High-pressure behaviour of the LiInGe2O6 (LIG) – LiScGe2O6 (LSG) solid solution

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Pyroxenes are among the most abundant minerals in the upper mantle of the Earth. Knowledge about their high-pressure behaviour is of particular interest because phase transitions of pyroxenes are discussed as being responsible for discontinuities in seismic wave propagation (Woodland, 1998). The compression behaviour of pyroxenes does not follow the bulk modulus – unit cell volume relationship for isostructural compounds as proposed by Anderson and Anderson (1970), but strongly depends on their chemical composition (Hofer et al., 2015; Nestola et al., 2012), therefore systematic investigations seem to be inevitable in order to be able to predict their high-pressure behaviour.

In this context bulk moduli of both end members LiInGe2O6 (LIG) and LiScGe2O6 (LSG) and one intermediate LiIn0.1Sc0.9Ge2O6 (LISG) composition have been determined in a high-precise lattice parameter experiment using an Stoe AED II single crystal X-ray diffractometer. For each pressure point about 15 unique diffraction peaks were used for the sample crystal and quartz (pressure standard [Scheidl et al., 2016]) in order to refine lattice parameters. In the case of LSG and LISG a first order orthorhombic to monoclinic phase transition was identified, whereas for LIG no evidence for a structural phase transition could be found up to at least 9.6 GPa.

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