



2 years Postdoctoral position at Institut Néel on “Elaboration of dense/ polycrystalline hybrid perovskite layers for the direct detection of X-rays”

Scientific context: Hybrid organic-inorganic perovskite (HOIP) materials are attracting a lot of attention due to their unique combination of advantages: high charge carriers generation and mobility and relative ease of elaboration, leading to record efficiencies in photovoltaic. Beyond the original application in photovoltaic systems a recent interest has emerged regarding their use as sensitive layer for the direct detection of ionizing radiations. In the past couple of years Institut Néel (CNRS-UGA), CEA Liten and CEA Leti have initiated a collaboration to study the potential of one specific HOIP ($\text{CH}_3\text{NH}_3\text{PbBr}_3$, MAPbBr_3) for the detection of X-rays. More specifically, we propose to realize an X-ray imaging device where a thick, polycrystalline MAPbBr_3 layer on a pixelated substrate would realize the direct conversion of X-rays into charge carriers. This would allow medical radiography with higher resolution and higher sensitivity and lower the patients' dose. This study has received the financial support of the European Community through a H2020-ICT5 grant.

Research topic: On one hand Institut Néel has a long experience in single crystal and epitaxial growths in solution and related structural characterizations. On the other hand, CEA Liten and Leti have strong experiences in respectively the fabrication and advanced characterization of hybrid organic-inorganic devices and in the research and developments of X-ray and γ -ray imaging detectors.

In this framework, we have grown and characterized MAPbBr_3 single crystals of high quality thanks to a specific growth protocol. Based on the growth of single crystals, the post-doctoral researcher will have to derive a protocol for the growth in solution of thick, high quality polycrystalline layers of HOIP directly on pixelated substrates. This will require defining the growth conditions as well as conducting structural characterizations of the grown layers (X-ray diffraction, SEM, AFM, ...). The privileged relation with the Liten's and Leti's specialists of integration and device fabrication and characterization will be maintained to optimize the structural quality (type and number of defects) with respect to the charge transport properties of interest.

Possible collaboration and networking: CEA Liten, CEA Leti, Trixell company (France), Universitat Jaume I (Valencia, Spain)

Skills: Candidate with a strong interest for experimentation and a strong background in material science is expected. Skills in crystallization are needed, in solution not compulsory but are a plus. Expertise in hybrid perovskite materials elaboration and/or characterizations would be welcome.

Starting date January -February 2020

Contact: julien.zaccaro@neel.cnrs.fr; alain.ibanez@neel.cnrs.fr

Institut NEEL CNRS/UGA UPR2940

25 rue des Martyrs BP 166

38042 Grenoble cedex 9, France

neel.contact@neel.cnrs.fr