

**PROJECT CATEGORY:** Energy & Sustainability**STARTUP:** Volexion**WEBSITE:** www.volexion-inc.com**PROJECT TITLE:** Graphene Precursor + Encapsulation Optimization & Scale-up**PROJECT DESCRIPTION**

Volexion is a Venture backed startup combatting climate change through a breakthrough graphene technology enabling the next generation of Li-ion battery materials. Our first product is a drop-in high energy cathode material with 10x better performance than state of the art, moving the Li-ion and electric vehicle industry 10 years forward. We are a spinoff of Northwestern University, we scaled up at Argonne National Lab, and we are backed by leading US climate tech venture funds and government agencies.

Volexion uses a graphene precursor mixture in its conformal carbon coating technology for advanced lithium-ion battery active materials. The first step in this process is producing graphene from graphite which is a high shear process the second step combines the graphene precursor with the substrate material to achieve conformal encapsulation. Both processes have been developed and demonstrated repeatably, however ample room exists for optimization, reduction in variability, and increase in throughput. The overarching goal of this project is to identify, recommend, and implement opportunities to improve both processes and maximize environmental impact.

**JOB EXPECTATIONS:**

The scholar will work with Staff at Volexion to design, execute and interpret experiments in order to optimize graphene production and encapsulation process (throughput, yield, efficiency), as we are preparing to scale-up. It is believed that our manufacturing processes (exfoliation, purification, encapsulation) can be significantly streamlined to be well positioned for our next stage of growth. This project will take a first principle approach, leveraging the traditional scientific and engineering toolkit, to identify and zero-in on "low-hanging" fruits improvement opportunities

**DESIRED EXPERIENCE:**

We are looking for Bachelor or Master Students preparing to major in one or several of the following areas:

- + Chemical engineering
- + Chemistry, Electrochemistry
- + Material Science
- + Mechanical Engineering

The ideal candidate for this role will have hands on experience in the following areas:

- + Chemical lab experience, with ability to handle volumes of chemicals up to 5 gallons
- + Demonstrated ability to analyze large data sets, make inferences and draw conclusions
- + Clear & concise communication skills.
- + Commissioning/troubleshooting/maintaining/operating mechanical equipment and instrumentation [while our projects are chemical in nature, experience with tools/machinery/instrumentation will serve the student greatly]

**TIME COMMITMENT:**

Given our many projects and commitments, and demonstrated inbound interest from students, we will prioritize applicants that are able to dedicate their full-time to this assignment over an 8 weeks period. If mutually agreeable, longer projects will be considered.

**TRAINING MENTORING:**

## Initial Meeting:

- + The scholar will meet with the project supervisor to discuss the project goals and objectives, as well as the expectations for the scholarship.
- + The scholar will be provided with a project overview, including relevant background information, literature review, and experimental protocols.
- + The scholar will be given a tour of the lab facilities and introduced to the lab equipment, procedures, and safety procedures

## Weekly Progress Meetings:

- + The scholar will meet with the project supervisor on a weekly basis to discuss progress, any challenges encountered, and next steps
- + The supervisor will provide guidance and feedback on the experimental design and data analysis
- + The scholar will also have the opportunity to ask questions and receive feedback on any challenges they may be facing

## Data Analysis and Interpretation:

- + The scholar will be trained on data analysis and statistical methods and will receive guidance on the interpretation of results
- + The supervisor will provide feedback on data analysis and interpretation and will help the scholar to identify any trends or patterns in the data

## Research Presentations:

- + The scholar will be required to give presentations on their research progress and findings to the lab group and other relevant stakeholders
- + The supervisor will provide feedback on the scholar's presentation skills and will help the scholar to improve their communication and presentation skills

## Final Report and Presentation:

- + The scholar will be required to prepare a final report and give a final presentation on their research project.
- + The supervisor will provide feedback on the report and presentation and will help the scholar to prepare for the final submission.

## Evaluation and Feedback:

- + At the end of the scholarship, the supervisor will provide the scholar with an evaluation and feedback on their performance
- + The scholar will also have the opportunity to provide feedback on their mentoring experience and the scholarship program

Feedback will be given informally regularly during the scholarship, as well as with two formalized sessions, one occurring halfway through the scholarship and a written evaluation occurring at the end of the scholarship. The development of the scholar will focus on improving problem solving skills in a professional engineering context, solidifying verbal and written technical communication, and emphasizing collaborative engineering work.