Grenoble, 26th January 2023

Summary

During the beamtime MA-5273, (DOI: 10.15151/ESRF-ES-656089266), performed between March 1st and March 3rd 2022 at ID15b, ESRF, single crystals of inderite and inderborite have been compressed, at ambient temperature, up to ~17 and ~10 GPa respectively (**Fig.1)**, using helium as pressure-transmitting medium.

The elastic behaviour and the structure evolution at atomic scale have been successfully investigated. Both indertite and inderbortite display phase transitions. Surprising enough, if the pressure at which the phase transition occur in inderborite is perfectively in trend with the previous studies on hydrated borates, inderite is clearly an out layer (**Fig. 2**).

A paper on inderite has been written and will be submitted in mid-February 2023; the paper will address in details the structure of the high-pressure polymorph of inderite and its strain anisotropy (**Fig. 3**)

For inderborite, few more months are required but we are confident that the acquired data will be published before the end of 2023.

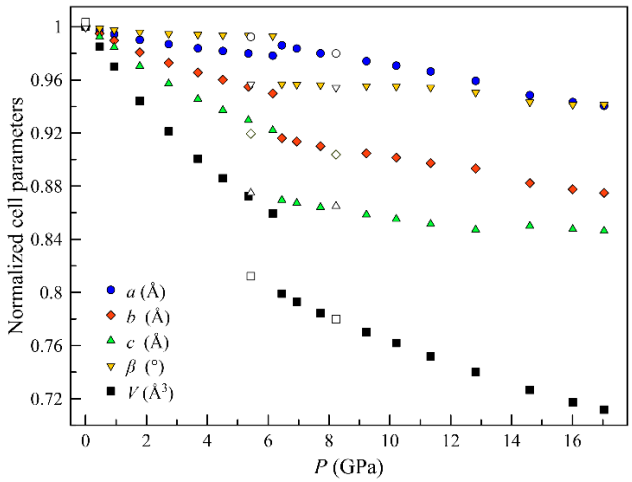

Fig.1a: Evolution of the normalized unit-cell parameters and unit-cell volume of inderite with pressure. Decompression data set are represented with empty symbols (the *e.s.d.* bars are smaller than the markers)

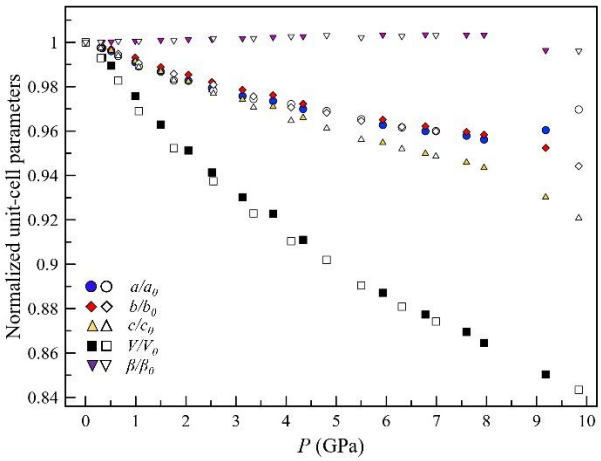

Fig.1b: Evolution with pressure of the unit-cell parameters in inderborite: *a* in *blue circles*, *b* in *red diamonds*, *c* in *yellow upward triangles*, *β* in *purple downward triangles*, *V* in *black squares* (first ramp, solid markers, second ramp in empty markers).

Remarks

Overall, ID15b produced high-quality data and the results are really promising: one paper is about to be submitted and we hope to publish the second before the end of 2023.

ID15b has proved to be the ideal beamline for these experiments due to the small-size of the beam, its Eiger2X 9M detector and its user-friendly set-up.

Due to these encouraging results we will submit, in the framework of a broader project (aiming to study the high-pressure and temperature stability of hydrated borates), further proposals on other hydrated borates. This will provide useful information to better understand the *P-T* stability of hydrated borates.

