

STEPHEN S. RAIMAN

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Education and Training

Ph.D.

University of Michigan Ann Arbor, MI 2016
Nuclear Engineering and Radiological Sciences
Concentration: Materials
Advisor: Gary Was
Thesis Title: Irradiation Accelerated Corrosion of 316L Stainless Steel in Simulated Primary Water

B.S.

University at Buffalo Buffalo, NY 2010
Major: Physics
Minor: Mathematics

Experience

- Nov 2020 Assistant Professor, Nuclear Engineering, Texas A&M University, College Station, TX
- 2016-2020 R&D Associate, Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN.
Corrosion in molten salt systems, hydrothermal corrosion in light water reactors, materials degradation in supercritical steam
- 2019-2020 Adjunct Assistant Professor, Department of Nuclear Engineering, University of Tennessee
- 2010 – 2016 Graduate Student Research Assistant, Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, MI.
Built, tested and benchmarked a facility to conduct simultaneous irradiation and corrosion experiments in high temperature water using a proton beam. Conducted irradiation experiments for up to 72 hrs in flowing PWR primary water. Characterized oxides using a variety of microscopy techniques (TEM, STEM, Raman, SEM) to gain new insights into the mechanism of oxide formation under irradiation.
- 2009 REU Summer Intern, department of physics, University of Alabama at Birmingham
Performed high-pressure and low temperature experiments on an iron-based superconductor to find critical temperature. Performed and analyzed X-ray diffraction experiments with synchrotron radiation to determine phase changes under high pressure.

Research Interests

Corrosion in current and advanced nuclear reactors, materials degradation in molten salts, materials for heat transfer and energy storage, hydrothermal corrosion of metals and ceramics, high temperature corrosion, irradiation accelerated corrosion, radiation effects in nuclear materials, ion irradiation, stress corrosion cracking, IASCC, materials for concentrating solar power

Students Supervised

- Post-docs Supervised
 - Cory Parker 5/20-10/20
 - J. Matthew Kurley 1/19-4/20 (promoted to staff)
- Students Supervised
 - Miranda Mazza, Ph.D. pre-candidate, Texas A&M, 08/20-present
 - Reid Bohanon, Ph.D. pre-candidate, Texas A&M, 08/20-present
 - Kyle Williams, Ph.D. pre-candidate, Texas A&M, 08/20-present
 - Diego Macias, undergraduate, Texas A&M
 - Thomas Vandever, undergraduate, Texas A&M
- Students Supervised at ORNL (academically advised by Steven Zinkle at The University of Tennessee)
 - Peter Doyle, Ph.D nuclear engineering 10/16-5/20 (graduated)
 - William Ponder, M.S. nuclear engineering 8/18-12/20 (expected)
- Interns supervised
 - Ryan Gordon, Undergraduate, University of Connecticut, 5/20-8/20
 - Andre Hillsman, Masters Student, University of Tennessee, 2/20-5/20
 - Daniel Moriarty, Undergraduate, US Naval Academy, 7/19-8/19
 - Seungyun Ryu, Undergraduate, University of Akron, 5/19-8/19
 - Jacob Startt, PhD Student, Georgia Institute of Technology, 5/18-5/19
 - Riley Parrish, PhD Student, University of Florida, 5/18-7/18
 - Sam Pearson, Undergraduate, University of Akron, 5/18-8/18
 - Jordan Rushing, Undergraduate, US Naval Academy, 5/18-6/18
 - Rogelio De Las Casas Aranda, Undergraduate, University of Akron, 5/17-7/17, 1/18-5/18
 - Kevin Stahl, Undergraduate, Purdue, 5/17-7/17

Other Teaching Experience

2019	Mentor – MeV school at ORNL
2017	Organizer and Instructor Oak Ridge / Knoxville chapter of ASM short course on Corrosion
2013-2014	Course Assistant, University of Michigan NERS 522 Nuclear Materials II and NERS 524 Nuclear Fuels

