

Sound velocity of hcp-Fe at multi-megabar pressures

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Earth's inner core consists of mainly hexagonal close-packed iron (hcp-Fe). Therefore, the physical properties of hcp-Fe can provide significant knowledge about the core. Despite seismological observations providing density-sound velocity data of Earth's core, there are few experimental reports about the sound velocity of hcp-Fe at ultrahigh pressure. Direct comparison of the sound velocity of hcp-Fe with that of observed inner core can provide a clear difference between them, which is an important information to determine the core composition. Here, we report the compressional sound velocity (V_p) of hcp-Fe up to 250 GPa using an inelastic X-ray scattering technique at BL43LXU of SPring-8. Based on the data, we can provide a standard of hcp-Fe (a linear relation of V_p with density: Birch's law), which enables us to indicate a better constraint on the composition of the Earth's core.

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