

LETTER

Unquenchable hexagonal perovskite in high-pressure polymorphs of strontium silicates

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ABSTRACT

The presence of hexagonal silicate perovskite (6H-BaTiO₃ type) was confirmed in the SrSiO₃ compound by in-situ angle dispersive X-ray diffraction at high pressure. The perovskite was crystallized from pressure-induced amorphous SrSiO₃ in a diamond anvil cell by laser heating at 35 GPa. On releasing the pressure, the perovskite also changed into an amorphous state as does CaSiO₃ perovskite. This SrSiO₃ perovskite, with a tolerance factor greater than unity, forms a face-sharing SiO₆ octahedron, which leads to a structure with hexagonal symmetry. Incorporation of Sr into CaSiO₃ perovskite in the early stage of the differentiation in the Earth's mantle might have influenced the symmetry of CaSiO₃ perovskite in the present lower mantle. As far as we know, this is the first report suggesting the existence of hexagonal perovskite in silicates.