

POST-DOCTORAL RESEARCH FELLOWSHIP

Synthesis of thin films by plasma treatment at atmospheric pressure plasma to modify the adhesion of composite materials.

The global warming effect is unequivocal, and the development of more durable materials and processes is now essential for our society. The use of composite materials dates from centuries ago. However, synthetic fillers (fibres, nanoparticles, etc.) with oil-based polymers have dominated the market in the last years. During the last decade there has been a renewed interest in the natural products motivated by potential to create more eco-friendly composites. Although the ecological advantages of renewable resources in composite material are well accepted by the researchers, some scientific challenges remain to be solved to use these solutions in the industry. In this context, the surface properties (chemical functionality, morphology, etc.) strongly affect the fabrication of composite materials. Today, wet-chemical processes are used to modify the polymeric materials and favour better adhesion between the surfaces. These approaches are not eco-friendly and strongly impact the safety of the employees.

Dry cold plasma treatments at atmospheric pressure does not use solvent and have already demonstrated their potential to replace conventional wet-chemical processes. However, chemical kinetics in these advanced plasma remains complex and advanced surfaces characterizations are necessary to understand the fragmentation processes involved during the processes. Our main objective is to develop front edge thin layers by using dielectric barrier discharge (DBD) with a roll-to-roll system.

The postdoctoral fellow who will work on this project will be responsible for studying the fragmentation of organic/organometallic molecules on polymers. The objective of this work will be to correlate the chemistry of the thin layers synthesized with the adhesion of the films on targeted materials. In this context, the candidate will have the opportunity to use a wide range of equipment (XPS, AFM, SEM, FTIR) for surface characterization. He will also evaluate the effectiveness of adhesion by using different mechanical tests.

Your profile:

- You have experience in plasma and chemical analysis of thin films by using different techniques (SEM, XPS, FTIR, AFM, etc.).
- You have a Ph.D. degree in chemistry, materials, or a related discipline.
- You have excellent theoretical and practical knowledge within one or more of the following fields: plasma chemistry, characterization of adhesive layers, chemistry of adhesion, mechanical characterization of composite materials.
- You have outstanding scientific track record demonstrating well-organized design and execution of research. Your excellent grades should allow you to apply for grants under Canadian funding schemes.
- You have strong communication skills (oral and written English) and ability to work independently as well as in a collaborative team. Your CV and the cover letter should highlight your leadership and how this project will contribute to your professional career.
- You have strong motivation to collaborate with researchers and the industry. Also, you are interested in technology transfer activities in collaboration with startups.

The candidate will be responsible for supervising graduate students, presenting and discussing the results with the international research partners involved in the project.

This project will develop an innovative strategy for the characterization of the plasma. You will be employed at Laval University, a Francophone University in Québec. You will interact with colleagues within the engineering materials department as well as an international renowned company working in the field of materials and processing.

Admission Department

Mineral, Metallurgical, and
Materials Engineering

Research Director

Gaétan Laroche, ULaval

Profile of the candidate PhD in chemistry, chemical/mechanical (or equivalent)

Requirements

Autonomy in research, writing, and supervision of research staff

Start date

Fall 2022

Additional information

35h/week, holidays: 20 days

Salary

Between 22\$/h and 27.5\$/h depending on the experience

To apply

Send your cover letter describing research interests and goals, your motivation (max. 2 pages), list of publications highlighting your most relevant peer reviewed works, CV, and academic transcript to:
Gaetan.Laroche@gmn.ulaval.ca

For this project we will encourage applications of members of equity seeking groups.

The postdoctoral fellow will carry out this innovative multidisciplinary project with 2 other PhD. students. 1 postdoc and 2 researchers. The postdoc will also be called upon to participate in national and international conferences. During the hiring process, particular attention will be paid to the values of equity, diversity and inclusion to promote the recruitment of under-represented groups in the scientific