Sujan Shrestha

Curriculum Vitæ (May 21, 2020)

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APPOINTMENTS

Application Engineer 2018-Present
Admiral Instruments

- Address technical inquiries from customers
- Lead hardware validation and testing
- Define requirements, design features, and test during software development
- Lead on designing, procuring and marketing electrochemical accessories that go with the potentiostats
- Support to the sales and marketing team

Research Assistant Professor 2017-2018
University of South Carolina, Columbia

- Designed and tested Aluminum primary alkaline battery prototypes
- Reduced hydrogen gassing during corrosion of Aluminum by 2 orders of magnitude
- Developed Zinc deposition baths for galvanic protection of Aluminium
- Tested corrosion rates of aluminium alloys in Zinc deposition baths
- Trained and supervised 2 undergraduates and advised 1 PhD student

Research Associate 2016-2017
Queens College, New York

- Electrochemically characterized laser-induced hydrodynamical properties of gold nanofluids
- Fabricated plasmonic devices to characterize polarized light
- Devised protocols for electroplating gold nano-wells on glass slides

Postdoctoral Fellow 2013-2015
City College of New York, New York

- Developed processes to electroplate palladium in ionic liquids
- Wrote 4 federal NSF grants with the advisor
- Conducted preliminary experiments for proposals
- Oversaw maintenance of lab safety according to EHS and OSHA regulations

- Trained and supervised 4 undergraduates, 3 Master students and advised 2 PhD students

Graduate Research Assistant 2008-2013
University of Connecticut, Storrs

- Developed nitrogen-doped high surface area carbon (NHSC) for electrochemical devices
- Synthesized platinum nanoparticles on various carbons supports
- Measured activity and stability of oxygen reduction reaction (ORR) catalysts using thin-film rotating ring-disk electrode (RRDE) technique
- Fabricated membrane electrode assembly (MEA) in a PEM fuel cell to test the performance of oxygen reduction reaction catalysts
- Collaborated with Physical Science, Inc on scale-up of the high surface area nitrogen-doped carbon
- Formulated a new flow-assisted process to coat gold electrodes on an enclosed channel in PDMS microfluidic devices
- Managed and trained 7 undergraduates and 1 summer REU fellow

EDUCATION

PhD Chemical Engineering 2008-2013
University of Connecticut, Storrs

"Role of Nitrogen Defects in Nitrogen-Doped Carbon for Electric Double-Layer Capacitor and Catalyst Support"

Thesis advisor: William E. Mustain

BS Chemistry 2004-2008
Fairleigh Dickinson University, Teaneck

Summa Cum Laude. Academic/Research advisors: Arthur Murphy/ Mihaela Leonida

SKILLS

X-ray photoelectron spectroscopy: Experience in preparing samples, designing methods, running experiments, and data analysis in CasaXPS. Mostly worked with Carbon, Nitrogen, Platinum, and Palladium

Computer programs: Microsoft Word, Excel, and PowerPoint

Other characterization techniques: Scanning electrons microscopy (SEM), Transmission electron microscopy (TEM), X-ray diffraction (XRD), Raman spectroscopy, Glove box operation, BET surface area analysis, Karl-Fischer titration, Electrochemical Impedance Spectroscopy (EIS), Fuel cell assembly/testing, Electrodeposition, Thin film RDE technique, Electrochemical analysis, Metal nanoparticle synthesis, Synthesis of porous materials, Ionic liquids, Nanocolloidal assembly

PEER-REVIEWED JOURNAL PAPERS (Statistics)

22. E. Faegh, S. Shrestha, X. Zhao and W. E. Mustain, "In-depth Structural Understanding of Zinc Oxide Addition to Alkaline Electrolytes to Protect Aluminium Against Corrosion and Gassing", *J. Appl. Chem.* , (2019).

21. G. Padmalaya, S. Shrestha, P. D. Kumar, and B. S. Sreeja, "An Electrochemical Cd (II) Sensor Using Cellulose Acetate Functionalized ZnO Nanocomposite and Its Behavioral Properties", *Anal. Bioanal. Chem.* , 1 (2018).

