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下部マントルにおけるカリウムを含む NAL 相の安定性
The effect of potassium on the stability of NAL phase in the lower mantle

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High-Pressure (*P*) and high-temperature (*T*) experiments were conducted at *P* = 33 to 144 GPa and *T* = 1,800 to 2,700 K in order to examine phase relations on the join $Na_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ - $K_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$. Stable phases were identified in-situ at high *P-T* in a laser-heated diamond-anvil cell (DAC), based on synchrotron X-ray diffraction measurements. The results show that K-rich new aluminous (NAL) phase forms continuous solid solution on the join $Na_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ - $K_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ at 30 GPa. And, NAL is formed as a single phase up to the lowermost mantle conditions in both $Na_{0.50}K_{0.50}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ and $K_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ compositions. On the other hand, single-phase NAL is found only to 100 GPa at 2,500 K, and NAL coexists with calcium-ferrite type (CF) phase at 120 GPa and 2,300 K in $Na_{0.75}K_{0.25}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$. Considering the NAL phase with $Na_{1.00}Mg_{2.00}Al_{4.80}Si_{1.15}O_{12}$ composition is stable only up to 45 GPa at 1,850 K, these results clearly indicate that the presence of potassium drastically expands the stability *P-T* field of NAL. In addition to hollandite, the NAL phase should be an important host of potassium in the deep lower mantle, formed in K-rich materials such as subducted continental crust.