# Melting relation in the MgO-$MgSiO_3$ system at lower mantle pressures

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Recent seismological studies have revealed thin and intermittent layers with greatly reduced compressional and shear velocities, called Ultra-Low Velocity Zone (ULVZ) just above the Earth's core-mantle boundary (CMB). Main causes of velocity reductions suggested are partial melting and chemical heterogeneity in the lowermost mantle. However, melting relation of the lower mantle constituents at the deep mantle pressures still largely uncertain.

In this study, we performed constant-temperature first-principle molecular dynamics (FPMD) simulations of $MgSiO_3$ melt and MgO melt the Earth's lower mantle pressures to investigate melting relation in the MgO-$MgSiO_3$ eutectic system theoretically. Melting phase equilibria were predicted based on the thermodynamic equations developed in this study including the non-ideality correction of melt. At 30 GPa, we found the eutectic composition and solidus temperature which are very close to experimental results. With increasing pressure, the eutectic point shifted towards the MgO side near the pyrolitic Mg/Si ratio. At 135 GPa, the solidus temperature is found to be several hundreds K higher than the recently proposed CMB temperature.