

Phase formation of $Ti_{1-x}Al_xN$ thin films by combinatorial magnetron sputtering

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Ti-Al-N thin film materials, as promising high-performance industrial benchmark coatings, still have great room for thermal stability and mechanical property improvements. In this work, the metastable phase formation diagram of $Ti_{1-x}Al_xN$ thin films is obtained by combinatorial magnetron sputtering. The thermodynamics and kinetics of this system are investigated systematically by applying ab initio and the CALPHAD approach.