Powder diffraction at ALBA synchrotron

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This talk is devoted to explain the uses of powder diffraction at MSPD (material science and powder diffraction) of ALBA synchrotron light source. General characteristics of the beamline are: **Station 1 -** High Pressure Diffraction on powders with diamond anvil cell (DAC) and CCD detector. Microdiffraction; and **Station 2 -** High Resolution Powder Diffraction with Multicrystal- and Silicon-Strip detector. Energy Range: 8-50keV; Typical beam size: 4x1mm; all typical sample geometries possible: capillary, reflection and flat sample in transmission.

Initially the setups are described in detail both in the optics hutch and in the experimental hutch. In the high-pressure end station, we can highlight: i) sample alignment semi-automatic; ii) data acquisition and reduction integrated within the beamline control system; iii) online pressure calibration system operational and several upgrades which are under commissioning: i) system for Membrane DAC, Automatic Drive System (change the pressure from outside the hutch); ii) Gas Membrane kit for Almax-Boehler DAC cell (from screw-driven to gas membrane driven); iii) low temperature cryostat and high temperature DAC cell projects are on-going.

In the high resolution powder diffraction end station, we can highlight: i) a diffractometer with 3 concentric rotary stages (for two detectors); ii) one very high resolution detector MAD26 (10 – 50KeV), devoted to high resolution ~0.005° [13 channels with 1.5 deg pitch, Si111 Bragg crystals, YAP scintillator + PMT]; iii) MythenII (8 – 30 keV) for fast acquisitions [6 modules that cover 40 deg 0.005 pitch angle, with millisecond resolution]; iv) Temperature range 80 – 900K; v) Eulerian Cradle optional.

Then, the main applications will be dealt with based on examples that expands from structure solution of zeolites to the in-situ studies of perovskite catalyst under H2 atmosphere at high temperatures. The high-pressure studies will be exemplified by studies of materials in DAC.