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Laboratory Manual Editor

- Initiated and coordinated the 2020 revision of the Brushett Group Lab Manual
- Delegated revision responsibilities among group members
- Authored new standard operating procedures (SOPs) for the Energy Conversion Subgroup
- Typeset the Laboratory Manual with Adobe InDesign®

Laboratory Data Manager

- Organized and managed the group's data with a Dropbox file system
- Improved data collection from laboratory sensors with Python-based data recording routines

Graduate Consultant

January 2017 to May 2017

Woodside Energy, Inc.

Pluto Feed Composition Modeling - Project Lead

- Developed a model to predict subsea natural gas well compositions for a network of offshore sites using onshore measurements from the Pluto LNG plant
- Validated operator heuristics composition lag times with model predictions for offshore-to-onshore composition changes

Assessing Train Efficiency During Offshore Constrained Production at KGP

- Evaluated LNG train efficiencies at the [Karratha Gas Plant \(KGP\)](#) to inform future plant operation and turndown strategies in resource-constrained scenarios
- Recommended using individual compressor efficiencies as descriptors for overall train efficiency

MedImmune, LLC

Developing Automation to Enable a Self-Regulating Continuous Purification Process

- Developed an automated control system for continuous purification of biologic drug products using a simple, low-cost Arduino platform
- Enabled future functionality upgrades by a second group of MIT Graduate Consultants in 2018

Evaluating an in vitro Tool to Predict Bioavailability of Protein Therapeutics Upon Subcutaneous Injection

- Evaluated the feasibility of deploying a commercial in vitro screening platform for comparing the release rates of various subcutaneously-injected drug formulations
- Identified a low-cost, in-house alternative to the commercial solution

Undergraduate Research Assistant

January 2012 to May 2015

High-Temperature Materials Laboratory, Montana State University

Developing MAX-phase coatings for hot corrosion mitigation

- Advisor: [Professor Roberta Amendola](#)
- Fabricated thin-film MAX-phase coatings using magnetron sputtering physical vapor deposition
- Pursued Cr-Al-C thin-films for mitigating Type II hot corrosion in jet turbine combustion zones

High-temperature corrosion of electroless nickel-plated ferritic stainless steel for SOFC components

- Advisor: [Professor Paul E. Gannon](#)
- Investigated high-temperature corrosion of metallic interconnect components for solid oxide fuel cells (SOFC) under a dual hydrogen-oxygen environment in the absence of electrical current
- Concluded from SEM, EDS, and XRD of sample cross-sections that electroless nickel coatings did not protect the 441SS alloy from corrosion over 100 hour experiments at 800°C

Process Engineering Intern

May 2014 to August 2014

IM Flash, LLC

- Implemented a process quality enhancement project in the Physical Vapor Deposition group
- Used Fab production data to improve the group's engineering processes
- Designed production defect reduction experiments to improve NAND wafer yield

Characterization

Gas chromatography (GC), High-pressure liquid chromatography (HPLC), SEM, EDS, UV/vis, XRD, XPS, Contact angle goniometry, Bubble point pressure measurement

Devices & Systems

Potentiostats, Three-electrode electrochemical cells, Flow cells, Electrolyzers, Mass flow controllers, Data acquisition (DAQ)

Engineering & Economics

Kinetics, Thermodynamics, Transport Phenomena, Numerical Methods, Machine Learning, Systems Engineering, Electrochemistry, Electrical Engineering, Microeconomics, Macroeconomics, Development Economics, International Economics

Machining & Fabrication

CNC mill machining, Laser cutting, Waterjet cutting, Catalyst spray-deposition, Membrane-electrode-assembly hot pressing, decal transfer

