

# 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 solar energy will play a major role in the next years. In this context, the development of advanced syntheses for better and more eco-friendly solar cells (SCs) has become essential. In this context, plasma treatments at atmospheric pressure have the potential to strongly improve the efficiency of SCs while reducing the environmental impact during their industrial production.

Today, the main limitation for the use of plasma at atmospheric pressure in the industry remains low control of the chemical and physical mechanisms. Our main objective is to develop front edge optical characterizations for plasma at atmospheric pressure. This will allow the control of the process in real time. The results obtained in this project will be used to better understand the scientific limitations during the synthesis of thin layers in dielectric barrier discharge (DBD) with a roll-to-roll system. This work will strongly contribute to the transition from lab-scale prototypes to industrial processes.

The postdoctoral fellow who will work on this project will be responsible for studying the physics and chemistry of plasma and improve the knowledge of the regimes occurring at atmospheric pressure during the fragmentation of organic/organometallic molecules.

The candidate will have the opportunity to use (and improve) different optical systems for the characterization of the discharge. He will be responsible for the FTIR (Fourier Transform Infrared Spectroscopy) analysis in the gas phase. The candidate will initially work with lab-scale reactors. Then, he will transfer the obtained to large-scale roll-to-roll system. Additionally, he will collaborate with a PhD. student for the OES analysis.

Your profile:

- You have experience in plasma at atmospheric pressure and their characterization (OES, lasers, FTIR, fast imaging, electrical, *etc.*). You also have significant experience building optomechanical system and the optical analysis of gas phases.
- You have a Ph.D. in physics, plasma, optical engineering, or a related discipline.
- You have excellent theoretical and practical knowledge within one or more of the following fields: plasma physics and diagnostics, lasers, optical simulation with commercial software, infrared analysis (FTIR), dielectric barrier discharges (DBD).
- 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

### Admission Department

Mineral, Metallurgical, and Materials Engineering

### Research Director

Gaétan Laroche, ULaval

**Profile of the candidate** PhD in optical engineering, physics (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](mailto: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 candidate will have the opportunity to be trained within a renowned team. In addition, 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 community.