The 388th Geodynamics Seminar

A new hydrous silicate in the deep upper mantle

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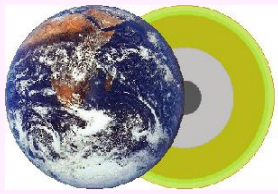

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Abstract

A new aluminum bearing hydrous silicate was observed coexisting with phase A and pyrope in the experiments under 10 GPa and 1000 ºC, using phase A ($Mg_7Si_2O_8(OH)_6$), Al_2O_3, and $Al(OH)_3$ as the starting materials. The composition was determined to be $Mg_{5.5}AlSi_2O_8(OH)_6$, which contained about 12 wt % of water. Almost pure phase was obtained in the synthesis experiments. The powder x-ray diffraction pattern and transmission electron diffraction patterns suggested a hexagonal structure, with a=5.1972(2) Å, c=22.991(4) Å, and V=537.8(2) $Å^3$. The calculated density is 2.753 g/cm^3. An abnormal large c axis was confirmed by electron diffraction pattern taken from c*-110* plane. Several experiments have been conducted to clarify its stability region, which turns out to be very similar to that of phase A. At lower pressure and higher temperature, it breaks down into Chondrodite + Garnet + Forsterite + Fluid, while at higher pressure it breaks down into Al-superhydrous phase B + Garnet + Fluid. In the other hand, only a small amount of aluminum (<1 wt%) is incorporated into phase A structure, which predicts that phase A can preserve only trace of aluminum. The decomposition of chlorite has also been studied under 10 GPa and 1000 ºC. The result shows that, for aluminum bearing composition in the slab, this new phase may replace phase A and transport water together with aluminum into the deep upper mantle, even into the upper part of transition zone.

詳細は当センターホームページ：http://www.ehime-u.ac.jp/~grc/をご覧ください
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