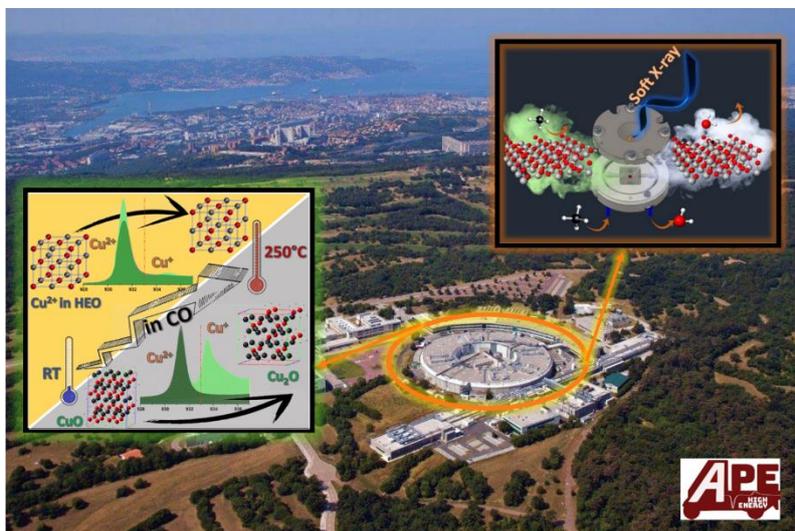


Materials for solid fuel cells studied by ap-nexafs

PhD Ciclo XXXVII (Borsa non ministeriale, IOM-CNR)



The candidate will have the opportunity to work at the synchrotron facility of Elettra (Trieste) at APE-HE beamline. The PhD student will become a recognized expert of the X-ray absorption spectroscopy (XAS) and will perform experiments for investigating the surface reactivity of materials especially for catalytic applications (metal oxides, metal organic frameworks, perovskites, etc.). The project will touch many advanced topics in the field of material science and among them the study of the reactivity of Hydrogen inside solid oxide fuel cells (SOFCs) will be addressed. SOFCs devices convert the chemical energy of H_2 directly into electrical work, and are efficient and environmentally clean (H_2O is the byproducts), since no combustion is required. A SOFC is mainly composed of two electrodes (the anode and the cathode), and a solid electrolyte.

In particular the focus of the PhD thesis will be the observation and the understanding of the H_2 oxidation mechanisms that occurs on the surface of different types of anode. In order to pursue this target the candidate will use the synchrotron radiation to perform *operando* XAS. The XAS spectroscopy is a very powerful technique which provides the electronic structure and the local geometric information of the absorber element. Recently at APE-HE beamline has been developed a new device that allows to perform *operando* XAS experiments at 1 bar up to $450^\circ C$. This kind of setup is a very new opportunity also because there are only few devices like this in the world and it is only waiting for your forefront discoveries.

The candidate will join a large group formed by several PhD's and post doc's coming from different countries operating the different instruments present at our laboratory. The international environment is also enriched by the presence of many international groups coming to perform experiment at our beamline and the candidate will have the chance to participate to some of them. Furthermore, the candidate will spend a period abroad for experiments in other facilities, schools and international conferences.

The candidate will also be trained at others techniques, present in our lab, and that we use as ancillary characterization in ours experiments such as: XRD, XPS, SEM, gas chromatography, computational simulation of XAS spectra.

We kindly invite you to write us for further information on the project and for planning a visit to our laboratory.

Supervisor: Dr. Piero Torelli torelli@iom.cnr.it

Dr. Luca Braglia braglia@iom.cnr.it