20. E. Faegh, T. Omasta, M. Hull, S. Ferrin, S. Shrestha, J. Lechman, D. Bolintineanu, M. Zuraw, and W. E. Mustain, "Understanding the Dynamics of Primary $Zn - MnO_2$ Alkaline Battery Gassing with Operando Visualization and Pressure Cells", *J. Electrochem. Soc.* **165**, A2528 (2018).

19. S. Shrestha, J. L. Dominguez-Juarez, and L. T. Vuong, "Light-induced Electrohydrodynamic Instability in Plasmonically Absorbing Gold Nanofluids", *Phys. Rev. Fluids* **2**, 064201 (2017).

18. S. Shrestha, M. Nagib, and E. J. Biddinger, "Pd Nanoparticle Formation during Constant Potential Electrodepositions in Ionic Liquids", *ECS Transactions* **75**, 649 (2016).

17. S. Shrestha, M. Nagib, and E. J. Biddinger, "Size-Controlled Synthesis of Palladium Nanospheres by Pulse Electrodeposition in 1-Butyl-3-methylimmidazolium Chloride Ionic Liquid", *J. Electrochem. Soc.* **163**, D74 (2016).

16. S. Shrestha and E. J. Biddinger, "Palladium Electrodeposition in 1-Butyl-1-methylpyrrolidinium Dicyanamide Ionic Liquid", *Electrochim. Acta* **174**, 254 (2015).

15. S. Shrestha, N. Morse, and W. E. Mustain, "Effect of Surface Chemistry on the Double Layer Capacitance of Polypyrrole-Derived Ordered Mesoporous Carbon", *RSC Advances* **4**, 47039 (2014).

14. S. Shrestha, E. Gjoka, and E. J. Biddinger, "Electrodeposition of Palladium in 1-Butyl-3-Methylimidazolium Chloride Ionic Liquid", *ECS Transactions* **64**, 267 (2014).

13. A. Kadilak, Y. Liu, S. Shrestha,J. R. Bernanrd, W. E. Mustain, and L. M. Shor, "Selective Deposition of Chemically-Bonded Gold Electrodes onto PDMS Microchannel Side Walls", *J. Electroanal. Chem.* **727**, 141 (2014).

12. S. Shrestha, S. Asheghi, J. Timbro, and W. E. Mustain, "Temperature Controlled Surface Chemistry of Nitrogen Doped Mesoporous Carbon and Its Influence on Pt ORR Activity", *Appl. Cat., A.* **464**, 233 (2013).

11. S. Shrestha, S. Asheghi, J. Timbro, and W. E. Mustain, "Effects of Pore Structure in Nitrogen Functionalized Mesoporous Carbon on Oxygen Reduction Reaction Activity of Platinum Nanoparticles", *Carbon* **60**, 28 (2013).

10. L. Su, S. Shrestha, Z. Zhang, W. E. Mustain, and Y. Lei, "Platinum-Copper Nanotube Electrocatalyst with Enhanced Activity and Durability for Oxygen Reduction Reaction", *J. Mater. Chem. A* **1**, 12293 (2013).

9. J. A. Vega, S. Shrestha, M. Ignatowich, and W. E. Mustain, "Carbonate Selective $Ca_2Ru_2O_{7-y}$ Pyrochlore Enabling Room Temperature Carbon Fuel Cells: I. Synthesis and Characterization", *J. Electrochem. Soc.* **159**, B12 (2012).

8. Y. Liu, S. Shrestha and W. E. Mustain, "Synthesis of Nanosize Tungsten Oxide and Its Evaluation as an Electrocatalyst Support for Oxygen Reduction Reaction", *ACS Catal.* **2**, 456 (2012).

7. S. Shrestha, S. Asheghi, J. Timbro, and W. E. Mustain, "Influence of Pore Structure of N-Doped Mesoporous Carbon in PEM Fuel Cells", *ECS Transactions* **50**, 1287 (2012).

