- *Developed DMFC electrochemistry models for systems level DMFC simulations.*
- *Utilized experimental and model data to analyze the losses in a DMFC system.*
- *Developed and patented a low-temperature synthesis route to a novel Nb-doped TiO_2 electrocatalyst support.*
- *Directed the research of 2 PhD. students, 5 undergraduate students, and 3 high school students*
- *Prepared and submitted funding proposals to the NSF and DOE*

Summer 2002 and Summer 2003 **Electrochemical Groundwater Remediation Research**
US ARMY CORPS OF ENGINEERS
Vicksburg, MS ENGINEERING RESEARCH AND DEVELOPMENT CENTER

- *Performed electrowinning studies for removal of lead from groundwater.*
- *Generated data analysis including chemical reactions and cost analysis.*
- *Made innovative improvements to the pilot plant implementation.*
- *Collaborated with Coastal and Hydraulic Laboratory personnel on the Mouth of Colorado River project.*
- *Collected data for bathymetry and bed movement charts of the Mississippi River.*

Jan. 2001 – Dec. 2002 **Environmental Engineering Laboratory and Teaching Assistant**
Mayagüez, PR UNIVERSITY OF PUERTO RICO-MAYAGÜEZ

- *Assisted professor to evaluate student performance in classroom and laboratory courses and taught students engineering fundamentals.*
- *Overhauled environmental engineering laboratory equipment (i.e. AA, liquid chromatography) and defined standard operating procedures.*
- *Defined and directed laboratory experiments for graduate and undergraduate laboratories*
- *Supported a Water Characterization Pilot Plant Project.*

Jan. - July 2000 **Process Engineering Assistant**
Arecibo, PR PHARMACIA CORPORATION

- *Optimized and improved distillation operations for the antibiotic Lincomicin.*
- *Analyzed distillation data and prepared EPA reports (SARA 313).*
- *Evaluated alternatives and proposed new a new inlet flow jet design for the column.*
- *Updated process flow and process & instrumentation diagrams.*
- *Improved process operations and trained operators on use of new equipment.*

Summer 1999 **NSF Researcher**
Columbia, SC UNIVERSITY OF SOUTH CAROLINA

- *Performed kinetics studies for the hydrogen production via direct cracking of methane over Ni-Fe / SiO_2*

MEMBERSHIPS

- ASM International
- The Electrochemical Society
- Golden Key National Honor Society
- Tau Beta Pi - National Engineering Honor Society
- Society of Women Engineers
- Institute of Chemical Engineering of Puerto Rico
- College of Engineers and Surveyors of Puerto Rico

INVENTIONS / COPYRIGHT DISCLOSURES

B. L. García-Díaz, H. Colon-Mercado, D. Babineau, and L. C. Olson, "Direct Method of LiT Electrolysis in Molten Lithium," invention disclosed to Savannah River National Laboratory, October 2013, patent pending.

B. L. García-Díaz, M. J. Martínez-Rodríguez, J. R. Gray, and L. C. Olson, "Solid Oxide Reduction of Metal Oxides," invention disclosed to Savannah River National Laboratory, May 2013, patent pending.

B. L. García-Díaz, M. J. Martínez-Rodríguez, J. R. Gray, and L. C. Olson, "Electrochemical Fluorination for Processing of Used Nuclear Fuel," invention disclosed to Savannah River National Laboratory, June 2012, patent pending.

J. R. Gray, D. L. Fisher, **B. L. García-Díaz**, M. J. Martínez-Rodríguez, E. A. Clark, T. M. Adams, P. Ramadass, and C. Adams, "Electrochemical Dynamic Mechanical Analysis," invention disclosed to Savannah River National Laboratory, September 2012.

J. W. Weidner, R. D. Adams, B. Captain, and **B. L. García**, "Bimetallic Cluster Derived Electrocatalyst," invention disclosed to the University of South Carolina Research Foundation, June 2006.

J. W. Weidner and **B. L. García**, "Novel Electrocatalyst Support and Catalyst Supported Thereon," invention disclosed to the University of South Carolina Research Foundation, April 2006.

PUBLICATIONS

H. Cho, J. W. Van Zee, S. Shimpalee, B. Tavakoli, J. W. Weidner, **B. L. García-Díaz**, M. J. Martinez-Rodriguez, L. Olson, and J. Gray, "Dimensionless Analysis for Predicting Fe-Ni-Cr Alloy Corrosion in Molten Salt Systems for Concentrated Solar Power Systems," *Corrosion*, Accepted.

