

A high-pressure Raman spectroscopic study of hafnon, HfSiO₄

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ABSTRACT

Raman spectra of synthetic HfSiO₄ were determined to pressures of 38.2 GPa. Changes in the spectra indicate that HfSiO₄ undergoes a room-temperature phase transition from the hafnon structure (*I4₁/amd* space group) to the scheelite structure (*I4₁/a* space group) at a pressure of ~19.6 GPa. Upon release of pressure to ambient conditions, the spectra indicate that the sample retains the scheelite structure. Zircon has been classified previously as the least compressible tetrahedrally coordinated silicate known. However, pressure derivatives of the peak positions in hafnon are smaller than those in zircon, and suggest that hafnon is more incompressible than zircon. Furthermore, the pressure derivatives also suggest that the high-pressure, scheelite-structured HfSiO₄ phase is more incompressible than the scheelite-structured ZrSiO₄ (reidite). Thus, the post-hafnon phase appears to be even more incompressible than hafnon, which would make it the least compressible tetrahedrally coordinated silicate known to date.

Keywords: Raman Spectroscopy, hafnon, phase transformation, scheelite-structured HfSiO₄