Elastic Wave Velocities of Pyrope-Majorite Garnets of Py62Mj38 and Py50Mj50 to 8 GPa and 873 K	X17B1

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Polycrystalline specimens of pyrope-majorite garnets (Py50Mj50 and Py62Mj38) were synthesized in a 000-ton uniaxial split-sphere apparatus (USSA-2000) at pressures of 18 GPa and temperatures of 1700 K for run durations of one to two hours using homogeneous glasses as starting materials. Ultrasonic interferometric measurements on these specimens were conducted at pressures to 9 GPa and temperatures to 873 K using a DIA type cubic anvil apparatus (SAM85) in conjunction with in situ synchrotron X-ray diffraction at the superconducting wiggler beamline (X-17B) of the National Synchrotron Light Source. In this study, compressional (P) and shear (S) wave travel times were measured in one experiment with the utilization of a dual-mode LiCrO3 transducer. At the same time the travel times of the P and S waves were measured, X-ray diffraction data of the specimen were also collected which gave the length and density of the specimen under high P-T conditions. Travel times and length data from X-ray diffraction yield elastic moduli (KS and G) and their pressure and temperature derivatives [dKS/dT (KS'), dKS/dT (G'), dKS/dT and dG/dT]. KS, G, K' and G' obtained in this study are generally consistent with that obtained in another high pressure experiment at room temperature for the same specimen (Liu et al., 1998) and a previous study of Rigden et al. (1994) for a similar specimen. These new elasticity data are used to calculate velocity-depth profiles of the Earth's mantle transition zone and to re-evaluate the contribution of the garnet component to the anomalously high seismic velocity gradients observed in the mantle transition zone. Through forward calculation, elasticity data of the specimens also provided pressure information which were compared with that obtained from the Decker's equation of state of NaCl.