D. J. Tallman, L. He, **B. L. García-Díaz**, E. N. Hoffman, G. Kohse, R. L. Sindelar, and M. W. Barsoum, "Effect of Neutron Irradiation on Defect Evolution in Ti_3SiC_2 and Ti_2AlC," *Journal of Nuclear Materials*, 468, pp. 122-129, 2016.

D. J. Tallman, E. N. Hoffman, E. N. Caspi, **B. L. García-Díaz**, G. Kohse, R. L. Sindelar, and M. W. Barsoum, "Effect of Neutron Irradiation on Select MAX Phases," *Acta Materialia*, 85, pp. 132-143, 2015.

B. R. Maier, **B. L. García-Díaz**, B. Hauch, L. Olson, R. L. Sindelar, and K. Sridharan, "Cold Spray Deposition of Ti_2AlC Coatings for Improved Nuclear Fuel Cladding," *Journal of Nuclear Materials*, 466, pp. 712-717, 2015.

L. Olson, R. E. Fuentes, M. J. Martinez-Rodriguez, J. W. Ambrosek, K. Sridharan, M. H. Anderson, **B. L. García-Díaz**, J. Gray, and T. Allen,"Cold Spray Deposition of Ti_2AlC Coatings for Improved Nuclear Fuel Cladding," *Journal of Nuclear Materials*, 466, pp. 712-717, 2015.

B. L. García-Díaz, H. R. Colón-Mercado, K. Herrington and E. B. Fox, "Polarization and Electrocatalyst Selection for PBI Direct Methanol Fuel Cells," *Journal of Fuel Cell Science and Technology*, 11 (3), 031001, 2014.

B. L. García-Díaz, J. R. Patterson, and J. W. Weidner, "Quantifying Individual Losses in a Direct Methanol Fuel Cell," *Journal of Fuel Cell Science and Technology*, 9 (1), 011012, 2012.

M. J. Martínez-Rodríguez, **B. L. García-Díaz**, J. A. Teprovich Jr, D. A. Knight, and R. Zidan, "Advances in the Electrochemical Regeneration of Aluminum Hydride," *Applied Physics A: Materials Science & Processing*, 106 (3) pp. 545-550, 2012.

M. Au, Y. He, Y. Zhao, H. Ghassemi, R. S. Yassar, **B. García-Díaz**, and T. Adams, "Silicon

and Silicon-Copper Composite Nanorods for Anodes of Li-Ion Rechargeable Batteries," *Journal of Power Sources*, 196 (22), 9640-9647, 2011.

R. Fuentes, **B. L. García**, and J. W. Weidner, "Effect of Titanium Dioxide Supports on the Activity of Pt-Ru Toward Electrochemical Oxidation of Methanol," *Journal of the Electrochemical Society*, 158 (5) B461-B466, 2011.

R. Zidan, **B. L. García-Díaz**, C. S. Fewox, A. C. Stowe, J. R. Gray and A. G. Harter, "Aluminium Hydride: A Reversible Material for Hydrogen Storage," *Chemical Communications*, 25 3717-3719, 2009.

S. Eccarius, **B. L. García**, C. Hebling, and J. W. Weidner, "Experimental Validation of a Methanol crossover Model in DMFC Applications," *Journal of Power Sources*, 179 (2), 723-733, 2008.

B. L. García, R. Fuentes, and J. W. Weidner, "Low Temperature Synthesis of a $PtRu/Nb_{0.1}Ti_{0.9}O_2$," *Electrochemical and Solid-State Letters*, 10 (7) B108-B110, 2007.

B. L. García, B. Captain, R. D. Adams, A. B. Hungria, P. A. Midgley, S. J. M. Thomas, and J. W. Weidner, "Bimetallic Cluster Provides a Higher Activity Electrocatalyst for Methanol Oxidation," *Journal of Cluster Science*, 18 (1) 121-130, 2007.

B. L. García and J. W. Weidner, "Direct Methanol Fuel Cells," in *Modern Aspects of Electrochemistry*, Ralph E. White (ed.), vol. 40, 352, 2007.

B. L. García, V. A. Sethuraman, J. W. Weidner, R. Dougal, and R. E. White, "Mathematical Model of a Direct Methanol Fuel Cell," *Journal of Fuel Cell Science and Technology*, 1 (1), pp. 43-48, 2004.

B. L. García-Díaz, E. N. Hoffman, "Inhibition of Nitrate Induced Pitting by Nitrite Inhibitors," *Corrosion Science*, in preparation.