Chance Norris

Graduate Research Assistant · Microstructural Expert
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Summary

Currently a Graduate Research Assistant at Purdue University's Energy Transport Science Laboratory, with over three years experience in microstructural characterization, safety/performance analysis, and experimental design. I love working with my hands and using computers to aid in design and data analysis. I have a passion for using creative thinking to solve intricate and challenging problems.

Education

Purdue University — *West Lafayette, Indiana*

Ph.D in Mechanical Engineering | Thesis: Microstructural Analysis of Graphite Anodes in Secondary Batteries — *August 2017 - August 2021*

- Cum Laude

Texas Tech University — *Lubbock, Texas*

BS in Mechanical Engineering | Minor: Mathematics — *August 2013 - May 2017*

- Summa Cum Laude

Work Experience

Purdue University — *West Lafayette, Indiana*

Graduate Research Assistant — *August 2017 - Current*

- Use Python to create new microstructural characterization techniques in tomograms and SEM images.
- Run experiments to validate in-house finite volume physics simulations. This includes abuse tests, forced plating experiments, and cycling tests.
- Implement image analysis of SEM, tomograms, and microscopy images. Characterize plating, degradation, and heterogeneity were some of the properties that were probed.
- Implement large data analysis techniques on over 10TB of data using Python and Matlab to retrieve trends, and be used in machine learning algorithms.
- Set up computers, servers, and communication between Purdue's cluster as the computational lead.

Sandia National Labs — *Albuquerque, New Mexico*

Year Round Intern — *April 2018 - October 2019*

- Implemented microstructural characterization in electrodes, foams, and sprays.
- Quantified uncertainties due to segmentation of various binarized structures. This implemented TensorFlow in Python where convolutional neural networks and Bayesian convolutional neural networks developed.
- Created codes that ran in parallel in order to expedite physics simulation run in order to process large sets.
- Used finite element method in 3D physics simulations to analyze particle stresses and concentration gradients in extreme fast charging cells.
- Clearance obtained: Secret

Research Experience

Purdue University — *West Lafayette, Indiana*

Graduate Research Assistant — *August 2017 - Current*

- Used image processing techniques and microstructural charaterization to analyze anisotropies and heterogenieties in graphite electrodes. Also used my characterization skills to aid in multiple projects and used experimental setups to validate simulation runs and unveil microstructural influences.

Université de Picardie Jules Verne — *Amiens, France*

Visiting Researcher — *Fall 2019*

- Co-founded a new project which analyzed physical phenomena of silicon – graphite composite electrodes. Special interest was taken in electrochemical performance and stresses as the electrodes underwent lithiation. Physics simulation was performed in COMSOL, a finite element software, while data analysis was done in Matlab and Python. Performance curves were validated through experimental results.

Texas A&M University — *College Station, Texas*

Undergraduate Researcher — *Summer 2016*

- Analyzed the potential for tin sulfide as a battery electrode material using a first principles approach. This involved using VASP, a density functional theory program, to find electrochemical properties of the three major elements used in secondary batteries including their respective diffusion barriers, energy paths, and volume expansion.

Skills

Programming Python · Matlab · C++ · LaTeX · Mathematica
CAD CREO · Inventer · AutoCAD
Software COMSOL · Fluent · ImageJ · Avizo · GeoDict · Tecplot · Origin · Office Suite · Ansys
Tooling Lathe · Mill · MIG Welder · Solder

Honors & Awards

International

2018 **Chateaubriand Fellowship** *Amiens, France*

Domestic

2016 **Undergraduate Research Scholar Grant** *College Station, Texas*
2016 **Lawrence Mechanical Engineering Scholarship** *Lubbock, Texas*
2015 **Devon Energy Emerging Scholar Scholarship** *Lubbock, Texas*
2015 **Oliver Pfluger Scholarship** *Lubbock, Texas*

Presentations & Publicaions

Presentations

Norris, Chance et al."Current and Future Progression in Lithium-ion Electrode Characterization." Invited Seminar, UPJV, Amiens, France, November 2020.

Norris, Chance et al."Microstructural Screening for Porous Li-ion Battery Electrodes." ECS Dallas, Sheraton Hotel, Dallas, Texas, May 2019.

Norris, Chance et al."Microstructural Screening for Porous Li-ion Battery Electrodes." Finite Elements in Fluids, Palmer House Hilton, Chicago, lllinois, April 2019.

Norris, Chance"Importance of Thinking Simply." CISER Science Fair, Texas Tech University, Lubbock, Texas, November 2016.

Norris, Chance et al."Theoretical Study of SnS Monolayer as Anode Material." USRG Poster Presentation, Texas A&M University, College Station, Texas, August 2016.

Norris, Chance et al."Axial Positioning of Binary Star Systems." Atrogroup Meeting, Texas Tech University Lubbock, Texas, March 2016.

Publications

Norris, Chance et al."Microstructural Screening for Variability in Graphite Electrodes." Under Review, April 2020.

International Experience

2018|2019 **Université de Picardie Jules Verne** Laboratoire de Réactivité et Chimie des Solides *Amiens, France*
2015 **Jade Hochschule** Department of Engineering *Wilhelmshaven, Germany*

Relevant Coursework

Senior Design Project *Texas Tech University*

Ocean Wave Energy Conversion System *August 2016 - June 2017*

- Designed energy conversion system that used waves to produce renewable electricity we a team of 4.
- Created dampening system which minimized damage when large rogue waves were to be expected.
- Used programs such as Malab, Python, AutoCAD, and Ansys to anayze stresses and create models to prototype.

Thermodynamics II *Texas Tech University*

Solar Desalination Plant *August 2017 - December 2017*

- Designed a desalination plant which used photovoltaic cells to be powered.
- Utilized multi-step electrodialysis reversal to desalinate high salinity water from Indian Ocean.
- Validated desalination method through prototyping carbon rods with personal photovoltaic cell.

References

Available upon request