

LETTERS

Elasticity of MgSiO₃ orthoenstatite

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ABSTRACT

The single-crystal elastic moduli of the MgSiO₃ orthoenstatite end-member have been measured by Brillouin spectroscopy at ambient conditions. The aggregate elastic moduli at 1 atm are $K_S = 107.6(15)$ GPa and $\mu = 76.8(7)$ GPa, for the adiabatic bulk modulus and shear modulus, respectively. These values are in excellent agreement with the results of previous acoustic studies of synthetic MgSiO₃. Comparison of our results with pressure-volume (P - V) measurements do not support the presence of a change in the P - V trajectory of orthoenstatite at ~ 4 GPa, as suggested previously on the basis of X-ray measurements to 8.5 GPa. The effects of chemical composition on the elasticity of orthopyroxenes are well represented by the variation of compressional and shear velocities with density, which exhibit well defined trends for both synthetic and natural samples.