Journal Publications

- J.K. Startt, R. Dingreville, S.S. Raiman, C. Deo “The Effect of Adsorbed Salts on Segregation of Cr at the Ni (100) Surface” *in review, Applied Surface Science*
- J.K. Startt, R. Dingreville, S.S. Raiman, C. Deo “Role of electronic charge transfer on the oscillatory segregation in Ni-Cr alloy” *in review, Applied Materials and Interfaces*
- D. Sulejmanovic, J.M.Kurley, K. Robb, B.A. Pint, **S.S. Raiman** “Validating Modern Methods for Impurity Analysis in Fluoride Salts” *in review, J. Nucl Mater.*
- **S.S. Raiman**, J.M. Kurley, D. Sulejmanovic, A. Willoughby, S. Nelson, K. Mao, C. Parish, M.S. Greenwood, B.A. Pint “Corrosion of 316H Stainless Steel in Flowing FLiNaK Salt” *in ORNL internal review*
- J.M. Kurley, D. Sulejmanovic, R.T. Mayes, **S.S. Raiman** “Chloroform as a More Economical Reagent for Purification of Molten Chloride Salts” *in ORNL internal review*

- **S.S. Raiman**, D. Sulejmanovic, S.A. Utlak, J.M. Kurley, W.S. Ponder, J.W. McMurray, B.A. Pint “Metallic Mg as a Redox Control Additive in Molten Chloride Salt” *in ORNL internal review*
- J. Moon, C.W. Abney, D. Dolzhenkov, J.M. Kurley, K. Beyer, J. Wright, S. Dai, R.T. Mayes, **S.S. Raiman** “In situ X-ray Absorption Study of Dilute Chromium Ions in a Molten Chloride Salt” *in ORNL internal review* preprint on ChemRxiv, DOI: 10.26434/chemrxiv.9959807.v1
- N.D. Ezell, S.S. Raiman, J.M. Kurley, J. McDuffee “Neutron Irradiation of Alloy N and 316L Stainless Steel in Contact with a Molten Chloride Salt” *in press*, Nuclear Engineering and Technology, DOI: 10.1016/j.net.2020.07.042
- R. Pillai, S.S. Raiman, B.A. Pint “First steps toward predicting corrosion behavior of structural materials in molten salts” *Journal of Nuclear Materials* 546 (2021) DOI: 10.1016/j.jnucmat.2020.152755
- P.J Doyle, C. Ang, L. Snead, Y. Katoh, K.A. Terrani, **S.S Raiman** “Hydrothermal Corrosion of First-Generation Dual-Purpose Coatings on Silicon Carbide for Accident-Tolerant Fuel Cladding” *Journal of Nuclear Materials* 544 (2021) DOI: 10.1016/j.jnucmat.2020.152695
- P.J. Doyle, S.J. Zinkle, **S.S. Raiman** “Hydrothermal corrosion behavior of CVD SiC in high temperature water” *Journal of Nuclear Materials* 539 (2020) DOI:10.1016/j.jnucmat.2020.152241
- P.J Doyle, K. Sun, L. Snead, Y. Katoh, D.A. Bartels, S.J. Zinkle, **S.S Raiman** “The effects of neutron and ionizing irradiation on the corrosion of SiC” *Journal of Nuclear Materials* 536 (2020) DOI: 10.1016/j.jnucmat.2020.152190
- P.J. Doyle, T. Koyanagi, C. Ang, L. Snead, P. Mouche, Y. Katoh, **S.S. Raiman** “Evaluation of the effects of neutron irradiation on first-generation corrosion mitigation coatings on SiC for accident-tolerant fuel cladding” *Journal of Nuclear Materials* 536 (2020) DOI: 10.1016/j.jnucmat.2020.152203
- **S.S. Raiman**, K.G. Field, R. Rebak, Y. Yamamoto, K.A. Terrani “Hydrothermal Corrosion of Second Generation FeCrAl Alloys for Accident Tolerant Fuel Cladding” *Journal of Nuclear Materials* 536 (2020) DOI: 10.1016/j.jnucmat.2020.152221
- P. J. Doyle, A. Savara, **S.S. Raiman** "Extracting meaningful standard enthalpies and entropies of activation for surface reactions from kinetic rates". *Reaction Kinetics, Mechanisms and Catalysis* 129, 551-581 (2020) DOI: 10.1007/s11144-020-01747-2
- J.W. McMurray, B. Jolly, S.S. Raiman, A. Schumacher, K. Cooley, E. Lara-Curzio “Ceramic Encapsulated Metal Phase Change Material for High Temperature Thermal Energy Storage” *Applied Thermal Engineering* 170 (2020) DOI: 10.1016/j.applthermaleng.2020.115003
- J.M. Kurley, P.W. Halstenberg, A. McAlister, S.S. Raiman, R.T. Mayes “Enabling Chloride Salts for Thermal Energy Storage: Implications of Salt Purity” *RSC Advances* 44 (2019) DOI: 10.1039/C9RA03133B
- **S.S. Raiman**, R.T. Mayes, J.M. Kurley, R. Parrish, E. Vogli, “Amorphous and Partially-Amorphous Metal Coatings for Corrosion Resistance in Molten Chloride Salt” *Solar Energy Materials and Solar Cells* 201 (2019) DOI: 10.1016/j.solmat.2019.110028
- J.J. Lee, S.S.Raiman, Y. Katoh, T. Koyanagi, C. Contescu, X. Hu “Chemical Compatibility of Silicon Carbide in Molten Fluoride Salts for the Fluoride Salt-Cooled High Temperature Reactor” *Journal of Nuclear Materials* 524 (2019) 119-134
- B.A. Pint, J.W. McMurray, A.W. Willoughby, J.M. Kurley, S.R. Pearson, M.J. Lance, D.N. Leonard, H. Meyer, J. Jun, S.S Raiman, R.T Mayes “Re-establishing the paradigm for evaluating halide salt compatibility to study commercial chloride salts at 600°C–800°C”, *Materials and Corrosion* 70 (2019) 1439-1449 DOI: 10.1002/maco.201810638.
- **S.S. Raiman**, P. Doyle, C. Ang, Y. Katoh, K.A. Terrani “Hydrothermal Corrosion of Coatings on Silicon Carbide in Boiling Water Reactor Conditions”, *Corrosion* 75 (2019) 217-223 doi.org/10.5006/2997
- **S.S. Raiman**, S.K. Lee “Aggregation and Data Analysis of Corrosion Studies in Molten Fluoride and Chloride Salts”, *Journal of Nuclear Materials* 511 (2018) 523-535

