

## A new DIA-type multi-anvil apparatus dedicated to XRD and imaging at the PSICHE beamline, synchrotron SOLEIL

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The multi-anvil (MA) apparatus as proven to be invaluable for experiments where an excellent control over pressure and temperature conditions and a large sample volume are required. Access to *in-situ* X-ray diffraction (XRD) and imaging can be given by carefully integrating a MA on a synchrotron beamline. These techniques are used for the determination of many materials physical properties, e.g. thermoelastic properties, viscosity and electrical or thermal conductivity. XRD is also used in the study of phase diagrams of sometimes chemically complex materials or structural studies of crystalline solids and even liquids.

Here we present the full experimental station introduced to the users a couple of years ago at the French national synchrotron light source SOLEIL (PSICHE beamline). It consists of -1/ a 1200 tons load capacity MA press with a (100) DIA compression module operated in white and pink beam modes, focused in the vertical direction for a very high flux or parallel - 2/ a CAESAR (combined angle- and energy-dispersive structural analysis and refinement, Wang et al. in 2004) XRD setup, which is the ideal tool when accurate structural measurements are required, especially in the case of liquids and amorphous materials -3/ a high resolution imaging system, with framerates up to 2 kHz full-frame and beam sizes up to 10x4 mm<sup>2</sup> (HxV). This latter mode is illustrated with recent results obtained on viscosity measurements of forsterite and diopside liquid compositions up to 30 GPa.

### Reference

Y. Wang et al., A new technique for angle-dispersive powder diffraction using an energy-dispersive setup and synchrotron radiation (2004), J. Appl. Cryst. (2004). 37, 947–956

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