

SIT042-11

会場: 101

時間: 5月25日12:00-12:15

## 下部マントル条件におけるパイロライトの相関係・Fe分配・および密度変化

### Phase relations, Fe partitioning, and density changes in pyrolite under the lower mantle P-T conditions

入船 徹男<sup>1\*</sup>, 新名 亨<sup>1</sup>, キャサリン・マッキヤモン<sup>2</sup>, 宮島延吉<sup>2</sup>, デイビッド・ルービー<sup>2</sup>,  
ダニエル・フロスト<sup>2</sup>

Tetsuo Irifune<sup>1\*</sup>, Toru Shinmei<sup>1</sup>, Catherine A. McCammon<sup>2</sup>, Nobuyoshi Miyajima<sup>2</sup>,  
David C. Rubie<sup>2</sup>, Daniel J. Frost<sup>2</sup>

<sup>1</sup>愛媛大学GRC, <sup>2</sup>パイロイト大BGI

<sup>1</sup>GRC, Ehime Univ., <sup>2</sup>BGI, Univ. Bayreuth

Phase transitions in pyrolite composition have been studied at pressures to 47 GPa and temperatures along an adiabatic geotherm, using multianvil techniques combined with in situ X-ray observations and other spectroscopic measurements. On the basis of electron microprobe analysis of the recovered samples, we noted a significant increase of the Fe-Mg partition coefficient (KD) between silicate Mg-rich perovskite (Pv) and magnesiowustite (Mw) with increasing pressure to 30 GPa, suggesting the coupled substitution of Mg<sup>2+</sup> and Si<sup>4+</sup> by Fe<sup>3+</sup> and Al<sup>3+</sup>, consistent with earlier studies. In contrast, KD was found to decrease substantially with pressure above about 40 GPa. EELS and Mossbauer measurements on some recovered samples suggest that the Fe<sup>3+</sup>/(Fe<sup>2+</sup>+Fe<sup>3+</sup>) values in both Mw and Pv do not change in this pressure range: iron in Mw is essentially ferrous, while about 60% of iron in Pv is in the ferric state at these pressures. The relative enrichment of iron in Mw above 40 GPa may be related to the electronic high-spin to low-spin transition in ferrous iron in Mw at these pressures, as suggested by some recent theoretical and experimental studies. The density changes determined by a combination of the P-V-T and chemical composition data on individual phases agree well with the typical seismological models, suggesting that pyrolite is a good model composition for the upper to middle parts of the lower mantle.

キーワード:パイロライト,密度,鉄分配,スピン転移,下部マントル

Keywords: pyrolite, density, iron partitioning, spin transition, lower mantle