6. S. Shrestha, Y. Liu, and W. E. Mustain, "Electrocatalytic Activity and Stability of Pt Clusters on State-of-the-Art Supports: A Review", *Catal. Rev. Sci. Eng.* **53**, 256 (2011).

5. S. Shrestha, S. Asheghi, J. Timbro, C. M. Lang, and W. E. Mustain, "ORR and Fuel Cell Performance of Pt Supported on N-Functionalized Mesoporous Carbon", *ECS Transactions* **41**, 1183 (2011).

4. S. Shrestha and W. E. Mustain, "Properties of Nitrogen-Functionalized Ordered Mesoporous Carbon Prepared Using Polypyrrole Precursor", *J. Electrochem. Soc.* **157**, B1665 (2010).

3. S. Shrestha and W. E. Mustain, "Platinum Nanoparticles Supported on N-Functionalized Mesoporous Carbon", *ECS Transactions* **33**, 293 (2010).

2. S. Shrestha and W. E. Mustain, "Electrochemical Studies of N-Functionalized Mesoporous Carbon", *ECS Transactions* **28**, 27 (2010).

1. P. Ramachandran, M. Fouad, B. Aurian-Blajeni, S. Shrestha, and M. D. Leonida, "Enzyme Modified By Transient Exposure to Ionic Liquids Shows Promise For Use in Biosensors (Ionic Liquids Used in Enzyme "Wiring")", *Nonlinear Opt. Quantum Opt* **44**, 167 (2010).

BOOK CHAPTER

- S. Shrestha and W. E. Mustain, "Promises and Challenges of Unconventional Electrocatalyst Support", In M. Shao (ed), Electrocatalysts in Fuel Cells: A Non and Low Platinum Approach, Springer, London, (2013).

CONFERENCE PRESENTATIONS

14. S. Shrestha, M. Dion, and M. Sholin, "Discharging Batteries Using Maximum Power Point Tracking (MPPT) Algorithm", *IBA 2019*, San Diego (2019) Poster.

13. S. Shrestha, M. Sholin, C.A. Schiller, M. S. Froba,M. Multerer, and W. Strunz, "Accounting for Unsteady-State Behavior During Electrochemical Impedance Spectroscopy", *AiMES 2018*, Cancun (2018) Poster.

12. S. Shrestha, M. Nagib, and E. J. Biddinger, "Electrochemical Recovery of Fission Platinoids in 1-Butyl-1-Methylpyrrolidinium Dicyanamide Ionic Liquid", *2015 Annual AIChE Meeting*, Salt Lake City (2015) Oral.

11. S. Shrestha and E. J. Biddinger, "Effect of 1-Butyl-1-Methylpyrrolidinium Dicyanamide on the Structure of Pd Electrodeposit", *228th ECS Meeting*, Phoenix (2015) Oral.

10. S. Shrestha, E. Gjoka, and E. J. Biddinger, "Electrodeposition of Fission Platinoids in Ionic Liquids for Nuclear Waste Management", *2014 Annual AIChE Meeting*, Atlanta (2014) Oral.

9. S. Shrestha, E. Gjoka, and E. J. Biddinger, "Electrodeposition of Palladium in 1-Butyl-3-Methylimidazolium Chloride and 1-Butyl-3-Methylimidazolium Dicyanamide Ionic Liquids", *226th ECS Meeting*, Cancun (2014) Oral.

8. S. Shrestha and W. E. Mustain, "Effect of Nitrogen Surface Chemistry in Electric Double Layer Capacitance of Nitrogen Doped Ordered Mesoporous Carbon", *2012 Annual AIChE Meeting*, Pittsburgh (2012) Oral.

7. S. Shrestha, S. Ashegi, J. Timbro, and W. E. Mustain, "Influence of Chemistry and Structure of Nitrogen Doped Mesoporous Carbon Support on the ORR Activity of Platinum for Fuel Cell Applications", *2012 Annual AIChE Meeting*, Pittsburgh (2012) Oral.

