



12-Months Post-doctoral Research Associate Position

Characterization of hybrid quantum dots (QD) / p-type semi-conductors assemblies for inverted solid-state QD-sensitized solar cells

Employer: University of Limoges, CNRS

Workplace: XLIM Research Institute, Limoges, France (www.xlim.fr)

Expected starting date: 02/2015 – 04/2015

Salary: ~ 2100€ net per month

Skill area: Organic and hybrid Optoelectronics, Solar Cells, Physics and Photo-Physics

The **XLIM** research institute (UMR CNRS 7252, University of Limoges, France) is currently seeking for a 12 months postdoctoral research associate on the **characterization of hybrid quantum dot (QD) / p-type nanostructures assemblies for photovoltaic applications**. The research project of the postdoctoral position is integrated within the framework of the **QUEPHELEC** project, which is funded by the French ANR agency over 2013-2017. The objective of this challenging project involving four academic partners (SPrAM, Grenoble; CEISAM, Nantes; XLIM, Limoges; IM2NP, Marseille) is to jointly develop and study novel hybrid architectures to be used in inverted QD-sensitized solar cells.

Description of the position

Ternary quantum dots exhibit high absorption coefficients over a wide spectral range and tunable band gap. They also do not contain toxic elements. By sensitizing nanostructured n-type materials with such QDs, efficient solar cells with power conversion efficiencies up to 6% have been recently obtained. At the same time, sensitization of p-type semiconductors by QDs has almost not been studied because of the scarcity of p-type nanomaterials of good electronic quality. Our partner (SPrAM) recently developed the fabrication of a promising organic p-type nanomaterial of high potential to be used together with QDs in novel inverted sensitized solar cells. In this context, the role of the XLIM partner is to perform several physical characterizations of the hybrid QD-semiconductor assemblies and to implement the QD-sensitized materials in solid-state QD-sensitized solar cells.

The research project of the postdoc will first involve the implementation of test devices suitable for the characterization of the hybrid assemblies using both impedance spectroscopy and photo-luminescence measurements (steady-state and time resolved). To do so, the

successful applicant will screen several solid-state electron transporting materials (ETM) in order to infiltrate the QD-sensitized nanostructures provided by the partners. Both novel organic p-type nanostructures as well as inorganic nickel oxide (NiO) porous electrodes, used as reference, will be considered. The main objective will be to identify the charge and/or energy transfer mechanisms occurring at the hybrid assembly in order to demonstrate efficient electrochemical devices. Device operation will be monitored with regard to the main experimental parameters (physical properties of the QD and the linkers, nature of the ETM, etc) to point out the main structure/properties relationships. Finally, QD-sensitized solar cells will be fully implemented and characterized in the lab.

This position will exploit the technological infrastructures available at XLIM in the field of printed electronics (PLATINOM Platform), as well as common facilities of the University of Limoges (electronic microcopies, AFM, etc).

Profile of the candidates

The postdoctoral position is open from February 2015. We are looking for a highly motivated young researcher presenting a relevant experience in the field of hybrid solar cells and especially in dye- or QD-sensitized solar cells. Some experience in advanced characterization techniques including photo-luminescence and electrochemical impedance spectroscopy will be highly appreciated. The ideal candidate also demonstrates good experimental skills, as well as some understanding of charge transfer mechanisms in solar cells. Team working abilities and good communication skills will be highly appreciated.

How to apply?

Applicants must send their cover letter, a detailed CV including a list of publications, as well as two references, to:

Dr. Johann Bouclé

XLIM UMR 7252, MINACOM/Equipe Optoélectronique Plastique

Université de Limoges/CNRS

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