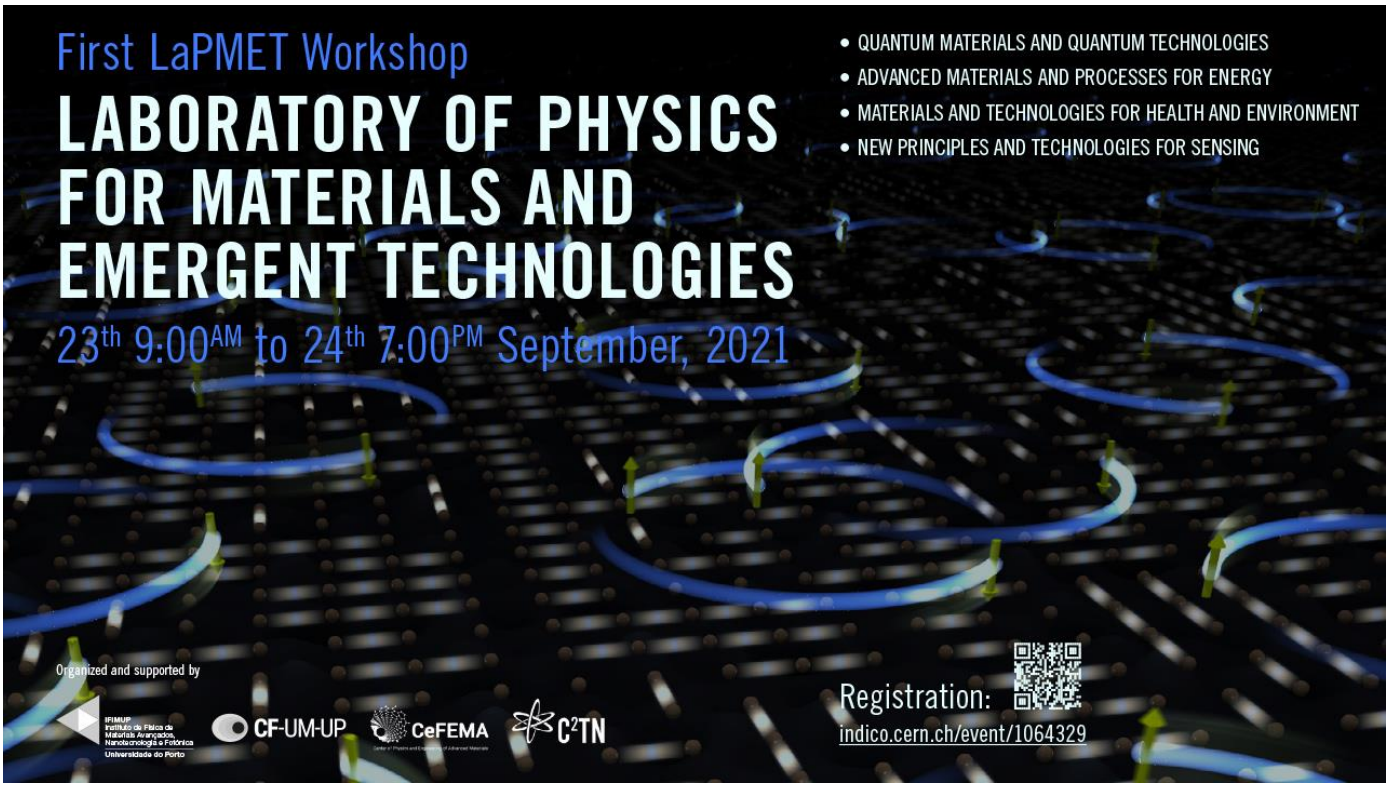

First LaPMET Workshop

Thursday, September 23, 2021 - Friday, September 24, 2021

Book of Abstracts

Nuclear microprobe: the tool to characterize new materials for energy conversion

V. Corregidor[1], L.C. Alves[1], M.A. Barreiros[2], P.M.P. Salomé[3]

[1] *C2TN, DECN, Instituto Superior Técnico, Universidade de Lisboa, Portugal*
e-mail: Presenting.vicky.corregidor@ctn.tecnico.ulisboa.pt
[2] *Laboratório Nacional de Energia e Geologia, UME, Estrada do Paço do Lumiar, 22, Lisboa 1649-038, Portugal*
[3]*International Iberian Nanotechnology Laboratory, Braga 4715-330, Portugal*

The ion beam analytical (IBA) techniques capabilities are enhanced when coupled to a scanning nuclear microprobe due to the possibility of: i) focusing the beam to sub-micrometer spot sizes and, ii) rastering the area under analysis. In this way, it is possible to obtain elemental distribution maps and the elemental depth profile in a fully quantitative manner.

The type of materials characterized in the nuclear microprobe installed at CTN-IST is vast and includes, among others: biological, alloys, cultural heritage or semiconductor materials.
In this work, we will focus on two materials used to convert the sun light into electricity: perovskites and CIGS (CuIn1-xGaxSe2) materials.

Optoelectronic defects, such as composition inhomogeneities created, for example, during the manufacturing process, can be revealed during the characterization (fig. 1).

Examples using different type of beams (protons or alpha particles) and energies (up to 2 MeV) will be given to show the capabilities of the IBA techniques and the nuclear microprobe in the this field.

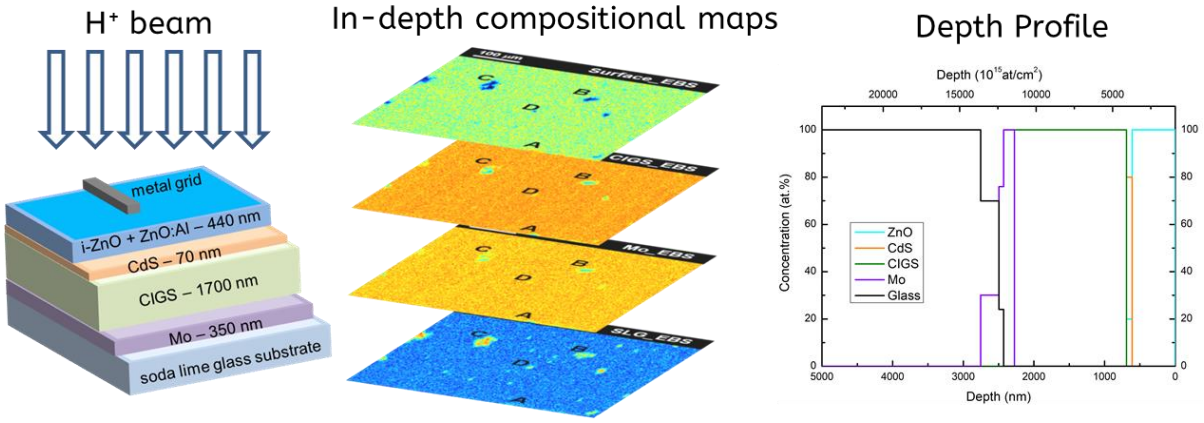

Fig. 1. Structure of a CIGS solar cell. Compositional maps showing non-homogeneous concentration regions and depth profile obtained using the IBA techniques.

References

[1] V. Corregidor, M. A. Barreiros, P. M. P. Salomé, L. Alves, *The Journal of Physical Chemistry C*, **16155-16165** (2021) /10.1021/acs.jpcc.1c02731.
[2] M.A. Barreiros, L.C. Alves, M.J. Brites, V. Corregidor, Nucl. Instrum. & Methods B, **211-218** (2017) /10.1016/j.nimb.2017.01.019