ESRF	**Experiment title:** Cobalt chemical state at the interface between SOFC cathodes and electrolytes	**Experiment number**: ME-1494
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Report:

Samples were prepared surrounding a dense pellet of electrolye with the cathode powder and then annealing at high temperature (1100-1150°C) for either 12 or 72 hours. We investigated the cathode material $La_{0.6}Sr_{0.4}Co_{0.8}Fe_{0.2}O_3$ (LSCF) with two different electrolytes: $BaCe_{0.9}Y_{0.1}O_3$ (BCY) and $Ce_{0.8}Sm_{0.2}O_2$ (SDC). The obtained dense samples were embedded in resin and then cross-cut and polished to expose the cathode/electrolytes interface. We measure the microXRF maps and the micreXANES at the cobalt K-edge (7.7 keV). All of the cations in the samples are visible using this incident energy and in all the maps it is possible to notice some degree of cation interdiffusion across the interface at the micrometer scale. Some elements (notably strontium) diffuse more than others. In the LSCF/SDC sample we observed a similar effect to what we observed at the Fe K-edge: in the cobalt/samarium map (fig. 2) it is evident that cobalt exits the LSCF structure, clustering in small perovskite islets inside the SDC structure with the composition of $Sm(Fe,Co)O_3$.

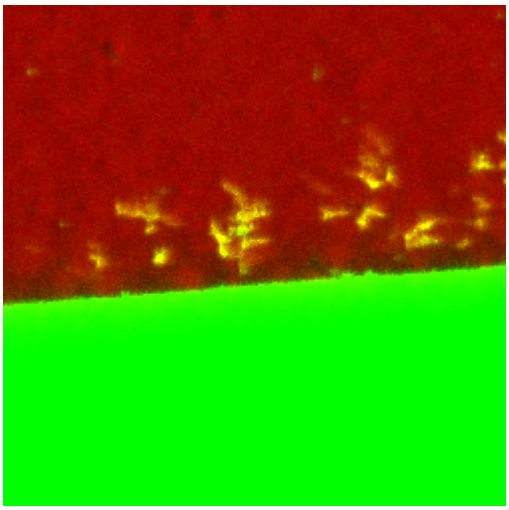

Figure 1: microXRF map of cobalt (green) and samarium (red) in annealed LSCF/SDC bilayer.

MicroXANES spectra also show interesting results: for instance, in the LSCF/GDC couple we detected a significant decrease in the oxidation state of the cobalt (from +3.4 to +3) after is diffusion (fig. 2), while in the LSCF/BCY couple there is no change in the edge shape or position.

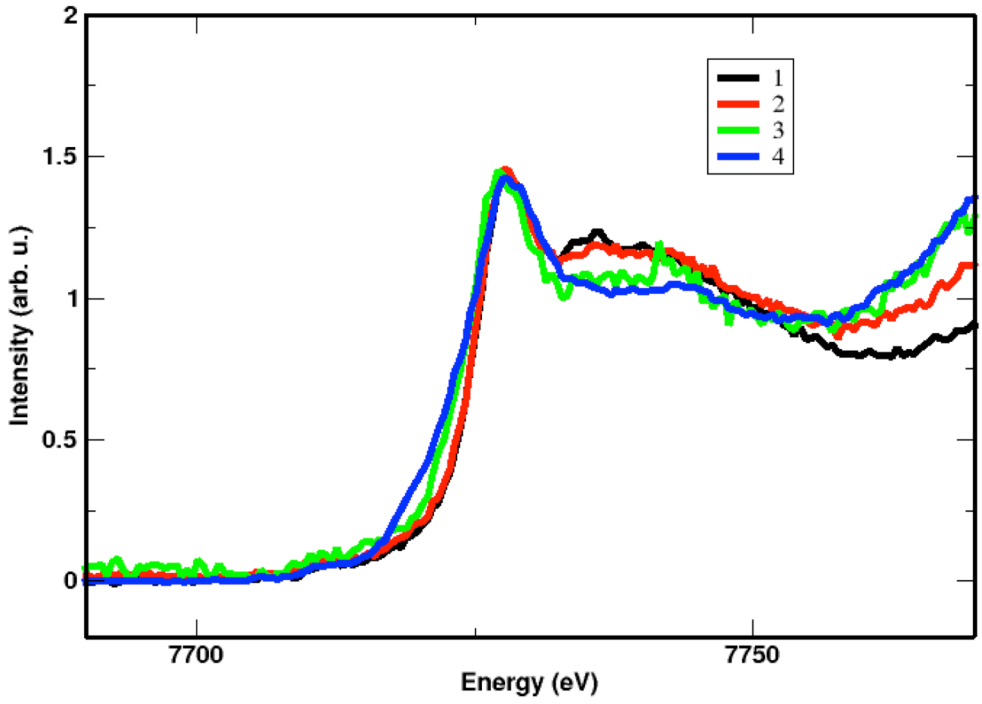

Figure 2: Cobalt K-edge XANES in LSCF/SDC couple.

MicroXANES and micro XRF were successful applied for the study of chemical stability of interfaces allow us to see the behavior of all the element of the samples, their diffusion or accumulation and the change in oxidation state of the cobalt after is diffusion.

These results, along with those from previous experiments, are going to be collected in a mini-review in preparation on SOFC electrolyte/cathode compatibility.