



	Experiment title: Fluoride laser hosts at high pressures and high temperatures: $\text{Li}_3\text{Na}_3\text{In}_2\text{F}_{12}$	Experiment number: HS-2179
Beamline: BM01A	Date of experiment: from: 17/09/2003 to: 21/09/2003	Date of report: 30/05/2004
Shifts: 12	Local contact(s): V. Dmitriev	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Andrzej Grzechnik, Univ. País Vasco Vladimir Dmitriev, SNBL Hans-Peter Weber, SNBL		

Report:

Compressibility of $\text{Li}_3\text{Na}_3\text{In}_2\text{F}_{12}$ garnet ($\text{Ia}\bar{3}\text{d}$, $Z = 8$) (Figure 1) has been studied to 10 GPa using x-ray powder diffraction in the diamond anvil cell using a mixture of methanol and ethanol as a pressure transmitting medium. No phase transition has been detected (Figure 2). The compression data could be fitted by a Birch equation of state (Figure 3), giving the zero-pressure bulk modulus $B_0 = 38 \pm 3$ GPa, the first pressure derivative of the bulk modulus $B' = 5.50 \pm 0.67$, and the unit-cell volume at ambient pressure $V_0 = 2073.4 \pm 6.3 \text{ \AA}^3$. The bulk modulus of this material is very small and comparable to the moduli of hydrogarnets, see V. Milman et al., *Acta Cryst.* **B57**, 163-177 (2001).

