Equations of State of $MgSiO_3$ in the Sub-Perovskite Pressure Range *	X17B1

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The study of the phase relations of $(Mg,Fe)SiO_3$ (1996 NSLS Activity Report, B145) is continuing with a measurement of the equation of state (EoS) of the magnesium end member of the Mg-Fe solid solution described above.

The study was going to be the measurement of stress relaxation of the ilmenite phase at about 10 GPa, at various high temperatures. The ilmenite sample studied previously (ibid), was from a natural enstatite and had about 10 mole percent $FeSiO_3$, as well as small amounts of Al. There were several problems, and a reliable EoS has not yet been determined from that data set.

The current, Mg end-member sample, was much less stable, and after a few minutes at 600°C it transformed to a high-pressure form of clinoenstatite. The unit cell volume of the HP-CEn as a function of pressure and temperature is currently being determined. The instability of the ilmenite phase is understandable, because we are operating outside of its stability field, but it is not known why the end-member is so much less stable than the natural sample.

Further work on the $MgSiO_3$ end member will require high temperature measurements within (or closer to) its stability field, *i.e.* > 18 GPa (see Figure 1.)

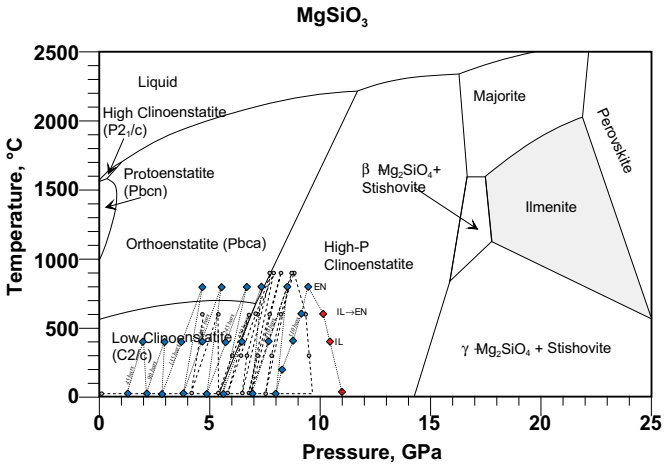

Figure 1. Phase Relations in $MgSiO_3$. Diamond-shaped symbols are the current data set. The two highest-pressure points were ilmenite phase; during the collection of the third data set, the sample transformed to High-pressure clinoenstatite. It remaind in this phase for the rest of the run. The data from last year are the fainter symbols in the background.

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