



	Experiment title: High pressure x-ray diffraction of MgSiO ₃ analog material NaMgF ₃	Experiment number: HS-2780
Beamline: ID-27	Date of experiment: from: 9 th June 2005 to: 11 th June 2005	Date of report: 27 th Feb. 2006
Shifts: 9	Local contact(s): Wilson Crichton	<i>Received at ESRF:</i>
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Report:

This experiment was very successful and the beamline contacts were very helpful. Data we collected during this experiment has allowed us to:

- 1) Identify the pressure of the perovskite/post-perovskite phase boundary in NaMgF₃
- 2) Identify a post-post-perovskite phase (N-phase) of NaMgF₃ which occurs upon laser heating in the post-perovskite pressure region

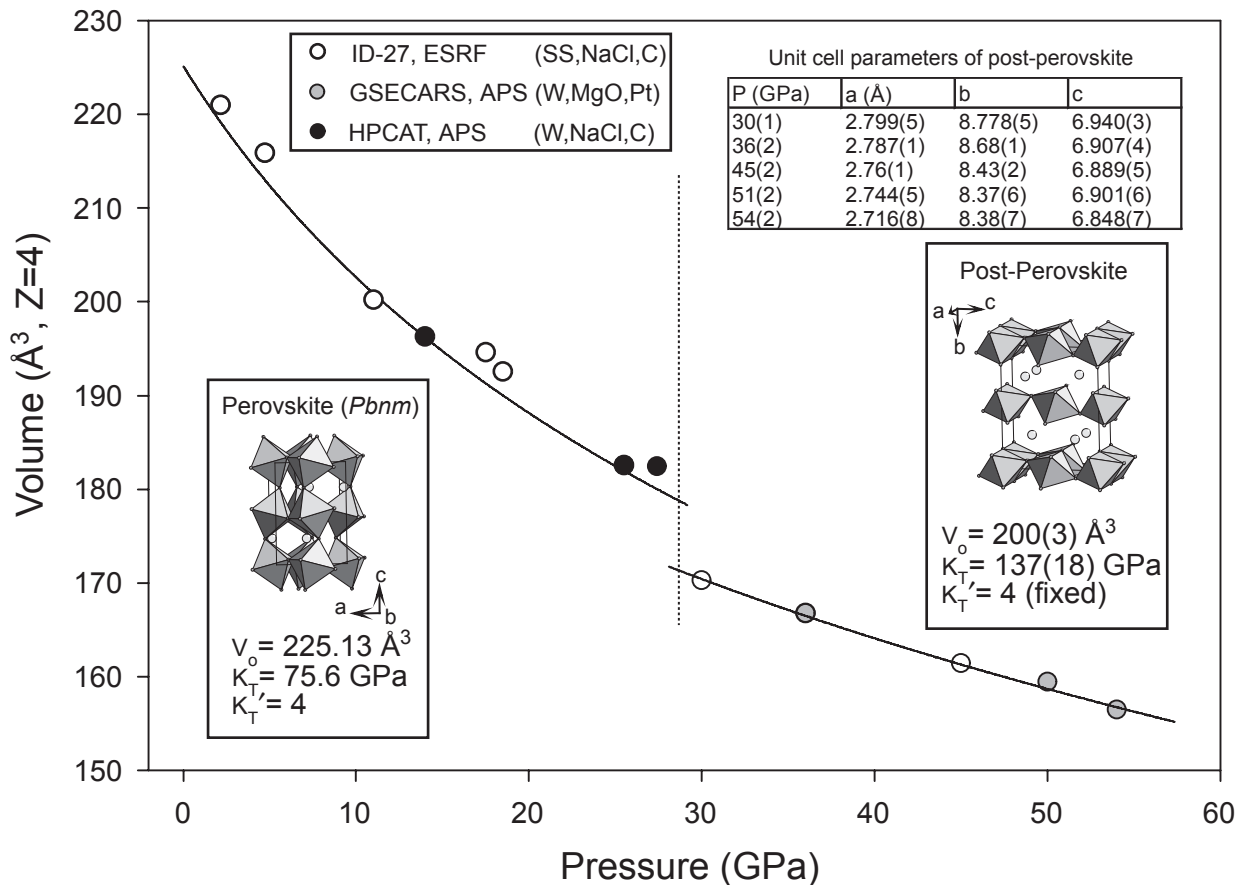
These results have recently been submitted to Geophysical Research Letters.

Abstract

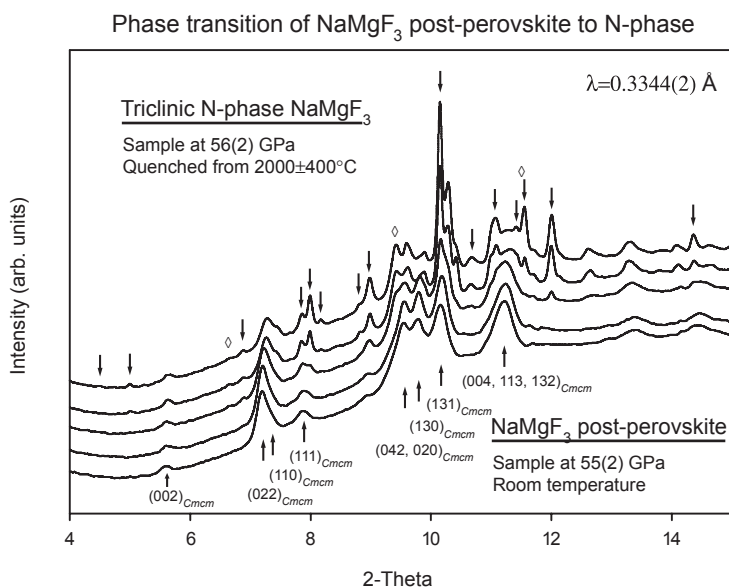
Using the diamond anvil cell with monochromatic x-radiation, perovskite structured Neighborite (NaMgF₃) is shown to transition to a structure resembling CaIrO₃-type post-perovskite between 28 and 30 GPa. Upon laser heating, the CaIrO₃-type structure transforms further to a possible triclinic distortion of post-perovskite (N-phase). Upon pressure release, N-phase NaMgF₃ becomes x-ray amorphous. N-phase may

account for previous observations of extra x-ray reflections during studies of MgSiO_3 and MgGeO_3 post-perovskite and tomographic observations of an additional boundary at the bottom of the D".

Compressibility of perovskite and post-perovskite NaMgF_3



The 2nd order Birch-Murnaghan equations of state (EoS) of NaMgF_3 are compiled from three high pressure runs. Each high pressure run contained different materials to preclude reaction with the sample (SS, stainless steel; C, graphite)



X-ray diffraction patterns of NaMgF_3 at high pressure before and after laser heating. Arrows pointing up show indexed peak positions of the post-perovskite structure, while arrows pointing down indicate peaks used to index N-phase NaMgF_3 . Multiple unit cell solutions for N-phase NaMgF_3 are triclinic and include all peak positions formerly held by post-perovskite. Sample also contains NaCl (\diamond) and graphite (no diffraction).