# Ray Matsumoto

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## Education

**Vanderbilt University** *Nashville, TN*

Doctorate of Philosophy in Chemical and Biomolecular Engineering *May 2021*

**Clemson University** *Clemson, SC*

Bachelor of Science in Materials Science *December 2015*

## Experience

**FIRST (Fluid Interface Reactions, Structure, and Transport) Center** *Nashville, TN*

Graduate Researcher *January 2017 - Present*

- Implemented computational screening over 400+ novel electrolytes to develop connections between chemical structure and energy storage performance
- Developed a random forest machine learning model to validate key trends related to electrolytes
- Performed hypothesis testing to validate thermodynamic distributions of molecular simulations
- Implemented clustering algorithms in Python that provided key findings in 2 journal articles
- Developed a Python package to perform initialization of MXene systems for molecular simulation
- Co-Authored 8 peer-reviewed journal articles

**MoSDeF (Molecular Simulation and Design Framework)** *Nashville, TN*

Developer *January 2017 - Present*

- Packaged and deployed new software releases on PyPI and Anaconda Cloud
- Expanded the functionality of readers/writers for input files of simulation engines
- Setup and maintained continuous integration with Azure Pipelines
- Developed a set of Cookiecutter templates to help users develop their own Python packages
- Demonstrated the use of MoSDeF by replicating a previous study through the use of 5 molecular simulation engines

## Skills

Python, Git, Continuous Integration, SciPy (NumPy, Pandas, Matplotlib), DS Frameworks (Scikit-learn, Keras), Unix

## Teaching Experience

**Cummings Research Group** *Nashville, TN*

Undergraduate Lab Advisor *January 2019 - Present*

- Supervised 1 graduate and 3 undergraduate research projects in molecular dynamics and energy storage
- Taught basics of Python, Git, and high-performance computing

## Independent Projects

**Phase-Separation**

- Wrote an open-source Python package that predicts phase separation of liquid mixtures through image processing, k-means clustering, and image analysis

**MLB Pitch Classification**

- Developed machine learning classification models to predict pitch types using large datasets from MLB Statcast