

Joshua L. Lansford

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Education

University of Delaware, College of Engineering

Major: PhD Candidate in Chemical Engineering, GPA: 3.76
Advisor: Dr. Dionisios G. Vlachos

Newark, DE
2015 – 2020 (Expected)

University of Virginia, School of Engineering and Applied Science

Major: Chemical Engineering with High Distinction and a minor in Engineering Business, GPA: 3.79

Charlottesville, VA
2009 – 2013

Interests and Skills

Research Areas: Electrocatalysis, fuel cells, and batteries

- Machine learning and uncertainty quantification of stochastic and deterministic models
- Applications in characterization and micro-kinetic modeling using transition state theories, statistical mechanics include heterogeneous catalysis, spectroscopy, surface science, and quantum chemistry

Programming Languages: Unix, SAS, SQL, Python, Aspen, MATLAB, Tableau, Java, JavaScript, VBA, HTML, Mathcad

- Contributor to open source atomic simulation python software [ASE](#)
- Developer the University's Proxify bookmark into a [Chrome Extension](#) for downloading scientific journals

Honors and Awards

- 2019-2020 – Blue Waters Graduate Fellowship
- 2018 – Phillip and Ruth Evans Fellowship, University of Delaware Professional Education Development Award, ISCRE25 Graduate Student Travel Grant, CRE Division AIChE Graduate Student Travel Grant
- 2017 – National Science Foundation Graduate Research Fellowship, Honorable Mention
- 2013 – Louis T. Rader Chemical Engineering Prize, First place national winner of the Up to Us National Debt Campaign, awarded by President Clinton
- 2012 – Second place at the AIChE student poster competition
- 2011 – Donald and Jean Heim Scholarship
- 2010 – Dr. John Kenneth Haviland Scholarship
- 2009 – ExxonMobil Teagle Scholarship

Research Experience

University of Delaware – Advisor: Dr. Dionisios G. Vlachos

Topic: Discrete and Probabilistic Surrogate Model Development with Uncertainty Quantification for Catalyst Characterization and Kinetic Modeling via Fundamental Theory and Machine Learning

Newark, DE

2015 – 2020 (Expected)

- Developed theory to explain vibrational scaling of chemisorbates on transition metal surfaces from quantum principles
- Built models from theory and computation for identifying adsorption species and sites in experiments
- Quantifying impact of uncertainty in a multi-scale oxygen reduction (ORR) kinetic model

University of Connecticut

National Science Foundation Research Fellowship

Storrs, CT

2012

- Developed Predictive Fluid Catalytic Cracking Model that split effects of the support matrix and active zeolite catalyst to better determine gasoil conversion and product yields

University of Virginia Organic Synthesis Lab

Charlottesville, VA

- Determined optimal reaction conditions for stereospecific mechanisms
- Ran ion-exchange chromatography separations

2010

Teaching & Advising

University of Delaware

REU Mentor – feature selection for rapid catalyst screening

Newark, DE

Summer, 2017

Teaching Assistant – process design

Spring, 2017

- Initiated, designed, and taught a new in-person team-building class for honors students

Journal Publications

J. L. Lansford, A. V. Mironenko, and D. G. Vlachos, Scaling relationships and theory for vibrational frequencies of adsorbates on transition metal surfaces. Nat. Commun. 8, No. 1842 (2017).

J. Feng, J. L. Lansford, A. Mironenko, D. B. Pourkargar, D. G. Vlachos, M. A. Katsoulakis, Non-parametric correlative uncertainty quantification and sensitivity analysis: Application to a Langmuir bimolecular adsorption model. AIP Adv. 8, 035021 (2018).

M. Núñez, J. L. Lansford, and D.G. Vlachos, Optimization of the facet structure of transition-metal catalysts applied to the oxygen reduction reaction. Nat. Chem. (2019).

J. L. Lansford, D. G. Vlachos, Generating synthetic IR spectra to reconstruct local catalyst microstructure from DFT, theory, and machine learning. (In Preparation)

J. L. Lansford, J. Feng, M. A. Katsoulakis, and D. G. Vlachos, The uncertainty quantification index for correlated uncertainty: Predicting the ideal catalyst for the oxygen reduction reaction. (In Preparation)

J. Feng, J. L. Lansford, M. A. Katsoulakis, and D. G. Vlachos, Probabilistic graph theory models combining physical models, expert opinion, and data. Proc. Nat. Acad. (In Preparation)

Invited Talks, Presentations and Posters

AIChE Meeting Presentation

Catalyst Characterization from Complex Infrared Spectroscopy: A Machine Learning Approach

Pittsburgh, PA

Oct. 2018

Gordon Research Conference

Entropic Effects on Microkinetic Modeling

New London, NH

June 2018

International Symposia of Chemical Reaction Engineering (ISCRE25) – Invited Talk

Catalyst Structure Prediction via DFT, Theory, and Machine Learning

Florence, Italy

May 2018

Catalysis Club of Philadelphia Poster Competition

Scaling Relations for Adsorbate Vibrations on Transition Metal Surfaces

Philadelphia, PA

Nov. 2017

AIChE Meeting Mresentation

Adsorbate Vibrations on Transition Metal Surfaces: Applications and Theory

Minneapolis, MN

Oct. 2017

AIChE Student Poster Competition

Separation of Catalyst Kinetics for Maximizing Gasoline Output, Yield, and Selectivity

Pittsburgh, PA

Oct. 2012

- Won second place in the Fuels, Petrochemicals, and Energy Division

Industry Work Experience

Capital One Bank

Senior Data Analyst: National Expansion

McLean, VA

2014 – 2015

- Developed geocoding system to map customer ATM transactions at foreign-owned ATMs: Makes use of Google's geocoding API, SAS fuzzy matching, Unix, Teradata, and Tableau
- Identified effectiveness of digital advertising and presented findings to the Managing Vice President of National Expansion
- Created Tableau based one-size-fits-all performance tool that provides daily updates to 10 Capital One Cafes and serves as the monthly business report for the managing vice president
- Converted organization's data library to Tableau infrastructure and scaled to all markets of interest.

Capital One Bank

Data Analyst: Bank Operations

Richmond, VA

2013 – 2014

- Led self-proposed initiative to automate case tracking system for five business teams. Headed two IT teams and coordinated with business teams in addition to developing and mapping out the automated system – saves 25-50 business hours per day
- Leveraged analysis and software development skills to automate identification of 17 high risk transactions
- Responded to audit of Capital One IRA team by generating dynamic alerts to all 900 branches
- Managed Capital One data work with a third-party company to fulfill social security asset requests

CLEARresult Consulting

Core Engineering Energy Efficiency Consultant

Fairfax, VA

2010 – 2011

- Incorporated new efficiency regulations and standards into training documents
- Presented contract proposal findings to Vice President of Engineering

University Service & Leadership

University of Delaware

Manage and update the Vlachos research group [website](#)

Newark, DE

2016 – Present

University of Virginia

University Dormitory Resident Advisor

Charlottesville, VA

2010 – 2013

- Advised over 60 first year students to help them transition to college through academic, service, and multicultural programs

President of UVA OXE Chemical Engineering Honor Society

2012 – 2013

- Organized tutoring, research panels, and other service and leadership opportunities

Co-President of UVA Wahoo Wizards Educational Outreach Group

2012 – 2013

- Develop and piloted new experiments in Charlottesville elementary schools to teach science to low-income students