



UNIVERSITY  
OF MANITOBA

## **“Developing New Binders for Li- and Na-ion Batteries”**

### **Fully Funded Graduate Student Projects Available for Fall 2019**

**The laboratory for electrochemically functional materials at the Department of Chemistry, University of Manitoba is looking for graduate students that are interested in battery materials.**

#### **About the project**

Without the development of high-performance rechargeable batteries, the mobile technology revolution that has brought us smart phones, tablets and powerful laptop computers, would not have been possible. Ground-breaking research into the chemistry of materials that can reversibly insert lithium ions has brought about the lithium-ion technology that we know today and that powers most mobile computing devices. Now is the time for young researchers to play a role in developing the next generation of batteries that will enable the renewable energy revolution. The project will explore the use of conjugated polymer based binders in Li-ion batteries, Na-ion batteries and all-solid-state batteries. These binders are designed to improve cycle life of batteries and enable the use of higher capacity materials while reducing manufacturing costs. This work encompasses binder synthesis, chemical, physical and mechanical characterization, imaging of binders and composite electrodes, and the fabrication, testing and characterization of functioning batteries.

#### **Requirements**

- An undergraduate degree in Chemistry, Chemical Engineering or a related subject
- An excellent G.P.A. of 3.5 or higher (for international conversion, see [http://umanitoba.ca/faculties/graduate\\_studies/admissions/equivalencies.html](http://umanitoba.ca/faculties/graduate_studies/admissions/equivalencies.html))
- Proven English language proficiency (see [http://umanitoba.ca/faculties/graduate\\_studies/admissions/139.html](http://umanitoba.ca/faculties/graduate_studies/admissions/139.html))
- A keen interest in energy materials and applied materials chemistry research
- Ability to work in a team as well as independently

#### **Application Procedure**

Applications should be sent to the principal investigator for this project Dr. Christian Kuss ([christian.kuss@umanitoba.ca](mailto:christian.kuss@umanitoba.ca)) and consist of a cover letter, CV, English language test certificate and transcripts. Please contact Dr. Christian Kuss in case of questions.

#### **About the funding**

Graduate student funding is guaranteed at the Department for Chemistry, University of Manitoba. For more information, please check the following website:

<http://www.sci.umanitoba.ca/chemistry/graduate-student/financial-support>

Generally, international students have to pay international tuition fees, which requires additional financial resources from the student. Exceptional international candidates (evaluation is based on the continuing evaluation of the student's G.P.A.) can receive tuition relief scholarships to reduce tuition fees to the national level. You can find more information here:

[http://umanitoba.ca/faculties/graduate\\_studies/funding/igses.html](http://umanitoba.ca/faculties/graduate_studies/funding/igses.html)

[http://umanitoba.ca/faculties/graduate\\_studies/funding/104.html](http://umanitoba.ca/faculties/graduate_studies/funding/104.html)

### **The University of Manitoba – a great training environment**

At the University of Manitoba, you will have access to brand-new state-of-the-art equipment for battery testing and research. You will be trained on a multitude of high-end characterization tools, available through affiliation with the Manitoba Institute for Materials. Part of the characterization work will be carried out at synchrotron light sources around the world. Based on your aptitude and interest, you may also develop and use finite element models to understand and predict properties of the newly prepared electrodes. With this training, you will have key qualifications that are urgently needed in the rapidly growing electrochemical energy sector.

### **Graduate studies in Winnipeg**

The University of Manitoba has a graduate student population of more than 3'500, out of which nearly 20% are international students. 55-60 graduate students are studying at the Chemistry Department, and the Chemistry's graduate student organization arranges regular invited talks and student mixer events. There is loads to do in and around Winnipeg and with a generous guaranteed stipend of 20'000 CAD (MSc) / 22'000 CAD (PhD) and some of the lowest living expenses in Canada, you'll be able to make use of all the opportunities.