6. S. Shrestha, S. Ashegi, J. Timbro, and W. E. Mustain, "Influence of Chemistry and Structure on the ORR Activity of Pt Supported on N-Doped Mesoporous Carbon", *222th ECS Meeting*, Honolulu (2012) Oral.

5. S. Shrestha, S. Ashegi, J. Timbro, C. M. Lang, and W. E. Mustain, "NOMC Synthesized From Modified SBA-15 and its Effect on ORR Activity", *220th ECS Meeting*, Boston (2011) Oral.

4. S. Shrestha and W. E. Mustain, "Stability and ORR Activity of Nitrogen Functionalized Ordered Mesoporous Carbon", *2010 Annual AIChE Meeting*, Salt Lake City (2010) Oral.

3. S. Shrestha, S. Ashegi, J. Timbro, C. M. Lang, and W. E. Mustain, "Effect of Pore Size of SBA-15 on the NOMC Synthesized from Pyrrole and its Application in PEM Fuel Cells", *220th ECS Meeting*, Boston (2011) Poster.

2. S. Shrestha and W. E. Mustain, "Novel Properties of Surface Modified Ordered Mesoporous Carbon Support For Electrochemical Applications", *2010 Annual AIChE Meeting*, Salt Lake City (2010) Poster.

1. S. Shrestha and W. E. Mustain, "Surface Modified Ordered Mesoporous Carbon for Electrochemical Applications", *218th ECS Meeting*, Las Vegas (2010) Poster.

PROPOSALS

5. Department of Energy (DOE), "Battery Sorting with Voltammetry and Impedance Data", Leader:Mark Sholin (Sept 2019).

4. National Science Foundation (NSF), "Ionicity of Silylamine Reversible Ionic Liquids used as Switchable Electrolytes", PI: E. J. Biddinger (Oct 2014).

3. National Science Foundation (NSF), "Using Ionic Liquids to Control Carbon Dioxide Reduction on Cu Electrocatalysts", PI: E. J. Biddinger (Nov 2014).

2. National Science Foundation (NSF), "Novel Electrochemical Stirred Reactor for Scale-up of Supported Metal Nanoparticle Manufacturing", PI: E. J. Biddinger (Feb 2015).

1. National Science Foundation (NSF), "InSitu Microscopy Investigations on the Effect of Ionic Liquids in Nucleation and Growth of Electrodeposited Palladium Films", PI: E. J. Biddinger and G. G. Botte (Oct 2015).

SERVICE

- Manuscript Reviewer: *Carbon*, *Nano-Micro Letters*, *Journal of Fuel Cell Science and Technology*.
- Co-chair at Catalysis with Microporous and Mesoporous Materials III Session, *2015 Annual AIChE Meeting*, Salt lake City.
- Judge at Undergraduate Poster Competition, *2015 Annual AIChE Meeting*, Salt lake City.
- Judge at Undergraduate Poster Competition, *2014 Annual AIChE Meeting*, Atlanta.

AWARDS

- CUNY Postdoctoral Travel Award, (2014).
- Travel Award, Molten Salts and Ionic Liquids 19, 226th ECS Meeting, Cancun, (2014).
- Travel Award, PEFC 12 Symposium, 222nd ECS Meeting, Hawaii, (2012).
- Doctoral Dissertation Fellowship, University of Connecticut, (2012).
- Honorable Mention, PEFC-11 Poster Session, 220th ECS Meeting, Boston , (2011).
- Top Ten, PEFC-10 Poster Session, 218th ECS Meeting, Las Vegas, (2010).
- Colonel Fairleigh S. Dickinson Scholarship, Fairleigh Dickinson University, (2004-2008).

TEACHING

- Electrochemistry Primer, City College of New York, Biddinger Research Group, New York, NY, (2014).
- Teaching Assistant, University of Connecticut, Storrs, CT, (2008-2009).
- Teaching Assistant, Fairleigh Dickinson University, Teaneck, NJ, (2006-2008).