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Kinetics Of Bridgmanite To $(Mg_{0.85},Fe_{0.15})SiO_3$-Post-Perovskite Towards A Better Comprehension Of The D'' Layer

Christopher Langrand (1), Nadège Hilairet (1), Denis Andraut (2), Zuzana Konopkova (3), Sébastien Merkel (1,4)

(1) Université de Lille, UMET - Unité Matériaux et Transformations CNRS , ENSCL, INRA, 59000 Lille, France (christopher.langrand@ed.univ-lille1.fr), (2) Laboratoire Magmas et Volcans, Observatoire de physique du Globe de Clermont-Ferrand, 63000 Clermont-Ferrand, France, (3) European XFEL GmbH,Hamburg, Germany, (4) Institut Universitaire de France, 75005 Paris, France

Phase transitions are important to constrain the nature of discontinuities in the deep mantle. Among them, the transition from Bridgmanite to $(Mg_{0.85},Fe_{0.15})SiO_3$-Post-Perovskite (pPv) is relevant for understanding the thermal and chemical state of the D'' layer.

Here, we investigate the kinetics of the Bridgmanite to pPv transition by time-series experiments in the Laser Heated Diamond Anvil Cell (LHDAC) conducted at the P02.2 beamline of the PETRA III synchrotron. Product phases and extent of transformation are monitored in-situ as a function of time at pressure and temperature ranging from 126.5 to 130.5 GPa and from 1600 to 2500 K, respectively. The data were analyzed with the Avrami model of nucleation and growth in order to determine the properties of this phase transition.

Apparent activation energy could be extracted (Ea≈238 $kJ.mol^{-1}$). Moreover, based on our data, we will present two possible kinetic models to constrain the dynamics and kinetics of the Bridgmanite to pPv transition at the D'' layer P/T conditions.