ID de Contribution: **9** Type: **Talk**

Development of new metrology protocols for chalcogenide materials related to process parameters

mercredi 31 mai 2017 16:45 (15 minutes)

Chalcogenide materials are composed of S, Se or Te elements from group VI of the periodic table. For these elements, the sequence of S, Se and Te shows that bonding changes from molecular, covalent, to metallic. They are receiving extensive interest not only for application in advanced memories (Phase Change RAM, Current Bridge RAM) and photovoltaics (i.e. CZTS: Cooper Zinc Tin Sulfide), but also in the development of 2-D materials based in transition metals (e.g. MoS2, WS2) [1]. The properties of the chalcogenides are deeply influenced by the chemical composition, the surface/interface effects and the depth-profile compostion [1]. Hence adequate metrology needs to be developed to probe these materials.
The objective of this PhD is to develop advanced metrology protocols required to support the development of the novel chalcogenide materials and their integration in complex technological stacks. The chemical composition is being investigated using Wavelength Dispersive X-Ray Fluorescence (WD-XRF). The composition profiles is under study by combination of X-Ray Reflectometry (XRR) with Grazing Incidence X-Ray Fluorescence (GI-XRF). These in-depth investigations run on state-of-the-art tools and they is being complemented by fluorescence (GiXRF) experiments at the SOLEIL/Metrology synchrotron line. X-Ray Photoemission Spectroscopy (XPS) and Angle-Resolved XPS protocols is under development for surface/interface effects and shallow elementary depth profile.
The combination of Lab and synchrotron based metrology will allow detailed understanding of the chemistry of chalcogenide thin films. The metrology protocols will be applied to the characterization of innovative films elaborated by PVD and CVD (ternay alloys, 2D transition metal dichalcogenides, etc).

Key-words: Chalcogenides; Thin-films; Chemical composition; X-Ray Metrology; XRF; XPS; GIXRF-XRR

[1] Tanaka, Keiji, and Koichi Shimakawa. Amorphous chalcogenide semiconductors and related materials. Springer Science & Business Media, 2011.

Auteur principal: M. BATISTA PESSOA, Walter (LETI CEA-GRENOBLE)

Co-auteurs: Dr ROULE, Anne (CEA-LETI); Dr NOLOT, Emmanuel (CEA-LETI); Dr LEPY, Marie-Christine (CEA-LIST)

Orateur: M. BATISTA PESSOA, Walter (LETI CEA-GRENOBLE)

Classification de Session: Accelerators