- J.W. McMurray, **S.S. Raiman** “Thermodynamic modeling of the K-KCl and Mg-MgCl₂ binary systems using the CALPHAD method”, *Solar Energy*, 170 (2018) 1039–1042
- **S.S. Raiman**, G.S. Was, “Accelerated corrosion and oxide dissolution in 316L stainless steel irradiated in situ in high temperature water”, *J. Nucl. Mater.* 493 (2017) 207–218.
- **S.S. Raiman**, D.M. Bartels, G.S. Was, “Radiolysis driven changes to oxide stability during irradiation-corrosion of 316L stainless steel in high temperature water”, *Journal of Nuclear Materials*, 493 (2017) 40–52.
- **S.S. Raiman**, A. Flick, O. Toader, P. Wang, N. A. Samad, Z. Jiao, and G. S. Was “A facility for studying irradiation accelerated corrosion in high temperature water”, *Journal of Nuclear Materials*, vol. 451, no. 1–3, pp. 40–47, 2014.

Refereed Conference Papers

- J. Jun, S.S. Raiman, R.D.L.C. Aranda, B.A. Pint “Effect of dissolved oxygen level on SCC susceptibility of LWR structural steels” Joint EPRI-123HiMAT International Conference on Advances in High Temperature Materials (2019)
- D. Sulejmanovic, S.S. Raiman, L. Garrison, H. Wang, L.S. Li, C. Silva, J.T. Busby “Materials integrity considerations and technical gap assessment for molten salt nuclear reactors” SMiRT-25 (2019)
- B.A. Pint, S.R. Pearson, R.D.L.C. Aranda, M.J. Lance, S.S. Raiman “Water Chemistry and Pressure Effects on Steam Oxidation of Ferritic and Austenitic Steels” Joint EPRI-123HiMAT International Conference on Advances in High Temperature Materials (2019)
- **S.S. Raiman**, P. Doyle, C. Ang, T. Koyanagi, D. Carpenter, K. Terrani, Y. Katoh, "Irradiation-Induced Cracking of Dual-Purpose Coatings on SiC" Proc. of 19th Intl Conf on Environmental Degradation. (2019)
- P. Doyle, S.S. Raiman, C. Ang, Y. Katoh, S. Zinkle, "Evaluation of the Corrosion Kinetics of SiC With and Without Mitigation Coatings in LWR Chemistries" Proc. of 19th Intl Conf on Environmental Degradation.– Water Reactors (2019)
- B.A. Pint, S.S. Raiman, J.R. Keiser “Lifetime Modeling for a Supercritical CO₂-Molten Salt CSP Power Block” SolarPaces 2018
- **S.S. Raiman**, P. Doyle, C. Ang, K. Terrani, "Hydrothermal Corrosion of SiC Materials for Accident Tolerant Fuel Cladding with and Without Mitigation Coatings," Proc. of 18th Intl Conf on Environmental Degradation. (2017)
- P. Doyle, S.S. Raiman, R. Rebak, K. Terrani, "Characterization of the Hydrothermal Corrosion Behavior of Ceramics for Accident Tolerant Fuel Cladding," Proc. of 18th Intl Conf on Environmental Degradation.– Water Reactors (2017)
- **S.S. Raiman**, P. Wang, G.S. Was, “Irradiation Accelerated Corrosion of Stainless Steel and Ferritic-Martensitic Steel in Simulated Primary Water”. NACE International, April, 2017
- **S.S. Raiman**, G.S. Was, “Composition and Morphology of the Oxide Film Formed on 316L Stainless Steel During In-Situ Proton Irradiation in PWR Conditions”, Proc. of 17th Intl Conf on Environmental Degradation. Ottawa, ON, Canada, 2015
