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James T. Owens

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Education

Ph.D. Student, Chemical Engineering Practice — *Enrolling September 2020*
Massachusetts Institute of Technology

Bachelor of Science, Chemical Engineering *in Honors,* **Minor:** Chemistry — *May 2020*
Virginia Polytechnic Institute and State University — **GPA:** 4.00/4.00

Study Abroad, Chemical Engineering Unit Operations Laboratory (5 credits) — *July 2019*
Technical University of Denmark — **Grade:** A

Research Experience

Virginia Tech, Polymer Composite and Materials Lab (Bortner Lab) January 2016-August 2020

Thermal Modeling of Large Area Additive Manufacturing, August 2019-August 2020

- Developing new algorithmic approaches to rapidly model complete thermal histories for extrusion-based, big-area additive manufacturing processes.
- First author publication in preparation.

Fabrication of Cellulose Nanocrystal (CNC) and Nanofibril (CNF) Composites, Spring 2018, Spring 2019

- Investigated composition-structure and structure-property relationships of mixed CNC-CNF composites.
- Developed a dynamic, humidity-controlled casting method that produces homogeneous composites.
- Characterized and analyzed composites using tensile tests, TGA, AFM, and PLM.

Silver Nanoparticle Pulsed Synthesis and Attachment to Cellulose Nanocrystals (CNCs), August 2016-May 2017

- Investigated a novel processing method for targeted particle morphology and density on the CNC surface.
- Planned and executed synthesis experiments, oxidized and characterized CNCs, and implemented DLS and SEM analyses.

Massachusetts Institute of Technology, Hatton Research Group June-August 2018, May-June 2019

Electrochemical Production of Hydrogen Peroxide in an Electrolyte-Free Environment

- Designed and built an automated, electrochemical cell for the synchronous production and concentration of H_2O_2.
- Devised an oxygen delivery scheme that accelerates the transport-limited oxidation step; and surveyed stabilizers that mitigate H_2O_2 decomposition.
- Attained 800+ PPM H_2O_2 concentration at high Faradaic efficiencies.

Contributions to other projects

- Synthesized electrophilic adducts of varying basicity and characterized their affinities for selective CO_2/SO_2 capture and release using cyclic voltammetry.
- Developed a testing setup that automates 40+ hours of experiments for mechanistic CO_2 absorption studies.

University of Cape Town, Energy Research Center (Dr. Jiska de Groot), South Africa May-June 2018

Virginia Tech Honors College Class of 1954 Odyssey Fellowship

- Wrote a proposal and was awarded a fully funded fellowship to study the energy policy and infrastructure of underdeveloped South African communities.
- Investigated the outcomes of off-grid solar panel training and maintenance programs.
- Worked in a team to conduct a literature review and analysis to inform forthcoming policies and initiatives.

Drexel University, Thin Films and Devices Laboratory (Dr. Kenneth Lau) June-August 2016

Polymer-based Solar Cells

- Examined the use of different polymer materials and polymer electrolyte solutions in solar cells.
- Utilized linear sweep voltammetry, spectrometry (FTIR), absorption, and quantum efficiency tests to measure and characterize cell performance.

Publications

K. Stinson-Bagby*, **J. Owens**, A. Rouffa, M.J. Bortner, E.J. Foster, "Silver Nanoparticle Pulsed Synthesis and Attachment to Cellulose Nanocrystals", *ACS Applied Nano Materials*, 2 (4), 2317-2324 (2019). https://doi.org/10.1021/acsanm.9b00225.

Professional Experience

ExxonMobil Refining & Supply, Baton Rouge, LA August-December 2018
Process Engineering Co-op: Catalytic Cracker Light Ends Unit

- **Promoted to a full-time unit process engineer** for the second half of co-op term.
- Oversaw the process monitoring and improvement projects of two refinery units and reported on EPA compliance of the refinery's flare gas system.
- Led a refinery-wide effort and developed VBA code to **identify the source of an in-line contamination**, which aided in preventing stream kick-out and off-spec product (a potential $350k/day loss).

ExxonMobil Research & Engineering, Paulsboro, NJ June-December 2017
Products Technologist Co-op: Products Technology Modeling Group

- Developed and programmed a model that predicts the viscosity change of non-ideal lubricant blends in various laboratory engine tests; designed targeted experiments and executed all data analysis.
- **Deployed the model and auxiliary tools to the site-wide modeling suite.**
- Other projects included a blending study of a new polymer additive, the development of analysis tools for gas chromatography data, and a multivariable analysis of historical lubricant degradation data.

Leadership & Co-Curricular Experience

President, Virginia Tech American Institute of Chemical Engineers August 2016-May 2020

- Elected by peers to lead a professional development organization that sponsors a career forum, industry plant tours, company information sessions, and mentorship to 210+ members.
- Established an annual newsletter for students that offers advice and resources for career development.
- Recognized for leading an ***Outstanding Student Chapter*** (awarded to 30 of 337 student chapters globally)
- **Led and won bid** to host 2020 AIChE Mid-Atlantic Regional Student Conference at Virginia Tech.