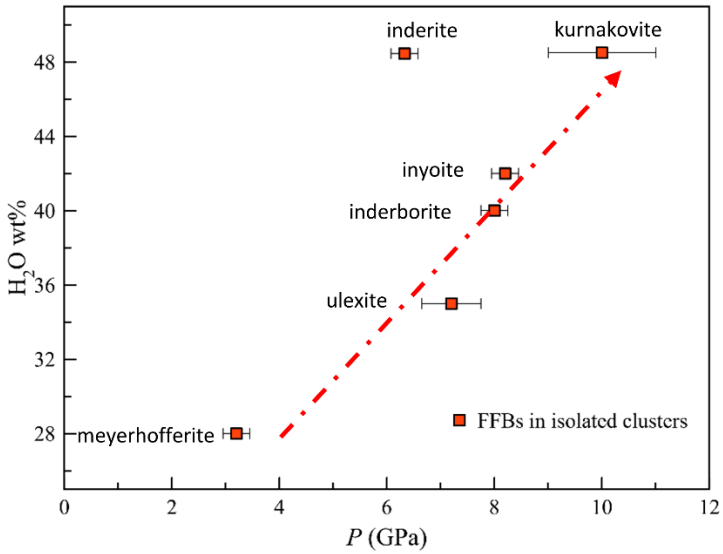

Fig.2: Water content *vs* pressure at which hydrated borates undergo a phase transition

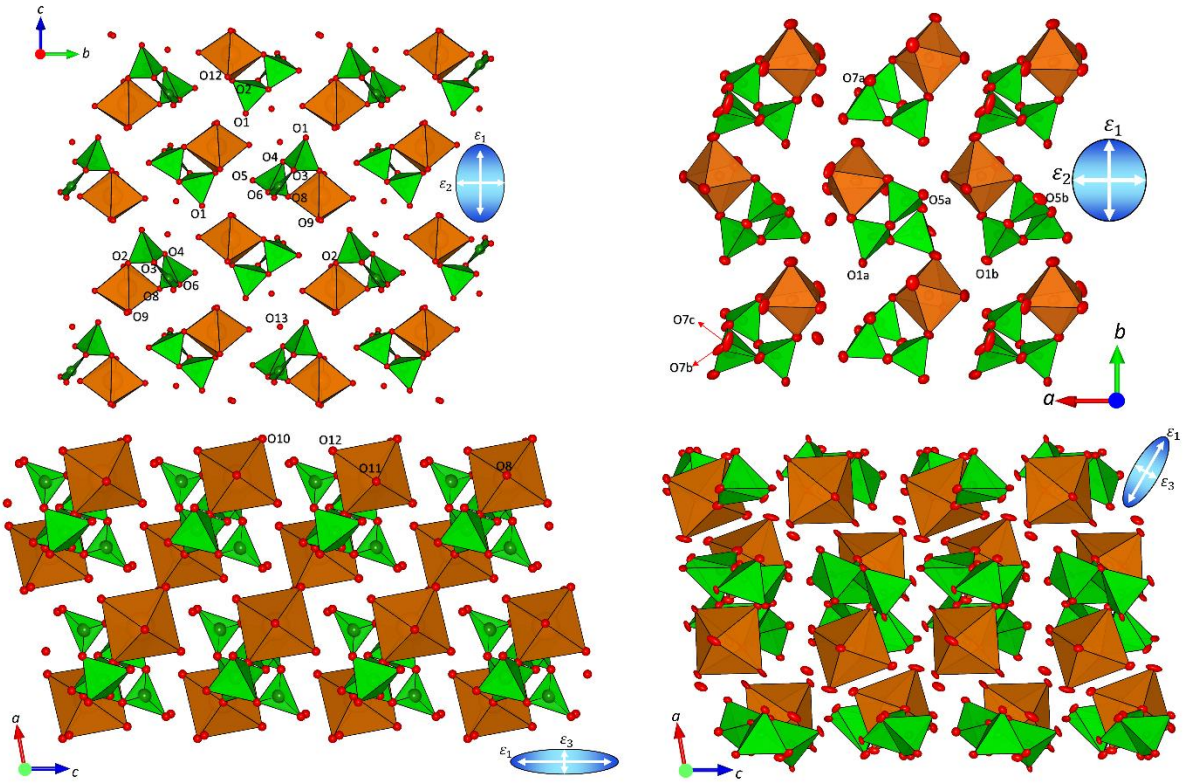

Fig. 3: Schematic representation of the unit-strain ellipsoids in inderite (left) and inderite-II (right). Boron units are in *green*, Mgφ_6 octahedra in *orange*, oxygen atoms are represented as *red* spheres.