

Optimization of microfabrication processes for high efficiency solar cells fabrication

Record number : OPR-34

Overview

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ADMINISTRATIVE UNIT(S)

Faculty of Engineering
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LEVEL(S)

Master's degree
Ph.D.
Postdoctoral Fellowship

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation
technologique

Project Description

Multi-junction solar cells convert solar spectrum into electricity much more efficiently than traditional single-junction solar cells. In particular, triple-junctions based on III-V semiconductors, such as InGaP / InGaAs / Ge make reach conversion efficiency greater than 40%. These performances have largely contributed to the recent development of concentrated photovoltaic technologies (CPV). In fact, under concentration of solar radiation, the cells exhibit increased conversion efficiency and the cell area can be reduced. These two parameters combined make it possible to reduce the cost of electricity production produced by terrestrial photovoltaic systems using these cells. At Université de Sherbrooke, we have developed microfabrication processes to produce triple-junction photovoltaic cells on small samples. The objective of this internship is to optimize and stabilize certain key processes of these microfabrication (lithography, metallization for making thick contact, dry or wet etching, anti-reflective coating, etc.). These stabilized manufacturing processes will allow the development of innovative approaches for the microfabrication of CPV cells that can be integrated into systems with concentrations exceeding 1000 suns. Furthermore, we will adapt these processes for manufacturing on larger surfaces to allow the manufacture of multi-junction cells in larger quantities (a few hundred), which will make it possible to assess the reliability of the cells thus manufactured, and to integrate these cells in demonstration modules.

In addition to contributing to the advancement of PV work at the University of Sherbrooke, this research topic offers the candidate the opportunity to develop skills in fields related to photovoltaics, micro / nano fabrication in clean rooms and semiconductor physics. The internship will therefore include aspects of manufacturing and characterization of solar cells. This part of the work will be carried out at Université de Sherbrooke in Quebec, Canada. The characterizations of cells under concentration will be carried out using solar simulators. This work will be performed within the framework of the international research laboratory LN2 bringing together researchers from Université de Sherbrooke and CNRS (France).

Discipline(s) by sector

Natural Sciences and Engineering

Electrical Engineering and Electronic

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Funding offered

Yes

The last update was on 29 March 2021. The University reserves the right to modify its projects without notice.