

Elastic moduli and their temperature dependence of orthosilicate high pressure phases beta and gamma-(Mg,Fe)₂SiO₄

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We have synthesized and sintered wadsleyite (beta-phase) and ringwoodite (gamma-phase) specimens with San Carlos olivine ((Mg_{0.91}Fe_{0.09})₂SiO₄) at high pressure and temperature. Temperature dependence of the elastic moduli was measured with the resonance sphere technique (RST) for both specimens. We evaluated the compressional (vp) and shear (vs) wave velocities at the upper mantle conditions for the olivine mantle model. Comparing these results with seismic Earth models, we estimated the olivine content around the 410km-discontinuity to be about 60 and 45 volume% for vp and vs, respectively. If olivine content estimated above were uniform below 410km-depth, it may be expected the jump of seismic velocity at 520km-discontinuity to be about 1.5%.

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