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Thermodynamic Properties of $CaMoO_4$ at High Temperatures

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Highlights:

- Heat capacity of $CaMoO_4$ single crystal was measured in the 255–766 K range.
- Isobaric thermodynamic functions up to the 766 K were calculated.
- Melting point and enthalpy of melting were determined experimentally.
- Isochoric thermodynamic functions up to the melting point were calculated.

Abstract

We studied the thermodynamic properties of calcium molybdate ($CaMoO_4$) single crystal sample. Heat capacity was measured by DSC in the 255–766 K range. Isobaric thermodynamic functions (entropy, enthalpy, and Gibbs free energy) were calculated in the 298.15–766 K range. Melting point and enthalpy of melting were determined experimentally. We calculated isochoric heat capacity and thermodynamic functions up to the melting temperature of 1750 K by using low-temperature adiabatic calorimetry data within the framework of the effective sum method. We obtained the characteristic temperatures associated with the moments of the phonon density of states and its effective cutoff frequency. We estimated accuracy of the obtained results and compared the results with the known data.

Keywords: heat capacity; thermodynamic functions; effective sum method; cryogenic scintillators; calcium molybdate.