Pressure-induced phase transitions in NaMgF3 post-perovskite\(^1\)
KOICHIRO UMEMOTO, Department of Geophysics and Geology, University of Minnesota, RENATA WENTZCOVITCH, MSI and CEMS, University of Minnesota — Understanding the behavior of MgSiO\(_3\) postperovskite(PPV) under extreme pressures is fundamental for modeling the interiors of solar giants and extrasolar planets. In 2006, MgSiO\(_3\) post-perovskite was predicted to dissociate into MgO and SiO\(_2\) at 1.1 TPa (Umemoto et al., Science 311, 983 (2006)). However, the predicted dissociation pressure is too high to be easily verified experimentally. Instead, a low-pressure analog, NaMgF\(_3\) neighborite, has been studied to test for structural predictions in MgSiO\(_3\). NaMgF\(_3\) was predicted to dissociate at \(\sim 40\) GPa (Umemoto et al., Geophys. Res. Lett. 33, L15304 (2006)), but this has not been confirmed experimentally (Martin et al., Geophys. Res. Lett. 33, L11305 (2006); Grocholski et al. Geophys. Res. Lett. 37, L14204 (2010)) and the dissociation MgSiO\(_3\) PPV is now being questioned. Here, we reexamine in detail the pressure dependence of crystal structures and phonon frequencies in NaMgF\(_3\) and reveal the apparent reason why dissociation was not observed in this material.

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