

SMP056-05

会場:展示ホール7別室2

時間: 5月23日10:00-10:15

## X線その場観察実験と急冷実験で決定したFe<sub>2</sub>O<sub>3</sub>-Al<sub>2</sub>O<sub>3</sub>系の高温高圧下における相関係

### Phase relation in Fe<sub>2</sub>O<sub>3</sub>-Al<sub>2</sub>O<sub>3</sub> system under high PT determined by in-situ X-ray diffraction and quench experiments

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We carried out in-situ X-ray diffraction and quench experiments in Fe<sub>2</sub>O<sub>3</sub> and FeAlO<sub>3</sub> at pressure of 15-35 GPa and at temperature of 300-1800 K to determine phase relation in Fe<sub>2</sub>O<sub>3</sub>-Al<sub>2</sub>O<sub>3</sub> system. In situ X-ray diffraction measurements of alpha-Fe<sub>2</sub>O<sub>3</sub> (Hematite) were performed using a Kawai-type apparatus, SPEED-1500, installed in BL04B1, SPring-8, Japan. Starting material was a mixture of Fe<sub>2</sub>O<sub>3</sub>, KCl, and Au which was used as a pressure marker. We observed transformations from hematite to Rh<sub>2</sub>O<sub>3</sub>(II)-type structure (forward transition) and those from Rh<sub>2</sub>O<sub>3</sub>(II)-type structure to hematite (reverse transition), separately. Pressure and temperature conditions of the forward transition were different from those of the reverse transition below 1100 K, because of the slow reaction kinetics. In contrast, at a temperature of 1200 K, we observed forward and reverse transitions at the same pressure and temperature conditions. Therefore, we determined the equilibrium phase boundary between hematite and Rh<sub>2</sub>O<sub>3</sub>(II)-type structure above 1200 K. We also performed in situ X-ray diffraction and quench experiments of FeAlO<sub>3</sub> at pressures between 17 and 35 GPa and at a temperature of 1673 K. Starting material was FeAlO<sub>3</sub> with FeGaO<sub>3</sub>-type structure. We observed decomposition of FeAlO<sub>3</sub> into Fe-bearing Al<sub>2</sub>O<sub>3</sub> and Al-bearing Fe<sub>2</sub>O<sub>3</sub> at all the experimental conditions. Results of in-situ X-ray diffraction experiments show that Al-bearing hematite transforms into Rh<sub>2</sub>O<sub>3</sub>(II)-type structure above 24.5 GPa indicating that the Al incorporation increases the transition pressure. Chemical compositions of recovered samples were measured using SEM-EDS. The results revealed that the Al<sub>2</sub>O<sub>3</sub> component incorporates about 10 mol% Fe<sub>2</sub>O<sub>3</sub> whereas the Fe<sub>2</sub>O<sub>3</sub> component incorporates about 5 mol% Al<sub>2</sub>O<sub>3</sub> and that the amount of the mutual substitution is insensitive to pressure. Using the experimental data obtained in the present study, we propose a phase diagram in Fe<sub>2</sub>O<sub>3</sub>-Al<sub>2</sub>O<sub>3</sub> system with pressure at a temperature of 1673 K.

キーワード:ヘマタイト, FeAlO<sub>3</sub>,相関係, X線その場観察, Rh<sub>2</sub>O<sub>3</sub>(II)型構造

Keywords: hematite, FeAlO<sub>3</sub>, phase relation, in-situ X-ray diffraction experiment, Rh<sub>2</sub>O<sub>3</sub>(II)-type structure