IPVF
18, boulevard Thomas Gobert
91120 Palaiseau - France
Tél. : + 33 (0)1 69 86 58 60

IPVF Job Offer

MISSION TITLE

IPVF PhD Student: Remote Epitaxy of III-V Materials

towards low-cost high-efficiency solar cells

POSITION DESCRIPTION

Function	Ph.D. Student	**Reference**	IPVF-2020-S004
Contract type	CDD	**Duration**	36 months
Starting date	September 2020	**Education**	M.S. / Engineering degree in physics, materials science or related
Working Place	Palaiseau, Paris area	**Salary**	Salary grid

IPVF IN BRIEF

Become an actor of the Energy Transition by joining a team driven by innovation and impact to address today's most decisive challenges.

IPVF - Institut Photovoltaïque d'Île-de-France, is a global Research, Innovation and Education center, which mission is to **accelerate energy transition through science & technology**.
Gathering industrial PV leaders (EDF, Total, Air Liquide, Horiba and Riber) and world-renowned academic research teams (CNRS, Ecole Polytechnique), multi-disciplinary and international IPVF teams conduct research for clean energy technologies.

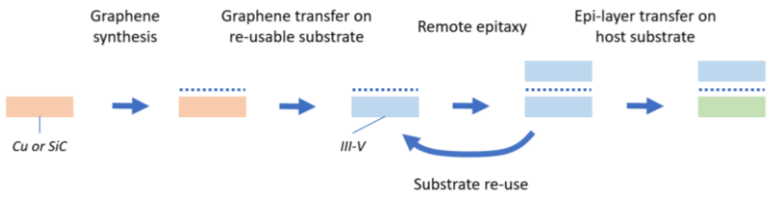
IPVF at a glance:

- *An ambitious Scientific and Technological Program: from tandem solar cell technologies to economy & market assessment, state-of-the art characterization, photocatalysis and concepts breakthrough.*
- *A state-of-the-art technological platform: more than 100 tools, located in cleanrooms (advanced characterization, materials deposition, prototypes for fabrication, modelling…).*
- *A high-standard Education program (M.S. and PhD students).*

JOB CONTEXT

Solar cells made of III-V materials present the best efficiencies among currently available technologies, up to 46% under concentration. However, this technology suffers from high cost, significantly higher than mainstream silicon modules. The major part of this cost (about 80% to 90%) lies in the III-V substrates needed for the growth of monocrystalline materials with high 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 easily detached, leaving a clean surface suitable for subsequent layer fabrication. A promising route for surface modification, emerging in recent high impact studies and called remote epitaxy, consists in depositing graphene layers on top of the substrate. The complete process is depicted in the figure below.



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MAIN MISSIONS

The candidate will directly report to the Deputy Programs Director of IPVF.

She/he will integrate a dynamic and talented team driven by innovation and results.

The objectives of the PhD are twofold:

(i) Define the best technological steps to achieve a high-quality remote epitaxy, which includes the fabrication and transfer of graphene on a III-V substrate, and the epitaxy by MBE.

(ii) Elucidate the nature of the physical interactions between the fabricated material, the graphene, and the substrate underneath. It is suspected that this interaction consists in Van der Waals forces through the graphene layer. This would constitute a totally new tool for the synthesis of III-V layers, with a wealth of applications, such as photovoltaic as targeted here, but also silicon photonics, flexible devices…

This work will be done in close collaboration with the Center for Nanoscience and Nanotechnologies (C2N, SUNLIT team). It includes several methods of fabrication (graphene by CVD, III-V by MBE) and characterization (luminescence, SEM, TEM).

She/he will work in close relationship with highly qualified scientists, specialized in III-V materials and nanofabrication. This environment gives the PhD candidate many opportunities to tackle this project challenge and gain experience.

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

SOUGHT PROFILE

Knowledge	Know-how	Self-management skills
▪ Master degree (or equivalent) in Physics, Engineering, Materials Science or related. ▪ Strong background in Materials Science, Surface Engineering and Physics. ▪ Excellent English language skills.	▪ Experience in cleanroom is an asset. ▪ Proficiency in II-V materials is a plus. ▪ Experience in nanofabrication is an advantage.	▪ Good organizational skills to fabricate targeted materials implying various parameters and equipment. ▪ Autonomous and rigorous. ▪ Communication and collaborative skills. ▪ Results-oriented.

CONTACT

Cover letter and résumé to be sent to: amaury.delamarre@c2n.upsaclay.fr and rh@ipvf.fr