

Ti₃(Al,Si)C₂ 소결체의 고온산화
High Temperature Oxidation of Ti₃(Al,Si)C₂ Sintered Materials in Air

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1. Introduction

The ternary carbides such as Ti₃AlC₂ and Ti₃SiC₂ have attracted an enormous attention because of its unique combination of both metallic and ceramic properties. Like metals, they have excellent electrical and thermal conductivities, high toughness, high fatigue-crack growth threshold, low hardness, good machinability, and high-thermal shock resistance. Like ceramics, they display excellent chemical resistance, high Young's modulus, high temperature strength, and high melting point. In this study, Ti₃(Al,Si)C₂ was synthesized via powder metallurgical routes, and its high temperature oxidation behavior was studied.

2. Experimental Procedure

The starting powders of TiC_x (x=0.6), Al and Si were mixed, and hot pressed at 1360°C to synthesize bulk Ti₃(Al,Si)C₂ specimens under 25 MPa Ar pressure for 90 min. Oxidation tests were performed at 900-1100°C in atmospheric air. The specimens were investigated by TG-DTA, SEM/EDS, AES, XRD.

3. Results

The oxidation of Ti₃(Al,Si)C₂ resulted in the formation of an outer TiO₂ oxide layer, an intermediate Al₂O₃-rich layer, and an inner (TiO₂+SiO₂+Al₂O₃)-mixed oxide layer. During oxidation, oxygen diffused inward, and carbon escaped from Ti₃(Al,Si)C₂.

Reference

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