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研究種目：若手研究（B）

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研究課題名（和文） マントル鉱物（カンラン石・ウォズリアイト・リングウッドイト）の水素拡散の研究

研究課題名（英文） Hydrogen diffusion in mantle minerals (Olivine, wadsleyite, ringwoodite)

研究代表者

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研究成果の概要（和文）：1) 圧力条件 1-30GPa、温度条件 27-1400 度において単純な炭酸塩系 (Na₂CO₃, K₂CO₃, CaCO₃, FeCO₃) の X 線回折パターンの取得し、相関係と状態方程式を制約することに成功した。

2) 下部マントルから炭酸塩メルトと含水メルトの上昇メカニズムと速度を推定した。得られたメカニズムは“dissolution-precipitation”といい、メルトからの珪酸塩成分の拡散輸送によって支配されている。

3) マントルに相当する条件下において単純な炭酸塩系 (K-Mg, K-Ca, Na-Mg, Na-Ca, K-Ca-Mg, Na-Ca-Mg, K-Na-Ca-Mg) の相平衡と融解関係の決定をするためのデータを取得した。

研究成果の概要（英文）：1) Recently I completed to collect X-ray diffraction patterns for simple carbonate systems Na₂CO₃, K₂CO₃, CaCO₃, and FeCO₃ in the range 1-30 GPa and 27-1400° C to constrain phase relations and EOS. 2) I supposed mechanism and estimated possible rates of carbonatite±H₂O and hydrous melt ascent from the transition zone and might be lower mantle. This mechanism so called “dissolution-precipitation” controlled by diffusion transport of silicate components via hydrous or carbonatite melt. 3) I collected experimental data point to constrain phase diagrams and melting phase relations in simple carbonate systems (K-Mg, K-Ca, Na-Mg, Na-Ca, K-Ca-Mg, Na-Ca-Mg, K-Na-Ca-Mg) at the conditions corresponding to the basement of lithospheric mantle.

交付決定額

(金額単位：円)

	直接経費	間接経費	合計
平成22年度	1,000,000	300,000	1,300,000
平成23年度	900,000	270,000	1,170,000
年度			
年度			
年度			
総計	1,900,000	570,000	2,470,000

研究分野：数物系科学

科研費の分科・細目：地球惑星科学・岩石・鉱物・鉱床学

キーワード：地殻・マントル・核・高圧揮発性元素

1. 研究開始当初の背景

深部マントルにおけるマグマ生成と相関係においてアルカリ金属を含む炭酸塩の系は重要な役割を果たしている。

また、高い駆動力のため、炭酸塩メルトはマントル中への炭素の運び手となり

うり、

深部まで含む全地球的な炭素循環に大きく貢献していると考えられる。

2. 研究の目的

上記の背景に基づき、本研究目的は(1)

アルカリ金属、アルカリ土類金属を含む炭酸塩系の相関係の決定、
(2)深部地球における炭酸塩メルトの移動メカニズムとその速度の解明である。

3. 研究の方法

本研究では、高温高压実験を

- (1) Kawai-type プレス、
- (2) Malinovskiy-type プレス、
- (3) Dia-type プレスを用いて行う。

4. 研究成果

圧力条件 1-30GPa、温度条件 27-1400 度において炭酸塩系 (Na₂CO₃, K₂CO₃, CaCO₃, FeCO₃) の X 線回折パターンの取得に成功した。

また、下部マントルから炭酸塩メルトの上昇メカニズムと速度を推定した。
加えて、マントルに相当する条件下において単純な炭酸塩系 (K-Mg, K-Ca, Na-Mg, Na-Ca, K-Ca-Mg, Na-Ca-Mg, K-Na-Ca-Mg) の相平衡と融解関係の決定をするためのデータを取得した。

5. 主な発表論文等

(研究代表者、研究分担者及び連携研究者には下線)

[雑誌論文] (計 20 件)

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