

# Elasticity and Raman study of CaTi<sub>2</sub>O<sub>4</sub> phase chromite under high pressure

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Chromite [(Mg,Fe)Cr<sub>2</sub>O<sub>4</sub>] is a common accessory mineral and exhibited with solid solution in the Earth, the moon, and meteorites. Recent studies suggest that calcium titanite (CT)-type structure is a high-pressure form of chromite found within meteorites. However, current reported Raman spectra of the CT chromite did not show distinctive features. Furthermore, the volumes of Mg and Fe-endmember chromite of CT phase are also expected to be different at high pressures. In order to provide decisive answers for the Raman data and volume of FeCr<sub>2</sub>O<sub>4</sub> CT phase at different pressures, we used synthetic FeCr<sub>2</sub>O<sub>4</sub> CT phase as a starting material to perform in situ high-pressure Raman measurements and synchrotron X-ray diffraction (XRD) study in diamond-anvil cell.

Our Raman data were collected using a custom-built Raman system equipped with an Ar<sup>+</sup> laser and 500-mm focal distance spectrometer at Western University. The obtained Raman frequencies as a function of pressure are all shown with positive slopes. High-pressure XRD CT chromite were collected from beamline 13-BMC at Advanced Photon Source. Our XRD data show pure CT phase stable at pressure to 35GPa. Above 35 GPa some new peaks emerged, together with CT phase till 60 GPa. Rietveld refinement was applied to obtain the unit-cell lattice parameters and volume of CT chromite phase. However, the crystal system of the new phase remains unclear in this study.