Structural characterization of oxide thin films using Resonant Elastic X-ray Scattering (REXS)

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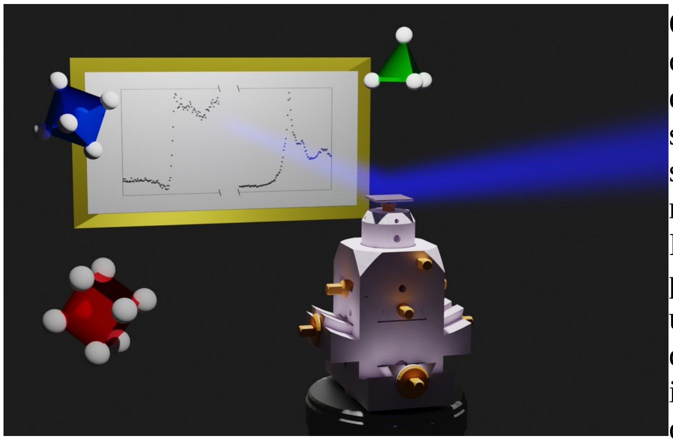

Oxide thin films have been enthusiastically considered for introducing new features in electronic devices over this last decade. crystal structure of those samples is a key point for the studies since it's linked to some properties such as magnetic properties or electric ones (polarization). If both cationic distribution and crystallographic position can be easily determined in bulk materials using classical methods such as X-rays or neutron diffraction, they are extremely tricky to determine in thin films owing to the relatively small amount of material to probe.

Anomalous scattering experiments have shown over the past ten years their capabilities for locating metal atoms on different sites, even in cases of small occupancies, and even in mixed metal situations (e.g. [1-4]). X-ray anomalous diffraction, benefiting from the tunable energy of the synchrotron, consists of recording the intensity of a Bragg reflection as a function of the energy of the scattered photons crossing an atomic absorption edge. It results to a variation of the atomic form factors leading to REXS spectra [5]. REXS is sensitive both to the local environment of the absorbing atom through the anomalous process and to the long-range order involved in the diffraction process.

Here, we will show that this <u>non-destructive</u> technique is perfectly adapted to probe the crystal structure. Moreover, the orientation of the polar cell on the substrates can be easily determinate (even visually on recorded spectra) [6]. Cationic distribution in spinel type (2 cationic sites) samples or in the $GaFeO_3$ (4 cationic sites) compounds will be introduced [6-7]. Finally, recent work on cationic position and oxygen position in thin films will be shown.

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