

Christopher G. Arges, Ph.D

3307 Patrick Taylor Hall, LSU, Baton Rouge, LA 70803 | carges@lsu.edu | U.S. Citizen | <https://faculty.lsu.edu/carges/index.php>

PROFESSIONAL EXPERIENCE

Louisiana State University – Cain Department of Chemical Engineering Baton Rouge, LA
Gordon A. and Mary Cain Professorship – Assistant Professor Jan 2016 - current

Baxter International, Inc. Round Lake, IL
Research Associate II Jul 2007 – Aug 2009

Hospira, Inc. (now a part of Pfizer) Clayton, NC
Associate Scientist (promoted from Assistant Scientist) Jun 2005 – Jun 2007

EDUCATION

University of Chicago – Institute for Molecular Engineering Chicago, IL
Argonne National Laboratory – Materials Science Division
Postdoctoral Scholar Oct 2013 – Dec 2015
Adviser: Professor Paul F. Nealey

Illinois Institute of Technology Chicago, IL
Doctoral of Philosophy in Chemical Engineering Aug 2009 – Sep 2013
Dissertation: Structure-property relationships in anion exchange membranes for electrochemical energy conversion and storage
Adviser: Professor Vijay Ramani (now at Washington University St. Louis)

North Carolina State University Raleigh, NC
Master of Science in Chemical Engineering (non-thesis) May 2006 – Dec 2008

University of Illinois Urbana-Champaign, IL
Bachelor of Science in Chemical Engineering Aug 2001 – May 2005
Thesis: Steady-state and time-resolved fluorescence for studying electron energy transfer mechanisms in organic dendrimers and DNA
Adviser: Professor Christopher J. Bardeen (now at University of California Riverside)

PUBLICATIONS – <https://scholar.google.com/citations?user=AQG8WlcAAAAJ&hl=en>

Peer-reviewed articles; h-index 22, over 1800 citations, 46 publications overall

Superscript designation: a = corresponding author, b = Arges Lab student

Most recent publications from my research group

10. S. Kole^b, G. Venugopalan^b, D. Bhattacharya^b, L. Zhang^b, J. Cheng^c, B. Pivovar, and C.G. Arges^a, Bipolar membrane polarization behavior with systematically varied interfacial areas in the junction region, *Journal of Materials Chemistry A*, **2021**, 9, 2223, <https://doi.org/10.1039/D0TA10602J>
9. L. Briceno-Mena, G. Venugopalan^b, J.A. Romagnoli, and C.G. Arges^a, Machine learning for guiding high-temperature PEM fuel cells with greater power density, *Patterns (Cell Press)*, **2021**, 2, 100187, <https://doi.org/10.1016/j.patter.2020.100187>
8. Q. Lei^b, K. Li, D. Bhattacharya^b, J. Xiao, S. Kole^b, Q. Zhang, J. Strzalka, J. Lawrence, R. Kumar, and C.G. Arges^a, Counterion condensation or lack of solvation? Understanding the activity of ions in thin film block copolymer electrolytes, *Journal of Materials Chemistry A*, **2020**, 8, 15962, <https://doi.org/10.1039/D0TA04266H> note: part of 2020 Emerging Young Investigator Issue
7. V.M. Palakkal^b, T. Nguyen^b, P. Nguyen^b, M. Chernova^b, J.E. Rubio^b, G. Venugopalan^b, M. Hatzell, X. Zhu, and C.G. Arges^a, A high power thermally regenerative ammonia-copper redox flow battery