PROFESSIONAL MEMBERSHIPS The Electrochemical Society

ACADEMIC MEMBERSHIPS • Society of Energy Fellows
• Goldwater Scholars

PUBLICATIONS 1. M. E. Leonard; M. J. Orella; N. Aiello; Y. Román-Leshkov; A. Forner-Cuenca; F. R. Brushett, “Editors’ Choice—Flooded by Success: On the Role of Wettability in CO₂ Electrolyzers that Generate Liquid Products”, *Journal of The Electrochemical Society*, 2020, 167(12), 124521.
2. M. J. Orella; M. E. Leonard; Y. Román-Leshkov; F. R. Brushett, “Automated Analysis of Contact Angle Goniometry Data Using DropPy”, *Software X*, (In Review).
3. M. E. Leonard; L. E. Clarke; A. Forner-Cuenca; S. M. Brown; F. R. Brushett, “Investigating Electrode Flooding in a Flowing Electrolyte, Gas-Fed Carbon Dioxide Electrolyzer”, *ChemSusChem*, 2020, 13(2), 400–411. Selected as a *Very Important Paper*
4. M. J. Orella; S. M. Brown; M. E. Leonard; Y. Román-Leshkov; F. R. Brushett, “A General Techno-Economic Model for Evaluating Emerging Electrolytic Processes”, *Energy Technology*, 2019, 1–12.
5. S. Sen; S. M. Brown; M. Leonard; F. R. Brushett, “Electroreduction of carbon dioxide to formate at high current densities using tin and tin oxide gas diffusion electrodes”, *Journal of Applied Electrochemistry*, 2019, 49(9), 917–928.
6. S. Sen; M. Leonard; R. Radhakrishnan; S. Snyder; B. Skinn; D. Wang; T. Hall; E. J. Taylor; F. R. Brushett, “Pulse Plating of Copper onto Gas Diffusion Layers for the Electroreduction of Carbon Dioxide”, *MRS Advances*, 2018, 3(23), 1277–1284.
7. S. Sen; B. Skinn; R. Radhakrishnan; M. Leonard; F. R. Brushett, “Investigation of Pulse-Reverse Electrodeposited Copper Electrocatalysts for Carbon Dioxide Reduction to Ethylene”, *ECS Transactions*, 2017, 77(11), 933–946.
8. L. Aw; R. Amendola; P. E. Gannon; M. Leonard, “Type II Hot Corrosion Behaviors of Cr, Al, C Binary and Ternary Thin Film Coatings on Ni-201”, *ECS Transactions*, 2015, 64(26), 149–159.
9. M. E. Leonard; R. Amendola; P. E. Gannon; W.-J. Shong; C.-K. Liu, “High-Temperature (800 °C) Dual Atmosphere Corrosion of Electroless Nickel-Plated Ferritic Stainless Steel”, *International Journal of Hydrogen Energy*, 2014, 39(28), 15746–15753.

PRESENTATIONS 1. M. E. Leonard; N. Aiello; L. E. Clarke; M. J. Orella; F. R. Brushett, “Wettability of Gas Diffusion Electrode Materials for CO₂ Reduction”, *Oral Presentation*, 236th Meeting of the Electrochemical Society, Atlanta, GA, USA, 2019.
2. M. E. Leonard; L. E. Clarke; A. Forner-Cuenca; S. M. Brown; F. R. Brushett, “Towards Understanding GDE Flooding in a Flowing Electrolyte CO₂ Reactor”, *Oral Presentation*, 235th Meeting of the Electrochemical Society, Dallas, TX, USA, 2019.
3. M. E. Leonard “Engineering Porous Electrode for CO₂ Upgrading”, *Oral Presentation*, Doctoral Student Seminar, MIT Department of Chemical Engineering, Cambridge, MA, USA, 2018.
4. B. Skinn; S. Sen; M. Leonard; R. Radhakrishnan; D. Wang; A. Forner-Cuenca; T. D. Hall; S. Snyder; F. R. Brushett; E. J. Taylor, “Pulsed Electrodeposition of Gas-Diffusion Electrocatalysts

- for CO₂ Reduction”, *Oral Presentation*, 234th Meeting of The Electrochemical Society, Cancun, Mexico, 2018.
5. R. Radhakrishnan; B. Skinn; S. Sen; M. Leonard; T. D. Hall; S. Snyder; F. R. Brushett; E. J. Taylor, “Pulsed Electrodeposition of Gas Diffusion Electrocatalysts for CO₂ Reduction to Value-Added Products”, *Oral Presentation*, 233rd Meeting of The Electrochemical Society, Seattle, WA, USA, 2018.
 6. M. Leonard “Synthesis of Cr₂AlC MAX-Phase Protective Coating on Ni-201 Substrate via Magnetron Sputtering”, *Poster Presentation*, Montana Space Grant Consortium Research Symposium, Montana State University, Bozeman, MT, USA, 2014.
 7. M. Leonard “Performance of Electroless Nickel Plating on 441 Stainless Steel for SOFC Interconnect Applications”, *Poster Presentation*, National Conference on Undergraduate Research, University of Wisconsin - La Crosse, La Crosse, WI, USA 2013.