SINGLE-CRYSTAL $NaCsMo_3O_{10}$: GROWTH, PHASE STABILITY, THERMODYNAMIC PROPERTIES

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At present, considerable efforts are devoted to the search for molybdenum-containing scintillation crystals with optimized properties for application in neutrinoless double beta decay experiments. In this study, a large-sized, optically homogeneous, and defect-free single crystal of sodium–cesium molybdate ($NaCsMo_3O_{10}$) was grown by the low thermal gradient Czochralski technique.

$NaCsMo_3O_{10}$ single crystal grown in the [001] direction

The as-grown single crystal was comprehensively characterized, including determination of its phase purity and elemental composition. Thermogravimetric analysis (TGA) combined with simultaneous differential scanning calorimetry (DSC) was performed over the temperature range of 300–900 K.

The DTA curve of $NaCsMo_3O_{10}$ exhibits a pronounced endothermic peak in the 800–820 K range, with a maximum at $T_{max} \approx 816$ K, corresponding to the melting process. No additional phase transitions were detected within this temperature interval. The onset of melting was determined to be $T_{onset} = 809 \pm 1$ K.

The heat capacity of the single crystal over the entire range of existence of the solid phase (from 0 K to melting) was measured using adiabatic and scanning calorimetry methods. Based on these data, the thermodynamic properties (entropy, enthalpy, and reduced Gibbs energy) were calculated.

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