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Behavior of Fe_2SiO_4 at Pressures and Temperatures of the Deep Mantle

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It is likely that a potential chemical reaction between core and mantle will increase the amount of iron in mantle materials. The goal of this research is to expand our understanding of the phase relations and equation of state of the end-member Fe_2SiO_4 system at pressures and temperatures corresponding to the deep mantle. X-ray diffraction experiments using the laser-heated diamond anvil cell were performed at both the Advanced Light Source in Berkeley CA (beamline 12.2.2) and at the Advanced Photon Source outside of Chicago, IL (GSECARS) to examine the phase stability and equation of state of spinel-structured Fe_2SiO_4 and high pressure assemblage of the FeO (wustite) plus SiO_2 stishovite structures at pressures of 5 to 70 GPa, and temperatures of 300 K – 2500 K. We present our measurements of the high pressure phase diagram of Fe_2SiO_4 and the high pressure thermal expansion parameters of spinel-structured Fe_2SiO_4, FeO wusite, and SiO_2 stishovite.