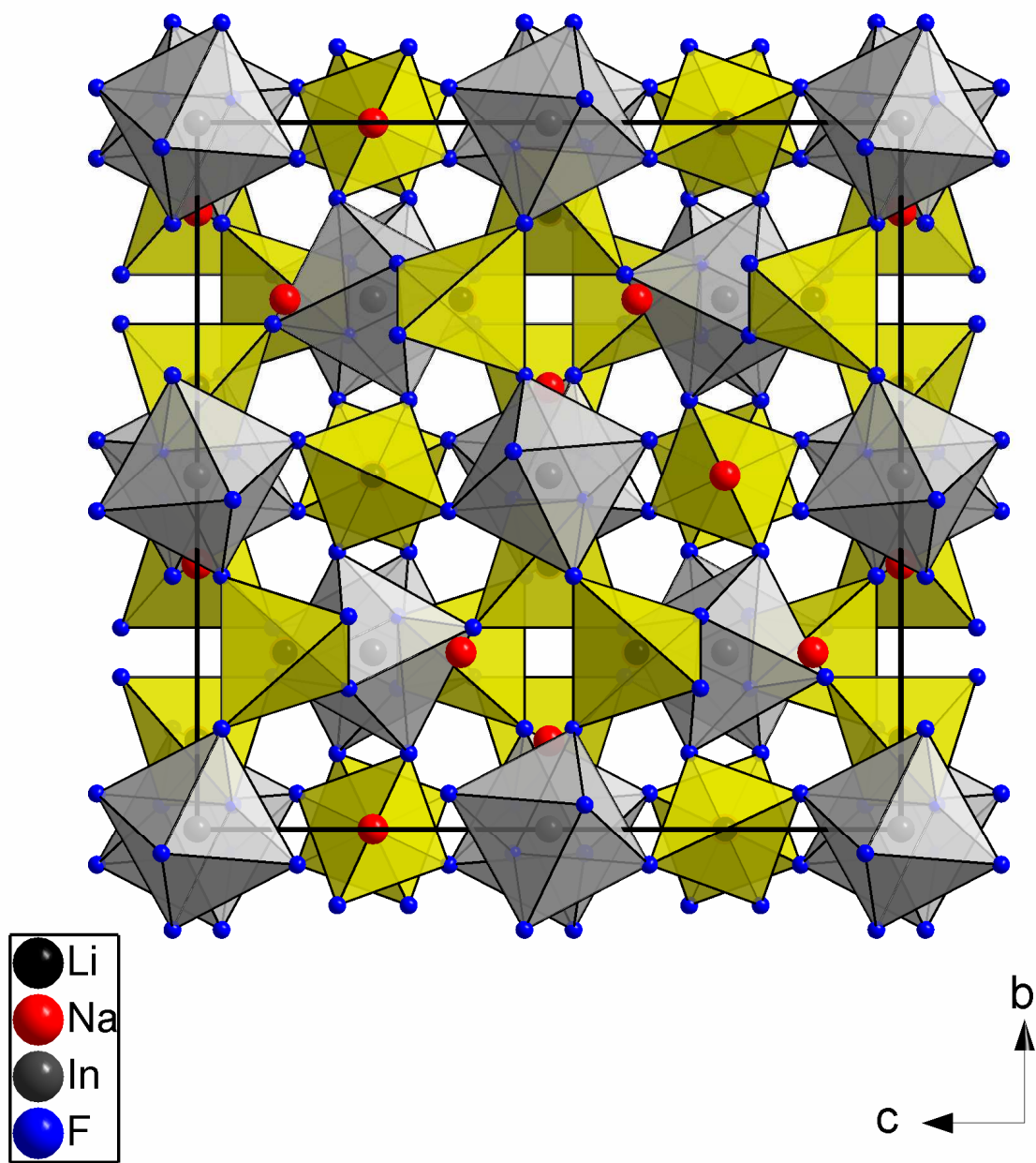


Figure 1 Crystal structure of $\text{Li}_3\text{Na}_3\text{In}_2\text{F}_{12}$ garnet ($Ia\bar{3}d$, $Z = 8$).