- **S. S. Raiman**, G. S. Was, “Irradiation Accelerated Corrosion of Stainless Steel”, Fontevraud 8, Avignon, France, September 2014
- **S. S. Raiman**, G. S. Was, “The Effect of In-Situ Proton Irradiation on the Corrosion of 316L Stainless Steel”, Proc. of 16th Intl Conf on Environmental Degradation. Asheville, NC, 2013.

Refereed Extended Abstracts

- N.C. Gallego, C. Contescu, T. Burchell, J. Keiser, S.S. Raiman, K. Putyera, A.L. Qualls "Characterization of nuclear graphite for molten salt reactors (MSR)" Transactions of the ANS (Nov 2019)
- **S.S. Raiman**, R.T. Mayes, J.M. Kurley, J.R. Keiser, N.C. Gallego, C.I. Contescu, D. Sulejmanovic, A.L. Qualls "Compatibility Studies of Structural and Moderator Materials with Molten Chloride and Fluoride Salts" Transactions of the ANS (Nov 2019)
- J.K. Startt, C.S. Deo, **S.S. Raiman** "First-principles Investigation on the Effect of Salt Species Adsorption on Cr surface Segregation in Ni-Cr Alloys" Transactions of the ANS (June 2019)
- N.D. Ezell, J. McDuffee, K. Smith, S.S. Raiman "Initial Irradiation Testing of Chloride Salts for Molten Salt Reactors" Transactions of the ANS (Nov 2018)
- **S.S. Raiman**, P.J. Doyle "Hydrothermal Corrosion of Candidate Coatings on Silicon Carbide" Transactions of the ANS (June 2018)

Publicly Available Reports

- **S.S. Raiman**, D. Sulejmanovic, S.A. Utlak, J.M. Kurley, W.S. Ponder, J.W. McMurray, B.A. Pint "Corrosion of 316H Stainless Steel in Molten NaCl-MgCl₂ With and Without Mg as a Redox Control Additive" ORNL/TM-2019/1297
- **S.S. Raiman**, G. Muralidharan, R.T. Mayes, J.M. Kurley "Compatibility studies of cladding candidates and advanced low-Cr superalloys in molten NaCl-MgCl₂" ORNL/TM-2019/1132 doi:10.2172/1507851
- J.K. Startt, C.S. Deo, **S.S. Raiman**, "Modeling Salt-Material Interactions in Molten Salt Reactors: Opportunities and Path Forward" ORNL/TM-2019/1194
- **S.S. Raiman**, K.G. Field, R. Rebak, Y. Yamamoto, K.A. Terrani "Hydrothermal Corrosion of Second Generation FeCrAl Alloys in Boiling Water Reactor Conditions" ORNL/TM-2019/1111 doi:10.2172/1507856
- J. T. Busby, L.M. Garrison, L. Lin, S.S. Raiman, S. Sham, C. Silva, H. Wang "Technical Gap Assessment for Materials and Component Integrity Issues for Molten Salt Reactors" NRC ML19077A137 March 2019
- R.T. Mayes, J.M. Kurley, P.W. Halstenberg, A. McAlister, D. Sulejmanovic, S.S. Raiman, S. Dai, B.A. Pint "Purification of Chloride Salts for Concentrated Solar Power Applications" ORNL/LTR-2018/1052 doi:10.2172/1506795
- J. McDuffee, N.D. Ezell, K. Smith, N. Taylor, S.S. Raiman, A.L. Qualls "Design and Irradiation of a Molten Salt Corrosion Experiment in the Ohio State University Research Reactor" ORNL/TM-2018/1005 September, 2018 doi:10.2172/1480620
- C. Ang, S.S. Raiman, J.R. Burns, X. Hu, Y. Katoh "Complete evaluation for the first-generation dual-purpose coating for SiC cladding" ORNL/TM-2017/318 January, 2018

