Stability and equation of state of MgGeO₃ post-perovskite phase

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ABSTRACT

A phase transition of $MgGeO_3$ perovskite was examined at high-pressure and -temperature using synchrotron X-ray diffraction measurements. The results demonstrate that it transforms to a $CaIrO_3$-type post-perovskite phase above 63 GPa at 1800 K. The density increase is 1.5% at the transition pressure. These observations confirm that $MgGeO_3$ is a low-pressure analogue to $MgSiO_3$, for which a similar phase transition was recently found above 125 GPa and 2500 K. The unit-cell parameters of $MgGeO_3$ post-perovskite phase obtained at 300 K during decompression from 79 to 6 GPa show that the **b**-axis is significantly more compressible than are the **a**- and **c**-axes, which could be due to the GeO_6-octahedral sheet stacking structure along **b**. The bulk modulus was determined to be $K_0 = 192(\pm5)$ GPa with a fixed pressure derivative of the bulk modulus, K', of 4.