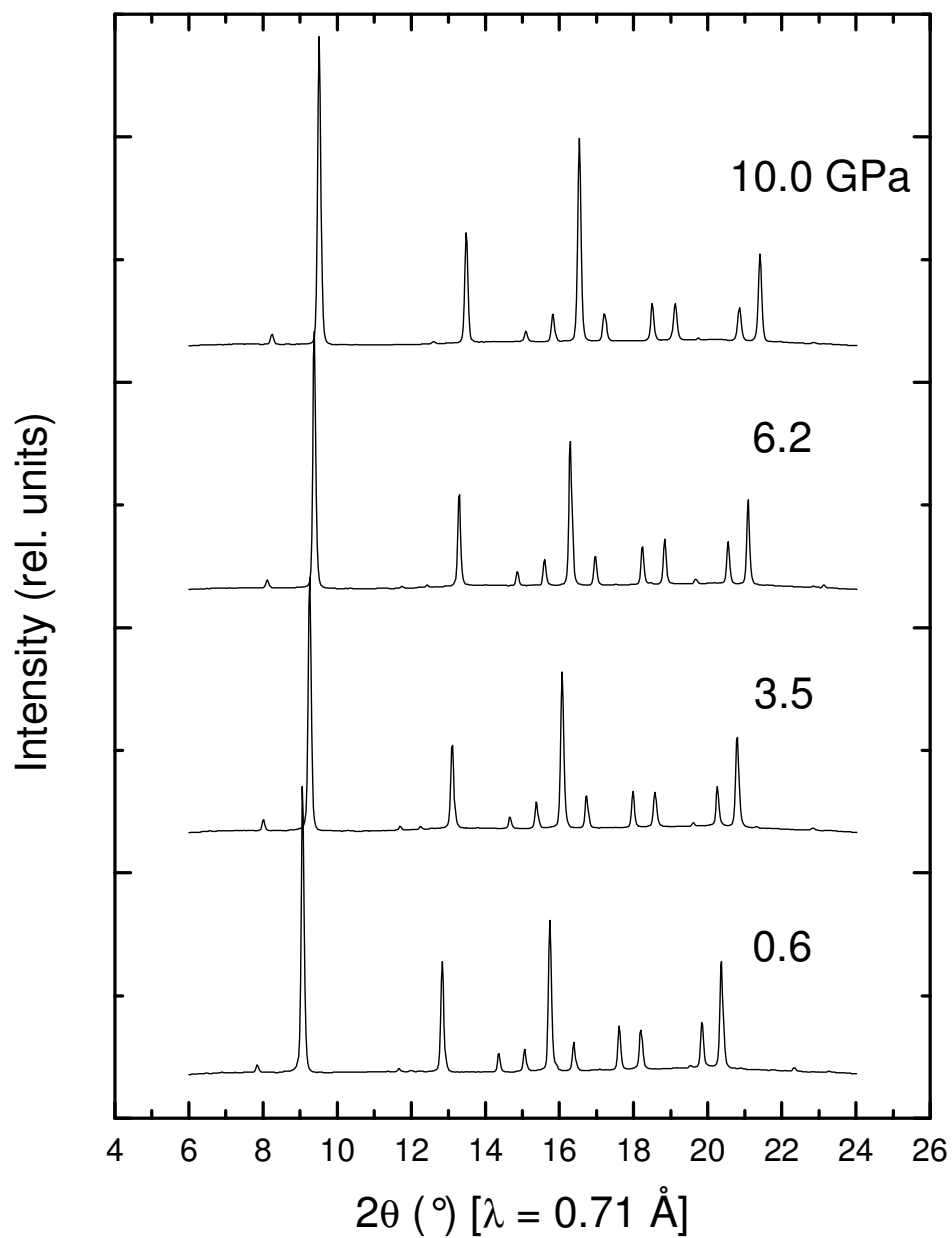


Figure 2 Selected x-ray powder patterns of $\text{Li}_3\text{Na}_3\text{In}_2\text{F}_{12}$ garnet ($\text{Ia}\bar{3}\text{d}$, $Z = 8$) upon compression.

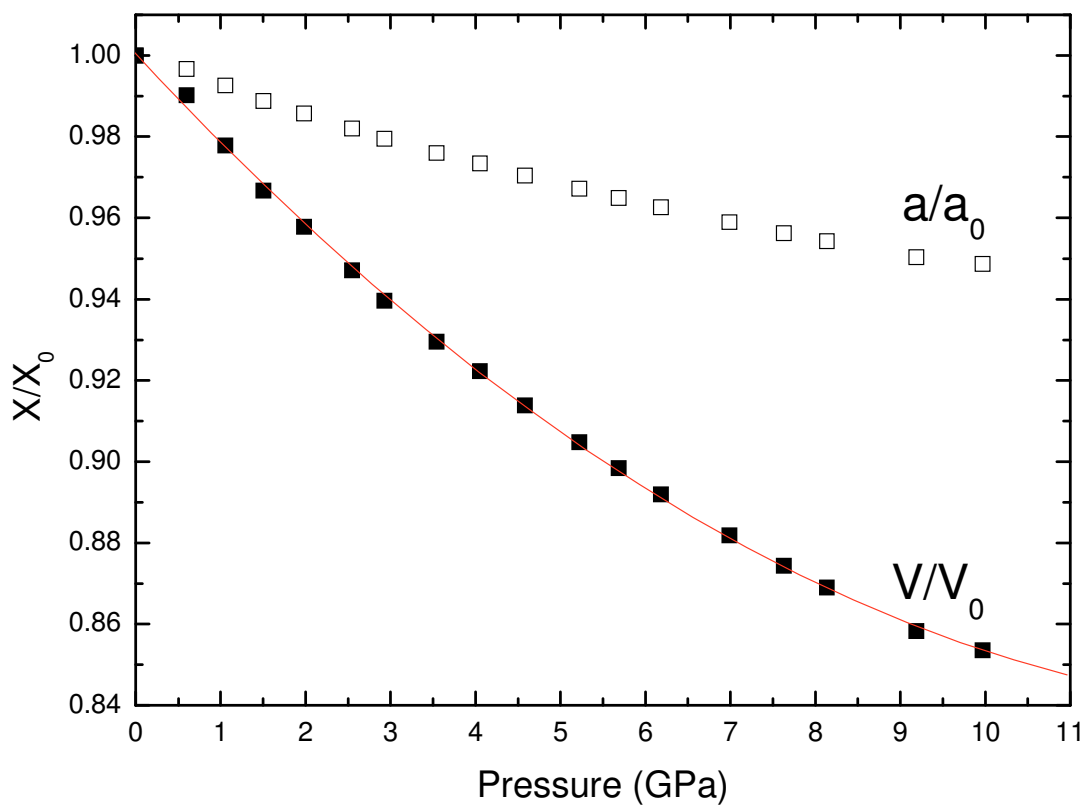


Figure 3 Pressure dependence of the lattice parameter and unit- cell volume of $\text{Li}_3\text{Na}_3\text{In}_2\text{F}_{12}$ garnet ($\text{Ia}\bar{3}\text{d}$, $Z = 8$).