

PRESSURE-INDUCED PHASE-TRANSFORMATIONS IN $\text{LiAlGe}_2\text{O}_6$ AND $\text{LiCrGe}_2\text{O}_6$ CLINOPYROXENES

Artac, A.¹, Pippinger, T.¹, Nestola, F.², Redhammer, G.³ & Miletich, R.¹

Institut für Mineralogie und Kristallographie, Universität Wien, Althanstraße 14, 1090 Vienna, Austria

²Dipartimento di Geoscienze, Università di Padova, Via Gradenigo 6, 35131 Padova, Italy

³Department of Materials Engineering and Physics, Division of Mineralogy, University of Salzburg
Hellbrunnerstraße 34, 5020 Salzburg, Austria
e-mail: andreas.artac@univie.ac.at

Clinopyroxenes and their synthetic analogues are in the focus of extensive experimental studies in mineral physics as the knowledge of elastic properties and the transformation behaviour depending on chemical variations is discussed for the geophysics under conditions of the Earth's upper mantle. Among a series of analogue phases the two selected Li-ferrous silicate compounds $\text{LiAlGe}_2\text{O}_6$ (LAG, space group $P2_1/n$, REDHAMMER et al. 2012) and $\text{LiCrGe}_2\text{O}_6$ (LCG, space group $P2_1/c$, REDHAMMER et al. 2008) have been subject of experimental in-situ investigations at high pressures, carried out by means of single-crystal X-ray diffraction in a diamond anvil cell. Unit-cell parameters of hydrostatically pressurized single crystals were determined up to approximately 9 GPa. Both samples show a first-order phase transition (see Fig. 1).

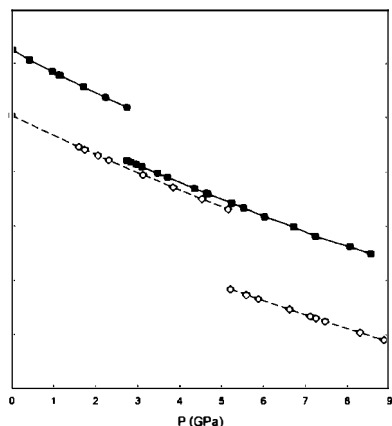


Figure 1 Pressure dependent changes in the unit-cell volume of LAG (closed symbol) and LCG (open symbol). The solid line represents the fit of a 3rd-order Birch-Murnaghan EOS, the dashed line represents the fit of a 2nd-order Birch-Murnaghan EOS.

The equations of state (EOS) were determined for the high-pressure (HP) and low-pressure (LP) polymorphs of both compounds, and fits of the P-V data to a Birch-Murnaghan EOS yield the parameters: $K_0 = 112.7(5)$ and $123.1(1.6)$ GPa for LP- and HP-LAG. The equivalent fits give $K_0 = 106(2)$ and $114.5(7)$ GPa for LP-LCG and HP-LCG, respectively. The observed reflection conditions suggest P-lattices for both high-pressure polymorphs. Structure investigations will shed light on the mechanisms of structural transformation.

REDHAMMER, G.J., ROTH, G., AMTHAUER, G. (2008): Acta Crystallographica Section C, Volume C64, i97-

REDHAMMER, G.J., NESTOLA, F., MILETICH, R. (2012): American Mineralogist, Volume 97, 1213-1218.