

## POST-DOCTORAL RESEARCH FELLOWSHIP

Advanced plasma treatment by homogenous atmospheric pressure plasma for the next generation of the OPV.

The global warming effect is unequivocal, and solar energy will play a major role in next years minimizing the impact on our environment. In this context, organic solar cells (OSCs) have become one of the most promising devices to replace conventional silicon-based solar cells with a global market size of 55.6 million U\$ in 2019, that is projected to grow to 101.3 million U\$ in 2027. In this device, conductive organic polymers ensure light absorption and the charge transport towards the electrodes. Today, the main limitation for the commercialization of the OSCs remains the low power conversion efficiency of the commercial devices in comparison with lab-scale products or inorganic solar cells. Our objective is to use front edge atmospheric-pressure plasma to create advanced large functional surfaces with optoelectronic properties. The results obtained in this project will be used to overcome the technical and scientific constraints that today limit the transition from laboratory prototype devices to manufacturing in continuous printing with industrial processes.

The postdoctoral fellow who will work on this project will be responsible for studying plasma treatments at atmospheric pressure to improve polymeric surfaces for organic photovoltaic (OPV) applications in static conditions. In this context, the candidate will have the opportunity to use a wide range of equipment (XPS, AFM, SEM, FTIR) for surface characterization. In addition, the postdoc will also study the possibility to transfer the obtained results from the prototype laboratory device to a large-scale system. The candidate will work with roll-to-roll plasma system to study the influence of the deposition method and the discharge conditions. Because conductivity of the substrate plays a role in modifying the uniformity of the electric field, different power supply evaluate on conductive, semiconductive and dielectric samples. Finally, pilot tests in industry will be conducted to evaluate the potential to scale up the developed approach.

Your profile:

- You have relevant experience in dielectric barrier discharges (DBD) at atmospheric pressure and material characterization (SEM, XPS, FTIR, AFM, etc.). You also have significant experience building plasma reactors (electrical/mechanical competencies).
- You have a Ph.D. in physics, chemistry, materials, mechanical-, electrical engineering, or a related discipline.
- You have excellent theoretical and practical knowledge within one or more of the following fields: plasma physics and diagnostics, synthesis and characterization of organic solar cells, plasma processes relevant for material synthesis, computer-aided manufacturing, computer-aided engineering, 3D modelling with commercial software.
- 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.

### Admission Department

Mineral, Metallurgical, and  
Materials Engineering

### Research Director

Gaétan Laroche, ULaval

**Profile of the candidate** PhD in science of engineering of materials, chemistry, 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 between 3 different departments as part of a collaboration with industrial partners (4 Canadian companies participating). Our strategic research academic-industrial team is driven by the possibility to highlight the potential of commercial OSCs fabricated in Canada. The candidate will have the opportunity to be trained within 3 internationally renowned teams. In addition, the student 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.