Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Pedesseau Given names : Laurent

Status (prof., assistant prof., …) : A. Prof.

Laboratory :	FOTON Institute	Website address : foton.cnrs.fr
Institution :	INSA Rennes	Website address : insa-rennes.fr

Scientific competence of the supervisor:

Skill and international expertise in atomistic calculation and optoelectronic devices numerical simulation and characterization. Member of the FOTON-OHM simulation team headed by Professor Jacky Even.

Two major publications in the field proposed for the PhD :

1. A. Rolland et al, Opt. Quant. Elec. https://link.springer.com/article/10.1007/s11082-017-1284-0
2. H. Tsai et al, Nature 2016 https://www.nature.com/articles/nature18306

Website address of the personal page : foton.cnrs.fr

Supervisor's email : laurent.pedesseau@insa-rennes.fr

Description of the research work proposed for a PhD ***Topic # (see list) :*** I-10

Title : Numerical simulation of optoelectronic devices based on perovskite materials

Subject :

The proposed PhD thesis aims at using the state of the art industry-based Silvaco numerical code to simulate perovskite based optoelectronic devices: Solar cells, Light-emitting diodes (LED) and Thin Film Field Effect Transistors (TFT). The application of the solar cells is now enlarged by FOTON laboratory to the multi-junctions (tandems cells) structures for low-cost and high performance single junction solar cells, in collaborations with state of the art experimental groups. The study of the later device can bring further understanding of the hysteresis effect attributed to ion migration in the perovskite layer, as well as progress to enhance solar cell stability under light soaking. This work will be done in close collaboration with the technology and characterization teams of French and foreign partners laboratories in order to assess the physical parameters used to describe the microscopic and macroscopic properties of the materials and the device structure.

Keywords :

Optoelectronic devices, solar cells, perovskite materials, numerical simulation.

Expected collaborations :

XLIM laboratory (Limoges France) website: xlim.fr ; The hebrew University of Jerusalem.

Background required from the applicant :

Good knowledge of semiconductor physics and skill in using mathematical tools for numerical simulation.

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

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