Invited Talks and Seminars

- S.S. Raiman "Corrosion in Molten Salts: What matters, what doesn't, and what we can do about it" American Chemical Society (ACS), virtual, August 2021
- S.S. Raiman "Corrosion in Molten Salts: What matters, what doesn't, and what we can do about it" NRC Advanced Reactor Workshop, Rockville MD, December 2019
- S.S. Raiman "Hotter, Safer, Stronger, Cheaper: Using Corrosion Science to Address Challenges in the Nuclear Industry" *University of Connecticut, Materials Science Department Colloquium*, October 2019

- S.S. Raiman et al. “A Holistic Approach to Understanding Alloy Degradation in Molten Chloride Salts”, ACS, San Diego, CA, August 2019
- S.S. Raiman, J.W. McMurray, R.T. Mayes, J.M. Kurley, C. Abney, D. Sulejmanovic, J. Moon “Understanding and Controlling Alloy Corrosion in Molten Chloride Salt” ACS, Orlando, FL, April 2019
- S.S. Raiman “Hotter, Safer, Stronger, Cheaper: Using Corrosion Science to Address Challenges in the Nuclear Industry” *University of Wisconsin, Special Seminar*, December 2018
- S.S. Raiman “Hotter, Safer, Stronger, Cheaper: Using Corrosion Science to Address Challenges in the Nuclear Industry” *University of Tennessee, Nuclear Engineering Department Colloquium*, October 2018
- S.S. Raiman “Fundamental and Applied Studies of Materials Degradation in Molten Chloride Salts, *University of Tennessee, Materials Science and Engineering, Invited Seminar*, May 2018
- S.S. Raiman “Corrosion Studies of Next-Generation LWR Fuel Cladding” *Georgia Tech, Nuclear and Radiological Engineering Department Colloquium*, March 2018
- S.S. Raiman “Corrosion Studies of Coated Silicon-Carbide for use as Next-Generation LWR Fuel Cladding” *University of Akron, Corrosion Engineering Department Colloquium*, February 2018
- S.S. Raiman et al. “Corrosion of candidate materials for accident tolerant fuel cladding” Intl. Soc. of Electrochemistry, Providence, RI, August 2017

