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Phase Decomposition of Rare Earth Apatite and Formation of Perovskite Rare Earth Silicate at High Pressure and High Temperature Conditions[1] FUXIANG ZHANG, MAIK LANG, RODNEY EWING, University of Michigan — The crystal structure of rare earth apatite was studied at high pressure and room temperature conditions. A reversible subtle phase transition was found at pressure. The high-pressure phase has also a hexagonal unit cell but with a lower symmetry reduced from $P6_3/m$ to $P6_3$. Due to the symmetry change, the high-pressure phase has an unusual lower bulk modulus as compared with the corresponding ambient structure. Laser heating of La-Si-O apatite at high pressure conditions revealed that apatite structure is not stable at temperatures higher than 1500 K and decomposes into two different phases. The decomposed phase is a perovskite-type structure. Alkaline earth silicate minerals can easily form the 6-coordianted high-pressure phase in the deep earth environment. However, a rare earth silicate with the perovskite structure has not been previously reported. The experimental results also suggest that the $La_{0.67}SiO_3$ perovskite structure is at least partially quenchable.

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Fuxiang Zhang
University of Michigan

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