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# In situ X-ray observations of phase transitions in MgCr2O4 to 30 GPa using Kawai-type multianvil apparatus

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Phase relations in $MgCr_2O_4$ (magnesiochromite) have been studied up to 30 GPa and 1600 ℃, using a large volume Kawai-type multianvil apparatus and in situ X-ray diffraction measurements system installed at SPring-8/BL04B1. $MgCr_2O_4$ spinel dissociates into $Mg_2Cr_2O_5$ (orthorhombic type) + $Cr_2O_3$ (eskolate) at 9 GPa and 1200 ℃, and then reunion to higher pressure phase ($CaTi_2O_4$ type) at 22 GPa and 1200 ℃. Moreover, another high-pressure phase was observed above $CaTi_2O_4$ type structure phase, and this phase was unquenchable to ambient condition. In addition, pressure-induced phase transition in $MgCr_2O_4$ was confirmed without decomposition under cold compression process. In this cause, Magnesiochromite is directly transformed to high-pressure phase through the mixture of spinel and high-pressure phase. In this study, $CaFe_2O_4$ type and $\varepsilon$-phase, which reported in earlier studies in $MgAl_2O_4$ were not observed. The Birch-Murnaghan equation of state was used for least-squares fitting of the volume data (assuming $K_0{}'$ =4). Thus, determined zero-pressure bulk modulus ($K_0$) of the $CaTi_2O_4$ type $MgCr_2O_4$ was 195 GPa.

In this presentation, we will discuss further details of high-pressure phase relation and physical properties of high-pressure phases in $MgCr_2O_4$ series.

Keywords: Magnesiochromite, in situ X-ray diffraction measurement, Kawai-type multianvil apparatus, phase transition