Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Fate of MgSiO3 Post-Perovskite at Terapascal Pressures[1]

KOICHIRO UMEMOTO, Earth-Life Science Institute, Tokyo Institute of Technology, Tokyo, Japan , RENATA WENTZCOVITCH, Department of Chemical Engineering and Materials Science, University of Minnesota, Twin Cities, MS, USA, SHUNQING WU, Deparatment of Physics, Iowa State University, Ames, IA, USA, KAI-MING HO, Ames Laboratory, US DOE, and Department of Physics, Iowa State University, Ames, IA, USA, MIN JI, Deparatment of Physics, Iowa State University, Ames, IA, USA, CAI-ZHUANG WANG, Ames Laboratory, US DOE, Ames, IA, USA — Understanding the fate of $MgSiO_3$ post-perovskite (ppv) under TPa pressures should provide insights into the nature of the interiors of Super-Earths-type exoplanets. The prediction that ppv should dissociate into the elementary oxides MgO and SiO_2 at TPa pressures has been confirmed by all ab initio computational studies so far. The most recent high pressure and high temperature (PT) studies agree that at ˜2.2 TPa the dissociation process should be completed. These studies also agree that the final dissociation phase boundary has a negative Clapeyron slope, irrespective of the dissociation paths, suggesting a barrier to whole mantle convection possibly leading to chemical stratification in the deep mantle of these planets. The dissociation paths identified more recently involve partial dissociation into MgO, SiO_2, and Mg- and Si-rich intermediate compounds whose compositions are temperature dependent. Here we re-investigate the high PT phase diagram of the MgO-SiO_2 system and identify novel phase fields and dissociation paths that push the final dissociation boundary to ˜3 TPa.

[1]Research supported by NSF grant EAR-1348066

Renata Wentzcovitch
Univ of Minn - Minneapolis

Date submitted: 11 Nov 2016 Electronic form version 1.4