Accelerated Oxidation of MoSi2 Coating for Gamma-TiAl Intermetallic Compounds
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Abstract
Gamma-TiAl intermetallic compounds have an attractive combination of properties, including low density, high specific yield strength and stiffness, and favorable creep at elevated temperatures. \(\gamma\)Gamma-TiAl is suitable for applications such as jet-engine blades, turbocharger turbine wheels, engine exhaust valves, and aerospace thrusters. However, the spalling of MoSi2 into powder by oxidation is severe around 773 K. This phenomenon is called pest oxidation. It was reported that pest oxidation is induced by the formation of scales containing crystalline oxides of Mo and silicon in available literatures.

In present study, MoSi2 was siliconized by dipping in a molten-salts mixture before heating in a mullite crucible at 1173 K for 40 h to prepare MoSi2 coating on Mo (MoSi2/Mo) functionally graded materials (FGMs). This sample was tested by cyclic oxidation. The cyclic oxidation was conducted between 773 K and room temperature with the specimen being heated for 10 h and cooled. The number of cycles was 35. The MoSi2/Mo sample before and after oxidation in air was evaluated using optical microscopy and X-ray diffraction. The cross-section of their samples were observed to have a smooth surface without a spalled scales. Their thickness of their samples was approximately 50\(\mu\)m. The MoSi2/Mo sample was not damaged by the cyclic oxidation.

From their results, pest oxidation did not occur in the MoSi2 coating for Gamma-TiAl.

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Keywords: Functionally graded materials, Pest oxidation, Intermetallic compounds, Disilicide, Molybdenum