Chemistry Team Lead, Virginia Tech Chem-E-Car Team August 2016-May 2020

- Develop, test, and model the iodine-clock reactions used to control the vehicle's start/stop mechanism.
- Created a tool that analyzes experimental data and optimizes the parameters of the reaction's kinetic model.
- **Achieved 1st Place in 2019 AIChE International Chem-E-Car Competition.**

Peer Mentor, Center for the Enhancement of Engineering Diversity (CEED) Fall 2016, Fall 2019

- Mentored ~20 domestic and international freshman engineering students.
- Led weekly seminars to help facilitate a smooth transition to a rigorous college program.
- Hosted exam study sessions; assisted with resume and career fair preparation.

Teaching, Mentorship, and Outreach

Undergraduate Teaching Assistant, Mass and Energy Balances with Professor Stephen Martin (Fall 2019)
Tutor, Mass and Energy Balances and ChE Thermodynamics with Omega Chi Epsilon (January 2017-May 2020)
Competition Judge, FIRST Robotics Competition (Spring 2019, Fall 2019)
Volunteer Notetaker, Virginia Tech Services for Students with Disabilities (Spring 2019)
Mentor, Virginia Tech Department of Chemical Engineering Sophomore Mentorship Program (August 2017-May 2018)
Student Roundtable, College of Engineering Advisory Board (Spring 2018)
Brother, Alpha Chi Sigma – Professional Chemistry Fraternity (April 2016-May 2020)
Residential Fellow and Mentor, Virginia Tech Honors Residential Commons Dorm (August 2016-May 2017)
Tutor and Shelter Volunteer, Friends Association for the Care and Protection of Children (2015-2017)

Honors

Outstanding Senior, Virginia Tech College of Engineering	2020
Phi Kappa Phi Medallion Award	2020
Barry M. Goldwater Scholarship	2019
Astronaut Scholarship	2019
1st Place, AIChE International Chem-E-Car Competition	2019

Future Leaders in Chemical Engineering Award, NC State University	2019
Virginia Tech Honors College Class of 1954 Odyssey Fellowship	2017-2018
2nd Place, AIChE Student Poster Session: Catalysis and Reaction Engineering Division III	2019
Best Presentation in Electrochemistry, Rice University GCURS	2018
Outstanding Overall Presentation, Rice University GCURS	2017
AIChE Topp Othmer Scholarship	2018, 2019
Omega Chi Epsilon	2018
Phi Kappa Phi	2017
Outstanding Junior Award, Department of Chemical Engineering	2019
Outstanding Sophomore Award, Department of Chemical Engineering	2017
Virginia Tech College of Engineering Merit Scholarships	2016-2019
Department of Chemical Engineering Merit Scholarships	2016-2019
Honors College Merit Scholarships	2016-2018
Honors College Enrichment Grant	2016, 2019
Chemical Engineering Study Abroad Scholarship	2019
Fralin Institute Conference Travel Award	2018
Rice University Conference Travel Award	2017
Viers Achievement Award for Excellence in Chemistry	2016
Norrine Bailey Spencer Strong Start Award with Distinction	2016
7th Place, AIChE International Chem-E-Car Competition	2016

Poster and Oral Presentations

J. Owens, S. Voskian, A.T. Murray, Y. Surendranath, T.A. Hatton. "In-situ Production of Hydrogen Peroxide via Electrochemical Reduction of Anthraquinone Electrodes". 2019 AIChE Annual Student Meeting, Orlando, FL, United States, November 11, 2019, Poster. Awarded 2nd Place in Catalysis and Reaction Engineering Division III

Gulf Coast Undergraduate Research Symposium (GCURS) at Rice University, Houston, TX, United States, October 6, 2018, Presentation**.** Awarded Best Presentation in Electrochemistry

J. Owens, C. Pritchard, G. Funk, J.E. Foster, M.J. Bortner. "Morphological Characterization of Cellulose Nanocrystal and Cellulose Nanofibril Composites". Virginia Tech Chemical Engineering Graduate Research Symposium, Blacksburg, VA, United States, April 17, 2019, Poster

J. Owens, K. Stinson-Bagby, J.E. Foster, M.J. Bortner. "Rate Limited Growth of Silver Nanoparticles on Cellulose Nanocrystal Templates for Transparent Conductive Materials". Gulf Coast Undergraduate Research Symposium (GCURS) at Rice University, Houston, TX, United States, November 4, 2017, Oral Presentation**.** Awarded Outstanding Overall Presentation

Virginia Tech Chemical Engineering Graduate Research Symposium, Blacksburg, VA, United States, April 13, 2017, Poster

Skills and Certifications

Laboratory: Electrochemical analysis (CV, CA, CP, EIS), air and water sensitive reactions (Schlenk lines and Glovebox), LC-MS, Tensile Tests (Instron), Conductometric Titration, Polarized Light Microscopy

Computer: MATLAB, Python, Aspen Plus, JMP, LabVIEW, Microsoft Visual Basic (VBA), MS Office Suite

Certifications: AIChE online safety training certifications (ELA 908, 950, 951,952, 953, 984)