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- enabled by a zero gap cell design, low-resistant membranes and electrode coatings, *ACS Applied Energy Materials*, **2020**, *3*, 4787, <https://doi.org/10.1021/acsaem.0c00400>
6. M.L. Jordan^{b*}, L. Valentino^{*}, N. Nazyrynbekova^b, V.M. Palakkal^b, S. Kole^b, D. Bhattacharya^b, Y.J. Lin, and C.G. Arges^a, Promoting water-splitting in Janus bipolar ion-exchange resin wafers for electrodeionization, *Molecular Systems Design & Engineering*, **2020**, *5*, 922, <https://doi.org/10.1039/C9ME00179D> * contributed equally to the article
 5. V.M. Palakkal^{b*}, L. Valentino^{*}, Q. Lei^b, S. Kole^b, Y.J. Lin, and C.G. Arges^a, Advancing electrodeionization with conductive ionomer binders that immobilize ion-exchange resin particles into porous wafer substrates, *npj Clean Water*, **2020**, *3*, article 5, <https://doi.org/10.1038/s41545-020-0052-z> * contributed equally to the article
 4. G. Venugopalan^b, K. Chang, J. Nijoka^b, S. Livingston^b, G.M. Geise, and C.G. Arges^a, Stable and highly conductive polycation-polybenzimidazole membrane blends for intermediate temperature proton exchange membrane fuel cells, *ACS Applied Energy Materials*, **2020**, *3*, 573, <http://dx.doi.org/10.1021/acsaem.9b01802>
 3. Z. Su^{*}, S. Kole^{b*}, V.M. Palakkal^b, L. Harden, C.-o. Kim, G. Nair, C.G. Arges^a, J.N. Renner, Peptide-modified electrode surfaces for promoting anion exchange ionomer microphase separation and ionic conductivity, *ACS Materials Letters*, **2019**, *1*, 467, <http://dx.doi.org/10.1021/acsmaterialslett.9b00173> * contributed to article equally
 2. V.M. Palakkal^b, J.E. Rubio^b, Y.J. Lin, and C.G. Arges^a, Low resistant ion-exchange membranes for energy efficient membrane capacitive deionization, *ACS Sustainable Chemistry & Engineering*, **2018**, *6*, 13778, <http://dx.doi.org/10.1021/acssuschemeng.8b01797>
 1. C.G. Arges^a and L. Zhang^b, Anion Exchange Membranes' evolution towards high hydroxide ion conductivity and alkaline resiliency, *ACS Applied Energy Materials*, **2018**, *1*, 2991, <http://dx.doi.org/10.1021/acsaem.8b00387>

SUPERVISED STUDENTS AND THESES/DISSERTATIONS DIRECTED

Postdocs (current)

1. Dr. Mario Ramos-Garcés - Postdoctoral Researcher *Sept. 2020 - current*

Graduate students (current)

4. Deepra Bhattacharya - PhD candidate *Dec. 2018 - current*
3. Matt Jordan - PhD candidate (NSF GFRP and US DOE SCGSR) *Nov 2018 - current*
2. Gokul Venugopalan - PhD candidate *Jan 2018 - current*
1. Subarna Kole - PhD candidate *Nov 2017 - current*

Alumni

3. Varada Menon Palakkal – PhD *Jan 2016 – May 2020*
Dissertation Title: Engineering ionomer materials for addressing ohmic resistances in electrochemical desalination and waste heat recovery
Postdoc at University of Texas at Austin, McKetta Department of Chemical Engineering
2. Qi Lei – MS *Jan 2018 – May 2020*
Dissertation Title: Probing counterion condensation phenomena in nanostructured thin film block copolymer and random copolymer electrolytes
1. Le Zhang – MS *Jan 2016 – Aug 2018*
Dissertation Title: Thin-film block copolymers (BCPs) self-assembly as versatile patterning scheme for functional nanomaterials

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GRANTS AWARDED

Total: \$4.32M; My share: \$1.13M; note: these values do not include cost share

Lead PI on NSF, US DOE BES, and US DOE EERE Awards

Funded research (selected)