Contributed Conference Talks

- S.S. Raiman et al. “Irradiation-Corrosion of Dual Purpose Coatings on SiC”, ICACC, Daytona Beach, FL, January 2020
- S.S. Raiman et al. “Neutron Irradiation of Structural Materials in Molten Chloride Salt” MiNES, Baltimore, MD, October 2019
- S.S. Raiman et al., “Irradiation-Induced Cracking of Dual-Purpose Coatings on SiC” Environmental Degradation of Materials in Nuclear Power Systems, Boston, MA, August 2019
- S.S. Raiman, E. Vogli, R. Parrish “Corrosion and Recrystallization of Amorphous Metal Coatings in Molten Chloride Salt” Corrosion, Nashville, TN, March 2019
- S.S. Raiman, J.W. McMurray, R.T. Mayes, J.M. Kurley, C. Abney, D. Sulejmanovic, J. Moon “Understanding Degradation of Structural Alloys in Molten Chloride Salt” TMS, San Antonio, TX, March 2019
- S.S. Raiman, P. Doyle, T. Koyanagi, C. Ang, Y. Katoh, K.A. Terrani “Irradiation-Corrosion of Coated Silicon Carbide for Accident Tolerant Fuel Cladding” ICACC, Daytona Beach, FL, January 2019
- S.S. Raiman, R.T. Mayes J.W. McMurray “Investigating Chromium Dealloying in Molten Chloride Salt” AiChE, Pittsburgh PA, October 2018
- S.S. Raiman, J.W. McMurray, R.T. Mayes, J.M. Kurley, C. Abney, J. Moon “Corrosion of Structural Materials in Molten Chloride Salt” NuMat, Seattle WA, October 2018
- S.S. Raiman, J.W. McMurray, R.T. Mayes, C. Abney, J. Moon “Corrosion of Ni-Cr Binary Alloys in Molten Chloride Salt” ACS, Boston MA, August 2018
- S.S. Raiman, P. Doyle “Hydrothermal Corrosion of Candidate Coatings on Silicon Carbide” ANS, Philadelphia, PA, June 2018
- S.S. Raiman, J.W. McMurray, R.T. Mayes, C. Abney, J.M. Kurley, J. Moon “Understanding Corrosion of Ni-Cr Alloys in Molten Chloride Salts” ECS, Seattle WA, March 2018
- S.S. Raiman, P. Doyle, C. Ang, B.A. Pint, R. Rebak, Y. Katoh, K. Terrani “Hydrothermal Corrosion of FeCrAl and Coated SiC for Accident Tolerant Fuel Cladding” ECS, Seattle WA, March 2018
- S.S. Raiman, P. Doyle, C. Ang, Y. Katoh, K. A. Terrani “Hydrothermal Corrosion of Coatings on Silicon Carbide in Boiling Water Reactor (BWR) Conditions” TMS, Phoenix, AZ, March 2017

- S.S Raiman, A. Willoughby, B.A. Pint, “A New Facility for Comparing Water Treatments in Ultra-Supercritical Steam Boilers” TMS, Phoenix, AZ, March 2017
- S.S Raiman, P. Doyle, C. Ang, Y. Katoh, K. Terrani “Hydrothermal Corrosion of Coatings on Silicon Carbide in Boiling Water Reactor (BWR) Conditions” ICACC, Daytona Beach FL, January 2018
- S.S Raiman, P. Doyle, C. Ang, “Hydrothermal Corrosion of Environmental Barrier Coatings on Silicon Carbide in Boiling Water Reactor (BWR) Conditions” MRS, Boston, MA, November 2017
- S.S. Raiman, J.R. Keiser “Corrosion of Structural Materials in Molten Fluoride and Chloride Salt”, IAEA workshop on coolants for the fast neutron spectrum, Vienna, Austria, July 2017
- S. S. Raiman, G. S. Was, “Accelerated Oxide Dissolution During Irradiation-Corrosion of 316L Stainless Steel in Primary Water” TMS Annual Meeting, Nashville, TN, February 2016.
- S. S. Raiman, G. S. Was, “Irradiation Accelerated Corrosion of 316L Stainless Steel in PWR Conditions,” ANS Winter Meeting, Washington, DC, November, 2015
- S. S. Raiman, K. Kanjana, D. A. Bartels, G. S. Was, “Corrosion of 316L Stainless Steel in Primary Water during In-Situ Proton or Electron Irradiation” TMS Annual Meeting, Orlando, FL, March 2015.
- S. S. Raiman, P. Wang, G. S. Was, “Corrosion of 316L Stainless Steel in Simulated PWR Conditions With In-Situ Proton Irradiation,” TMS Annual Meeting, San Diego, CA, February 2014
- S. S. Raiman, P. Wang, Z. Jiao, and G. S. Was, “TEM Studies of the Oxidation of 316 Stainless Steel with In-Situ Proton Irradiation,” Microscopy and Microanalysis, Indianapolis, IN, August 2013

Synergistic Activities

- Lead organizer, Materials and Chemistry for Molten Salt Systems symposium at TMS 2019, 2020, 2021
- Member, TMS Corrosion & Environmental Effects Committee, Nuclear Materials Committee
- Reviewer: Journal of Nuclear Materials, Corrosion Science, Nuclear Science and Technology, Corrosion, Oxidation of Metals, Journal of the Electrochemical Society, Annals of Nuclear Energy, Solar Energy Materials and Solar Cells, JOM, Materials and Metallurgical Transactions A, Acta Materialia

Awards and Honors

- Innovations in Fuel Cycle Research Award, Advanced Fuels category, 2015
- University of Michigan, College of Engineering Distinguished Leadership Award, 2012
- University at Buffalo, Sekula Scholarship, 2009