

Synthesis, Characterization, and Dielectric Properties of β -Gd₂(MoO₄)₃ Thin Films Prepared by Chemical Solution Deposition

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Abstract: A chemical solution was employed for deposition of gadolinium molybdate [β -Gd₂(MoO₄)₃] thin films. Gadolinium acetylacetonate hydrate {[CH₃COCH = C(O-)CH₃]₃Gd. xH₂O}, molybdenum isopropoxide {Mo[OCH(CH₃)₂]₅}, and acetylacetone were used in synthesis of this molybdate. Thermal gravimetry and differential scanning calorimetry suggested that crystallization of β -Gd₂(MoO₄)₃ occurs at around 480°C. Phase-pure, orthorhombic β -Gd₂(MoO₄)₃ films were deposited on Pt/Ti/SiO₂/Si(100) substrates. β -Gd₂(MoO₄)₃ films crystallized at 750°C showed a strong (001) preferred orientation. The film dielectric constant measured was 10~14 and the dielectric loss was less than 3%. There was no marked signature in the permittivity at the bulk Curie temperature, approximately 159°C.