11. MRI: Acquisition of a Near-Field Optical Microscope for Multidisciplinary Research and Education at Louisiana State University, \$665,000, (\$0 my share), Lead PI: K.M. McPeak, co-Is: C.G. Arges, J.A. Dorman, L. Haber, and O. Magana-Loaiza, *National Science Foundation – Division of Materials Research*, Award #: 2019094, September 2020 to August 2021
10. Machine learning for optimizing the manufacture and operation of intermediate temperature fuel cells, \$498,193, (\$199,097 my share), PI: C.G. Arges, co-Is: Jose Romagnoli (LSU Chem. Engr.) and B. Bahar (Xergy, Inc.), *U.S. Department of Energy Office of Energy Efficiency and Renewable Energy – Advanced Manufacturing Office*, Award #: DE-EE0009101, June 2020 to May 2022
9. Electrochemical reactor for upgrading low molecular weight alkanes, \$40,000, PI: C.G. Arges, *Louisiana Board of Regents – Proof-of-Concept/Prototype Initiative*, July 2019 to June 2020
8. Enhancing the Capabilities of the Shared Laboratory for Macro- and Bio-Macromolecular Research [SLMBR], \$883,339 one of seven co-IIs (14.2% co-I: C.G. Arges share) *Louisiana Board of Regents – Multi-disciplinary Comprehensive Enhancement Proposals*, July 2019 to July 2024
7. Understanding and manipulating counterion condensation within charged polymer electrolytes for selective and low resistant membrane separations, \$503,351 (\$269,304 my share), PI: C.G. Arges, co-I: Revati Kumar (LSU Chemistry), *U.S. Department of Energy Office of Basic Energy Sciences – Separations Science Program*, Award #: DE-SC0018989, September 2018 to August 2021
6. Modular electrochemical reactor-separator for upgrading methane to higher order carbons and simultaneous production of hydrogen, \$50,000, PI: C.G. Arges, *LSU LIFT²* July 2018 to June 2019
5. Advanced device fabrication for science and engineering research and education at Louisiana State University, \$907,715 one of seventeen co-Is (5.6% co-I: C.G. Arges share), *Louisiana Board of Regents – Multi-disciplinary Comprehensive Enhancement Proposals*, July 2018 to July 2023
4. Membranes with nanostructured interfaces generated by self-assembled block copolymers, \$45,000, PI: C.G. Arges, *3M Non-Tenured Faculty Award (NTFA)*, May 2018 to April 2021
3. Nanobipolar junction interfaces for ion-exchange membrane and resin materials for electrochemical systems, \$313,800, PI: C.G. Arges, *National Science Foundation – CBET – Interfacial Engineering Program*, Award #: 1703307, June 2017 to May 2021
2. Ion-exchange membranes and ionomer binder resin wafers for electrochemical organic acid separations, \$174,796, PI: C.G. Arges, *Argonne National Laboratory*, Subcontracts #: 7F030168 and 6F-31701, July 2016 to June 2020
1. Shared Facilities for Materials Research: Upgrade of the Small-Angle X-ray Scattering Beamline at LSU CAMD, \$204,951, Lead PI: E. Nesterov, one of six co-Is (14% co-I: C.G. Arges share), *Louisiana Board of Regents – Traditional Enhancement Proposals in Chemistry*, Award #: LEQSF(2017-18)-ENH-TR-10, July 2017 to January 2018

PATENTS

2. V.M. Palakkal, M.L. Jordan, C.G. Arges, Resin Wafer Technologies with Solution Processable Ionomers, U.S. Patent Application # 62/971,141, **2020**.
1. C.G. Arges, J.C. Flake, and Y. Fang, Electrochemical reactor for upgrading methane and small alkanes to longer alkanes and alkenes, U.S. Patent Application # 62/656,538, **2018**.

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PROFESSIONAL RECOGNITION

- LSU Rainmaker Award - Emerging Scholar in STEM Category *Feb 2021*
- Emerging Young Investigator Award, Journal of Materials Chemistry A *Aug 2020*
- LSU Alumni Association Rising Faculty Research Award *Apr 2019*
- Tiger Athletic Foundation Undergraduate Teaching Award *Apr 2019*
- 3M Non-Tenured Faculty Award *Feb 2018*
- Guest Editor: *Journal of Power Sources* – Issue on Alkaline Membrane Fuel Cells *Jan 2018*
- Guest Editor: *ECS Interface* – Next Generation Electrolytes for Electrochemical Devices *May 2017*

APPENDIX

Invited talks with LSU affiliation (selected)

