Laboratoire
d'électronique
et de technologie

Internship subject

DTSI
DCOS

Research Domain (check 4 boxes maximum):

Chemistry for nanos	☐	Molecular electronics	☐	Process Technologies	☐
Imaging devices & Systems	☐	Nanocharacterization	☒	RF Devices & Systems	☐
Materials	☒	Nanoelectronics	☐	Spintronics	☐
Memory technologies	☐	Nanos for Energy	☐	Autres	☒
MEMS and sensors	☐	Nanoscale simulation	☐		
Microtechnologies for bio	☐	Photonics	☐		

Initial training	Duration in months	Date starting up	For internship : possible PhD thesis (yes/no)	Funding
Master 1	6	1/03/2015	Yes	

Title: Development of advanced AFM characterization methods for photovoltaics

Collaboration framework and context *(8 lines maximum)*:

Nowadays, improvements in performance of third generation solar cells are strongly dependent on developing advanced characterization tools capable of mapping the photophysical properties of photovoltaic materials at the nanometer scale. For that purpose, within the Nano characterisation platform (PFNC), we develop several advanced approach based on the Atomic force microscopy (AFM) and its electrical modes, such as Kelvin Probe Force Microscopy (KPFM) and contact current imaging. PFNC owns two state of the art ultra-high vacuum (UHV) AFMs. The first is located in LETI/DTSI/SCMC, and the second at INAC/SPRAM/LEMOH. These AFMs are equipped with dedicated illumination setups for photovoltaic investigations with complementary performances in terms of light power, wavelength and modulation speed.

Work description *(13 lines maximum)*:

During this internship the applicant will:

- learn to operate non-contact AFM and contact AFM under UHV,
- perform the measurements under illumination by KPFM (photovoltage) and C-AFM (photocurrent) on reference samples and organic solar cells with a sub-10nm lateral resolution,
- analyse and interpret the scanning probe microscopy maps to obtain the solar cells proprieties, for example efficiency.

The applicant must be strongly motivated to learn how to handle advanced UHV-AFM facilities and analyse the data. Knowledge about solid state physics is essential. **The candidate should be motivated to continue his education as a PhD student**, either in the frame of this project or in another field. He will have the opportunity to develop transverse skills as the work will involve issues of intellectual property, industrial experience with the LETI partners and a daily practise of the English language.

Host institution

Direction/Department/Service/Laboratory	DRT/LETI/DTSI/SCMC
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Technical Supervisor	For PhD only
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