PHD SCHOLARSHIP – UNIVERSITY OF BORDEAUX

HYBRID PEROVSKITE BASED SOLAR CELLS

As often stated, the progression of perovskite solar cell photo conversion efficiency (PCE) has seen the fastest growth to date reported for all types of solar cell technologies. This class of materials has benefited from pre-existing knowledge gained from both inorganic semiconductors (band structure, photon absorption, charge transport…) and organic semiconductors (wet process, soft substrates, etc.). Nevertheless, the spread of PCEs reported in literature remains very large, suggesting that material properties and interfaces are very dependent on the quality of the fabrication process. Interfaces and contacts are therefore key points to achieve reliable and efficient solar cells. This is generally true for all type of solar cells. However, in most inorganic solar cells (and in silicon solar cells in particular), this difficulty is partially solved by using well-controlled doping layers. Indeed, doping allows contacting metal electrodes with highly doped semiconductor layers, removing interfaces away from the carrier collection area. Moreover, connecting semiconductor through highly doped layers also makes the cell performance insensitive to the value of the metal work function, giving more flexibility in selecting metals. The design of HOIP solar cells can be considerably enhanced by controlling doping and interface quality. The project of this thesis is based on this hypothesis and intends to investigate the impact of new dopants and customized self-assembled monolayers in state-of-the-art solar cell devices. Advanced characterization techniques will be used to design a physical model, allowing a thorough description of the physics of hybrid perovskites solar cells and their optimization.

The PhD student will be embedded in the organic electronics group of the IMS lab and she/he will participate to the HYPERSOL ANR funded project, which gathers four French academic partners. He will benefit from the experience of the full team at IMS and from the HYPERSOL project consortium.

Candidate’s Profile:
For this study, a physicist or material scientist is expected. Strong knowledge in the physics of the semiconductor is mandatory. Good experimental skills are also required.

Starting date:
PhD position is opened for January 2019.

Scholarship:
1 400 €/month (neto)

Localisation and Supervision:
The PhD student will be located in the « Laboratoire de l’Intégration du Matériau au Système (IMS – CNRS UMR 5218) », in Bordeaux, France. He/She will be working in the ELORGA team (http://oembordeaux.cnrs.fr). This project will be developed under the supervision of Dr. Lionel Hirsch.

Application:
Applications have to be sent by mail at: Dr. Lionel HIRSCH (Research Director at CNRS): lionel.hirsch@ims-bordeaux.fr

The application will include a complete CV, a motivation letter, transcripts of Master 1 and 2, references and 2 recommendation letters.