Geodynamics Seminar

第338回ジオダイナミクスセミナー

Synthesis of transparent polycrystalline garnets at high pressure and high temperature in multianvil apparatus

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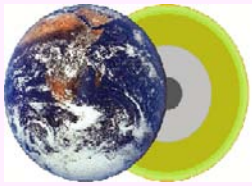
主催：愛媛大学地球深部ダイナミクス研究センター
日時：10/12（金）午後 4時30分～
場所：総合研究棟 4F 会議室



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Abstract

Garnet is one of the most abundant mineral constituents in the earth's upper mantle to transition region. Therefore, synthesis of well-sintered polycrystalline high pressure phases for ultrasonic sound velocity measurement is important. However, little is known about some physical properties of almandine ($Fe_3Al_2Si_3O_{12}$), and synthesis of pure almandine has been quite difficult.

In this study, synthesis of almandine has been conducted at pressures of 8, 15GPa and temperatures of 1200-1400℃ using multianvil apparatus (ORANGE-3000). Pure almandine, however, was not synthesized in the present synthesis experiment and synthesized almandine contained small amounts of other phases, such as stishovite and corundum. The lattice parameters and chemical compositions revealed that these almandine samples contain 3～7 mol % of $Fe_3^{2+}Fe_2^{3+}Si_3O_{12}$ (skiagite) end member. In addition, most of the run products were not well sintered and showed significant crystal growth of garnet up to several hundred micrometers.

An experiment under controlled oxygen fugacity was conducted at pressures of 8, 15GPa and temperatures of 1200-1400℃ using an iron foil inserted in the gold capsule. Highly transparent samples were obtained with lattice parameters (a=11.531 Å) of almandine being smaller than those of the products without iron foil. The amount of skiagite is greatly reduced to 1～1.5 mol % and the samples were very well-sintered with grain sizes less than a few micrometers.

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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