

Abstract Submission

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High-pressure behavior of natural REE-bearing phosphates and arsenates

Francesco Pagliaro*¹, Paolo Lotti¹, Davide Comboni², Tommaso Battiston¹, Alessandro Guastoni³, Nicola Rotiroti¹, G. Diego Gatta¹

¹Earth Science Department, University of Milan, Milano, Italy, ²ESRF, Grenoble, France, ³University of Padova, Padova, Italy

Please designate the presenter/contributor author(s)?: Francesco Pagliaro

Abstract Content: ATO_4 compounds ($A = \text{Sc, Y, Ln, U}$ and Th ; T stands for tetrahedrally-coordinated cations, e.g. P and As), represent a wide class of minerals, which includes the REE-bearing arsenates chernovite-(Y) (YAsO_4) and gasparite-(Ce) (CeAsO_4), and the more common REE-bearing phosphates, xenotime-(Y) (YPO_4) and monazite-(Ce) (CePO_4). Chernovite-(Y) and xenotime-(Y) share the same HREE-enriched, zircon-type structure ($I4_1/amd$), whereas the LREE-enriched gasparite-(Ce) and monazite-(Ce) crystallize in the so-called monazite-type structure ($P2_1/n$).

The *HP* behavior of the REETO_4 compounds has been object of many studies, mainly focused on their synthetic counterparts. In this work, we have studied the *HP* and combined *HP-HT* behavior of natural samples of the above-mentioned minerals, using *in situ* single-crystal synchrotron X-ray diffraction. A special attention was devoted to the relationships between chemical and structural features at non-ambient conditions. In particular, the compressional behavior of the REE-polyhedron, T -site tetrahedron and the deformation mechanisms acting at the atomic scale, poorly studied in the current literature, have been described and discussed. For both the arsenates and phosphates, the monazite-type minerals are found to be more compressible than the zircon-type ones, and the arsenates more compressible than the phosphate analogues. The analysis of the refined structure models showed that the T -tetrahedron is almost incompressible and the nature of its dominant cation (As or P) significantly affects the response to (T,P) -stimuli of the A -polyhedron.

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