10. C.G. Arges, Model Thin Films and Machine Learning for High-Temperature Polymer Electrolyte Membrane (HT-PEM) Fuel Cells, *General Motors Fuel Cell Forum, 2021*
9. C.G. Arges, Model Thin Films and Machine Learning for High-Temperature Polymer Electrolyte Membrane (HT-PEM) Fuel Cells, *University of North Texas – Department of Materials Science and Engineering, 2020*
8. C.G. Arges, Molecular Engineering of Polymer Electrolytes for Electrochemical Processes, *Case Western Reserve University – Department of Chemical and Biomolecular Engineering, 2019*
7. C.G. Arges, Qi Lei, K. Li, and R. Kumar, Differences in the extent of counterion condensation of ordered block copolymer electrolytes (BCEs) versus random copolymer electrolytes (RCEs), *U.S. Department of Energy, Basic Energy Sciences, Separation Science PI Meeting, 2019*
6. C.G. Arges and G. Venugopalan, (Invited) Stable and Conductive Anhydrous Proton Conducting Membranes Based on Polycations Blended with Polybenzimidazole, *235th ECS Meeting, 2019*
5. C.G. Arges, Directed self-assembly and new avenues of research for ionomer materials, *ACS Polymer Division: Polymers for Fuel Cells, Energy Storage, and Conversion, 2019*
4. C.G. Arges, Counterion condensation and new porous ionic materials for electrochemical separations, *Tulane University – Department of Chemical & Biomolecular Engineering, 2019*
3. C.G. Arges, (Invited) Molecular engineering of polymers for electrochemical energy conversion and separation, *AIChE National Meeting, 2018*
2. C.G. Arges, Harnessing molecular control of polymers using directed self-assembly principles for next generation water and energy materials, *University of Nebraska Lincoln – Department of Chemical and Biological Engineering, 2018*
1. C.G. Arges, Block copolymer electrolytes with everything in their right place, *University of New Mexico – Department of Chemical and Biological Engineering, 2017*

Louisiana State University Service (selected)

- Electrochemical Society Student Chapter at LSU, Faculty Advisor, *2016 – current*
- Undergraduate Committee for the Cain Department of Chemical Engineering, *2016 – current*
- Faculty Search Committee Member, *2017-2018 and 2019-2020*
- College of Engineering College Policy Committee, *2018 – current*
- Committee Member for Shared Laboratory for Macromolecule Research, *2019 – current*

Outside Professional Service

- NSF Panelist/Proposal Reviewer; U.S. Department of Energy Proposal Reviewer; Stanford Synchrotron Radiation Lightsource (SSRL) Proposal Reviewer; ACS Petroleum Research Fund Proposal Reviewer; American Association for the Advancement of Science (AAAS)

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- Referee for 50 different journals (selected): Nature Energy, Energy & Environmental Science, Journal of the American Chemical Society, Accounts of Chemical Research, Advanced Functional Materials, Angewandte Chemie, Science Advances, Nature Communications, Chemistry of Materials, Journal of Materials Chemistry A
- Electrochemical Society Awards Committee, 2019 - Present

Outreach Activities

- On-site learning demonstrations at North Banks Middle School (Baton Rouge), Glen Oaks High School (Baton Rouge) and East Baton Rouge Magnet High School
- ENGage LSU Day in 2017 and 2018 – Hands on activities for middle school students.

Chair or Organizer for National/International Technical Meetings

- Session Chair and Organizer, *AIChE National Meeting, 2016, 2017, 2019, 2020 and 2021*
- Session Moderator, *U.S. Department of Energy High-Temperature PEM Fuel Cell Workshop, 2020*
- Session Chair and Organizer, *NAMS Annual Meeting, 2020*
- Session Chair, *ECS Fall and Spring National Meetings, 2016 and 2017*
- Session Chair, *ACS National Spring Meeting, 2019*
- Session Chair and Organizer, *APS March Meeting (Polymer Physics), 2019*

Louisiana State University Teaching Assignments

- ChE 4198 S2020: Process Dynamics and Control, Core Course, (co-instructor, 20% credit)
- ChE 4162 S/F2019/S/F2020/S2021: Unit Operations Laboratory, Core Course, (co-instructor)
- ChE 4275 F2017/F2018/S2020: Electrochemical Engineering, Tech Elective
- ChE 3104 F2017/F2018: Engineering Measurement Laboratory, Core Course, (co-instructor)
- ChE 3102 S2016/S2017/S2018: Heat and Mass Transfer; Core Course

Memberships in Professional Societies

- Electrochemical Society (ECS)
- North American Membrane Society (NAMS)
- American Institute of Chemical Engineers (AIChE)
- American Chemical Society (ACS)
- American Physical Society (APS)