spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM) and pair distribution function analysis (PDF). The analyses show that, depending on the reaction conditions, different products are formed. Some of these are nanocrystalline.

**Keywords:** diamond anvil cells, decomposition, tungsten compounds

**FA2-MS19-P04**

Compressional Behaviour of Diomignite, Li₂B₄O₇.


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Despite the fact that diomignite (Li₂B₄O₇, I₄₁c symmetry) may control the physicochemical properties of highly fractionated late stage fluids in pegmatites [1], no diffraction studies concerning its compressional behaviour are available. In respect to technological importance, pegmatites are the primary source of lithium, which is widely employed in different fields of science and engineering (e.g. as a battery material, coolants for heat transfer applications etc.). Synthetic Li₂B₄O₇ can be implemented in acoustoelectronics, non-linear optics and piezotechnology.

Compressional behavior of weakly scattering diomignite was also investigated for the purpose of commissioning an Eulerian single crystal diffractometer with an ultra high intensity rotating anode X-ray source equipped with multilayer optics [2]. This technique allows 8-position centring of Bragg reflections for accurate measurements of lattice parameters. Full details of single crystal instrumentation and methodology are described in [3]. A sample was placed in a BGI design diamond anvil cell in ethanol:methanol (1:4) pressure transmitting media (steel gasket with a 350 microns hole preindent at 110 microns). For comparison, reference data were also collected for the same crystal at the same pressures using a conventional X-ray source/ optics [3]. The crystal size (180×120×50 mkm³) was selected on the basis of its scattering power, such that the Bragg maxima were reasonably intense on the conventional system. In summary, we note that the lattice parameters measured using both diffractometers agree perfectly, lying within less than 2 estimated standard deviations. Ultrasonic wave velocity measurements indicate that the dependency of the second order elastic stiffness tensor component C₁₁₁ vs. P extrapolates to zero at 3.2 GPa [4]. The possibility of a phase transition was therefore suggested [4]. However, we observed no transition up to 7 GPa, which agrees with high pressure Raman scattering study [5]. F_p/ε plot for Li₂B₄O₇ indicates a positive slope, therefore, a Birch-Murnaghan 3rd order EoS was fitted to the volume-pressure data (V_p=923.26(4) Å³, K=46(1) GPa, K'=6.8(5)). Li₂B₄O₇ is more compressible along polar c-axis with βₘ₀/βₑ₀=1:3.04. Finally, relations between thermal expansion and compressibility of Li₂B₄O₇ will be presented.

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**Keywords:** high-pressure mineralogy-1, elastic properties-2, X-ray high-pressure techniques-3

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ordering reactions called premartensitic transitions, bcc→B2 and bcc→→DO3, on cooling from high temperatures. On further cooling, martensitic transformation occurs to two or more lattice invariant shear on a [110]-type plane of austenite matrix called basal plane for martensite together with Bain distortion. Bain distortion consists of an expansion of 26% parallel to the [001] axis and a compression of 11% normal to this axis, and a delineated fct unit cell in the long range order β-phase undergoes to the corresponding fce lattice with this distortion. Martensite phase has the unusual layered structures called as 3R, 9R or 18R martensites with low symmetry depending on the stacking sequences on the close-packed planes of the matrix. The basal plane of martensite is subjected to the hexagonal distortion with martensite formation on which atom sizes have important effect. In case the atoms occupying the lattice sites have the same size, the basal plane of martensite becomes regular hexagon. Otherwise the deviations occur from the hexagon arrangement of the atoms in case atom sizes are different. martensite. In the present contribution, x-ray diffraction and transmission electron microscopy (TEM) studies were carried out on two copper based ternary alloys, CuZnAl and CuAlMn.

Key Words: Shape memory effect, martensitic transformation, layered structures.

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New Layered High-Pressure Phase of AsS. N.B. Bolotinaa, V.V. Brazhkinb, T.I. Dzyuzheva, A.G. Gavriliuka,b, A.G. Lyapinb, S.V. Popova,b, S. Samulski.c

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For arsenic sulfides, one layered covalent compound As3S7 and several molecular phases such as As4S7, As3S5 and others have been known so far. Under high pressures > 4 GPa and temperatures > 670 K the molecular phase As4S7 transforms into a new covalent modification with a layered orthorhombic structure (sp. gr. Pbc21; unit-cell values are a = 7.4537(7), b = 10.270(2), c = 18.258(1) Å). This high-pressure modification of AsS is metastable at normal pressure up to 530 K and represents a chemically stable narrow-gap (~0.8 eV) semiconductor. New structure is noticeable for the presence of covalent bonds between the same type of atoms (As-As) and anomalous weak covalent bonds between dissimilar atoms (As-S) with lengths (2.35 – 2.5 Å) “atypical” of this bond; some structure disordering has also been observed. Obviously, many of the known pseudo-molecular compounds such as As3S7, As8Se13, P2S5, P4S3 and others should transform under high pressure to new covalent-layered-structure modifications as well.

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Keywords: high-pressure phases, structure analysis, layered compounds

FA2-MS19-P08

Structure mechanism of decomposition of Mn3-xAlxO4 and La1-xCaMnO3 solid solutions. Olga Bulavchenko, Evgeny Gerasimov, Svetlana Cherepanova, Sergey Tsypulya, Lubov Isupova

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