In-situ X-ray Acoustic Measurements of P and S Wave Speeds in $MgSiO_3$ Synthetic Perovskite at High Pressure and Temperature at 10-50 MHz by Ultrasonic Interferometry *	X17B1

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Acoustic experiments were carried out in DIA-type, cubic anvil apparatus (SAM-85) installed on the superconducting wiggler beamline (X17B1) at the National Synchrotron Light Source of the Brookhaven National Laboratory (Liebermann et al., 1998). The cell assembly is described elsewhere (Chen et al., 1998). A piezoelectric transducer capable of generating P and S waves simultaneously was mounted on tungsten carbide anvil. Acoustic measurements of the compressional and shear wave travel times through $MgSiO_3$-perovskite specimen were performed over a wide range of pressure up to 8 GPa and temperature up to 800°C. At each pressure and temperature the P and S wave travel times were measured, and energy dispersive X-ray diffraction patterns from the specimen and from NaCl confining media were collected. The former provided structural information complementary to that obtained from the micro-Raman studies, and the latter provided the pressure standard. The pressure-temperature-time path of the experiments consisted of the room temperature compression followed by a series of heating and cooling cycles along decompression. The raw acoustic interference data were gathered outside silicate perovskite stability field. Accurate travel times through $MgSiO_3$ perovskite specimen were obtained as a regression parameter in non-linear least square fit to developed theoretical model of acoustic wave propagation in layered medium. To avoid retrogressive transformation of perovskite, the X-ray diffraction patterns were continuously monitored for the occurrences of non-perovskite peaks. After recovery specimens were examined with a combination of x-ray diffraction, Raman spectroscopy, density, and length measurements.

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