

Using a confocal PL microscope to correlate the PL and structural properties of 2D-layered perovskites crystals and thin films.

ABSTRACT n° 11345

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Type of presentation : : Oral Communication

Domain : Perovskites and organic semiconductors

Date of submission : 2018-03-16

[307 Words]

Text

Over the past few years, hybrid organic perovskites (HOP) were found to be remarkable semiconductors with outstanding optoelectronics properties. These materials are very versatile, as their bandgap and the carrier confinement can be easily tuned chemically. Many studies have focused on 3D perovskites, that tend to be good absorbing materials for thin films photovoltaic devices.

Alternatively, another class of perovskites, called 2D perovskites, is getting more attention. These 2D HOP have a natural quantum well structure and a high dielectric excitonic confinement. Nevertheless, many of the fundamental photophysics properties of these 2d HOP remain to be understood.

In this presentation, we will study the photoluminescence properties of 2D perovskites based on phenylethylammonium (C₆H₅C₂H₄NH₃)₂PbI₄ and their 2d/3d derivatives (including a proportion of methylammonium). A new method will be presented to grow large grains films as well as single crystals with large aspect ratios and low roughness [1].

These single crystals have a low proportion of defects and will be then used to unveil some of the intrinsic properties of these perovskites. In particular a cryogenic confocal study will be presented, to finely probe the optoelectronic properties (excitons/phonons, ...) and the presence of defects in the produced samples.

[1] F. Ledee, G. Trippé-Allard, H. Diab, P. Audebert, D. Garrot, J.S. Lauret and E. Deleporte, CrystEngComm, 2017,19, 2598-2602

This work has been performed within the GOTSOLAR project, which has received funding from the European Union's Horizon 2020 research and innovation Programme under the grant agreement No 687008. The information and views set out in this abstract are those of the authors and do not necessarily reflect the official opinion of the European Union. Neither the European Union institutions and bodies nor any person acting on their behalf may be held responsible for the use which may be made of the information contained herein.