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Ultrasonic interferometry and X-ray measurements on MgO in a new diamond anvil cell

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Abstract

The compressional sound wave velocity, v_p, of synthetic MgO in the (100) direction and the unit-cell parameter have been measured up to a maximum pressure of 6.1 GPa using a new type of diamond-anvil cell. The main feature of the cell is the transverse access of the X-ray beam into the sample chamber. This allows us to undertake single crystal X-ray measurements while the ultrasonic attachment is mounted on the diamond-anvil cell. The sound velocity and the elastic parameter c_{11} have been determined from these measurements; the variation with pressure can be described by $\partial c_{11}/\partial p = 9.35(13)$, in good agreement with previous studies.