

Observations of elastic behavior in pyroxenes across the phase transitions

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Abstract

Changing crystal structure in material (i.e. phase transition) can be detected by using different techniques, such as X-ray diffraction, Raman spectroscopy and acoustic techniques etc.. The properties of material are related to its crystal structure and can be reflected to its elasticity. Therefore, the acoustic techniques can be used to detect the phase transitions in materials. In this paper, we review the elastic behavior across the phase transition using the cases of pyroxenes.

Introduction

Pyroxene is an important mineralogical constituent of petrological models of the Earth's upper mantle. Mg-rich pyroxene (enstatite) has been shown to have many polymorphs at mantle conditions (Gasparik, 1990). The phase transitions in enstatite include the reconstructive and displacive. Using acoustic measurement interfaced with a large volume multi-anvil apparatus in conjunction with in situ X-radiation techniques, we are able to observe the elastic behavior (e.g. density and elastic wave velocities) across the phase transitions in enstatite. In the meeting, we present the features of the elastic wave velocities (P and S wave) measured across the reconstructive and displacive phase transitions in enstatite.

References

Gasparik, T.A., 1990. Thermodynamic model for the enstatite-diopside join. *Am. Miner.* 75, 1080–1091.