Co-fund DGA Thesis

Armaments Procurement Agency

Title: Perovskite photovoltaic sensors / photodetectors for printable micro-sources, self-powered sensor network and / or positioning devices

Full description

Perovskites recently demonstrated a technological breakthrough in the field of third generation solar cells, associated with power conversion efficiencies above 15% [1,2]. These perovskite solar cells are developed at relatively low cost and present high efficiencies, making them suitable for applications such as micro-sources for self-powered sensors. Home automation (energy management), photo-detection applications, or military applications (surveillance of a geographic area) can be also considered.

The aspect that we propose to study in the context of the PhD studentship, is the feasibility of such devices by printing technology. To this end, it is necessary to synthesize the perovskite materials in the form of nanoparticles, or in the form of inorganic-organic precursor solutions or inks. The successful candidate will first study the formulation and the rheology of such perovskite inks in order to adapt them to low cost printing technologies such as ink-jet. Then, the characterization of the morphologic, electronic and optical properties of the deposited perovskite films will be performed, both at the XLIM Research Institute, and with external academic partners. The candidate will finally ensure the implementation and optoelectronic characterization of test devices at the laboratory scale.

This research program will be developed through an academic consortium driven by the XLIM Research institute in Limoges (France), and which involves two groups of the "Ecole Normale Supérieure de Cachan" (the PPSM laboratory and the Aimé Cotton laboratory, Paris), the PCM2E group from the University of Tours, and the IM2NP Research institute (Marseille).

[1] Burschka, J. et al, Nature 2013, 499, 316–319.
[2] Liu, M. et al, Nature 2013, 501, 395–398.
[3] Eperon, G. E. et al, Adv. Func. Mat. 2014, 24, 151-157

Keywords: Perovskite, Solar cells, Photovoltaic, Sensors, Micro-sources, Printing

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Conditions of access:

- Citizen of the European Union or Switzerland;
- Not having started their professional career;
- In preparation of a Master degree in the year of submission of the application;
- Or hold a Master or equivalent allowing them to enroll in thesis;

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Laboratory: XLIM - http://www.xlim.fr/