

# Abstract Submission

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*Mineralogy at extreme conditions in Earth and other planets*

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

Francesco Pagliaro<sup>1</sup>, Paolo Lotti<sup>1</sup>, Davide Comboni<sup>2</sup>, Tommaso Battiston<sup>1</sup>, Alessandro Guastoni<sup>3</sup>, Nicola Rotiroti<sup>1</sup>, G. Diego Gatta<sup>1</sup>

<sup>1</sup>Earth Science Department, University of Milan, Milano, Italy, <sup>2</sup>ESRF, Grenoble, France, <sup>3</sup>University 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.

**Disclosure of Interest:** None Declared