**DIFFABS: Combining X-ray diffraction and absorption to study a large variety of materials**

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**Areas of application, instrumentation and methodologies used**

The range of instrumental techniques that can be used on DIFFABS beamline concerns numerous sectors of fundamental research and finalized applied research (oil industry, nuclear field, metallurgy), of which materials science and chemistry hold predominant positions.

The interest of coupled x-ray absorption spectroscopy and x-ray diffraction measurements on amorphous, polycrystalline or textured materials, is to ensure that both experiments are carried out on the same region of the sample, in absolutely identical physico-chemical conditions, which is very important for establishing correlations between the information provided by both types of measurements in the case of complex materials or materials under extreme conditions.

Energy range: 3 - 23 keV.
X-ray beam size at sample position: 300 x 300 $\mu m^2$ (standard beam mode) and 10 x 10 $\mu m^2$ (micro-beam mode)
6+2 circle diffractometer (Kappa geometry).
X-ray Diffraction (XRD), X-ray absorption spectroscopy (XANES and EXAFS) and x-ray fluorescence spectroscopy (XRF).
Anomalous wide-angle scattering/diffusion, diffraction anomalous fine-structure spectroscopy (DAFS), and X-ray reflectivity (XRR).
Sample environments: "high temperature" devices (ovens, lasers and Peltier device). Uniaxial /torsion and biaxial tensile machines). Chemical and electrochemical cells.

**Major disciplines**

Structural characterization of materials. "Extreme conditions" (high temperature, high pressure). Mechanical properties and behavior. Characterization of thin films and nanomaterials. Cultural heritage and archaeological materials. Pathological calcification and dendrochronology.