

## **In-situ High Temperature Microstructural Transformations of Oxide Epitaxial Thin Films**

René Guinebretière, R. Bachelet, A. Boulle, P. Thomas, *SPCTS CNRS UMR 6638, ENSCI, 47 Av. A. Thomas 87065 Limoges Cedex, France.*  
E-mail: r\_guinebretiere@ensci.fr

Real physical properties of thin films are greatly influenced by their microstructural characteristics. The elaboration processes of oxide thin films with appropriate microstructures often require post deposition thermal treatments. One of the key points on the way to the introduction of oxide thin films as functional materials into electronic or optoelectronic devices is therefore an accurate control of the structural and microstructural evolution during those thermal treatments. In collaboration with the INEL company, we have recently build a specific laboratory X-ray diffraction (XRD) set-up allowing the collection of diffraction patterns between room temperature and 1500 K. The incidence angle of beam impinging the sample is adjusted with an  $\omega$ -rotation with a precision of  $0.001^\circ$ . A specific procedure allowing an automatic compensation of the samples dilatation has been developed allowing a positioning precision of a few  $\mu\text{m}$ . A rotation around the normal to the sample surface allows to determine the in-plane orientation evolution through  $\omega$ -scan measurements. The diffracted beam are collected using a curved position sensitive detector so that reciprocal space maps can be recorded in situ in a few minutes only.

Zirconia thin films deposited using sol-gel process onto sapphire substrates have been used as test samples. Reciprocal space maps have been successfully recorded up to 1400 K. The corresponding microstructure evolutions will be presented at the conference.

**Keywords: x-ray diffraction, thin films, oxide**