


Internship offer 2019-2020

Laboratoire: Center for Nanoscience and Nanotechnology (C2N) Adresse: 10 Boulevard Thomas Gobert, 91120 Palaiseau, France Directeur du laboratoire: Giancarlo Faini (C2N)	
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Development of low-cost high-efficiency III-V solar cells

Scientific project :

Solar cells made of III-V materials present the best efficiencies among currently available technologies, up to 46% under concentration. Nevertheless, their cost is significantly higher than mainstream silicon modules. The major part of this cost, about 80% to 90%, lies in the III-V substrates necessary for the fabrication of monocrystalline materials with sufficient quality.

We propose to explore a new strategy to reuse the substrate for several consecutive growths, in order to drastically reduce its cost contribution. The main goal is to modify the surface of the III-V substrate, so that the fabricated III-V layers can be detached easily, leaving a clean surface suitable for subsequent layer fabrication. A promising route for surface modification, called *remote epitaxy*, consists in depositing graphene layers on top of the substrate.

The internship will aim at defining and optimizing the methods to fabricate graphene layers on top of the III-V substrate. This work includes advanced surface characterization. It will take advantage of a unique collection of fabrication (vapor deposition, graphitization) and characterization methods (XPS, electron microscopes, STM) available in partner laboratories, giving the intern various opportunities to tackle this project challenge and gain experience.

This work will be done in close collaboration between the C2N (SUNLIT team) and Institut Photovoltaïque d'Ile-de-France (IPVF) laboratories. The intern must show good organization skills to fabricate the target materials, using methods implying numerous parameters, in a clean room environment. Self-decision making and process improvement suggestions are expected. Communication skills are required for team working as well as regular presentation of work progress in internal meetings.

Websites: <https://sunlit-team.eu> , <https://www.c2n.universite-paris-saclay.fr> ,
<https://www.ipvf.fr>

Methods and techniques: Fabrication: chemical surface treatment, etching (wet or dry), vapour deposition, annealing chambers. Characterization: STM, electron microscopy, XPS, luminescence.
Required skills : Proactive, autonomous, communication skills for results presentation

Rémunération éventuelle du stage: Stage rémunéré

Possibility to go on with a PhD: YES

Envisaged fellowship: Institut Photovoltaïque d'Ile-de-France (IPVF)