

Metal Oxides: Crystallographic characterizations for high temperature electrochemistry applications

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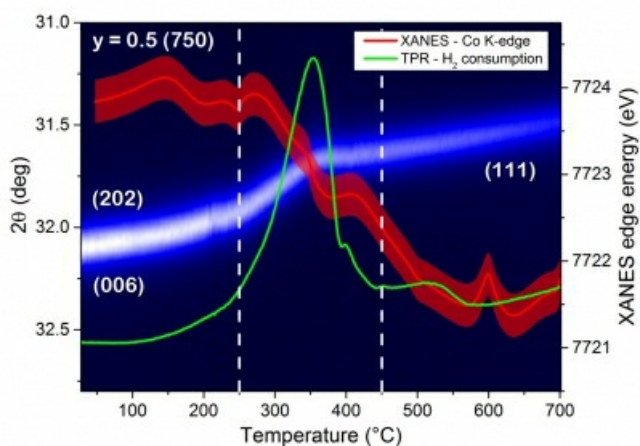
The strong relationship between the crystallographic structure and defects with the electronic and transport properties of a certain material is a key figure in most of the research conducted in materials science. The properties of an oxide in particular (transport, electrochemical, thermal, etc.) can be affected by several factors including the synthesis method and environmental conditions such as pressure, temperature, atmosphere, electrical current and field, magnetic field, etc. Therefore, it is important to go beyond the limited information obtained through the traditional ex-situ characterization techniques toward the more exhaustive ones provided by the in-situ or in-operando experiments, where it is possible the study of a device under non-ambient working conditions.

In this talk I will present some of the latest results obtained in our group involving several ceramic materials that are intended for sustainable clean energy generation devices like solid oxide fuel cells (SOFC). The focus will be placed on the correlation between the microstructural aspects (determined by the processing parameters) and their physical properties that determine the materials efficiency. The structural stability and chemical compatibility between the electrode and electrolyte materials studied were evaluated through the combination of several characterization techniques, such as electron microscopies (SEM, TEM), X-ray diffraction (XRD), chemical analysis by EDS and synchrotron radiation methods (XANES y EXAFS), including some in-situ and in-operando techniques.

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