High-Temperature Behaviour of Ti-Al-Si Alloys Prepared by Spark Plasma Sintering

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Nowadays, there is effort to substitute in aerospace industry so far commonly used alloys (especially nickel alloys) with new low-density materials, which will have comparable mechanical properties and good resistance against high-temperature oxidation. Ti-Al intermetallic alloys are in this trend modern, already-used material. The results of the tests show that further enhancement of properties can be achieved by addition of silicon. The disadvantage of these materials is a low fracture toughness at room temperature and difficult production. Powder metallurgy seems to be a way to replace still used melting metallurgy. In this work, cyclic oxidation of Ti-Al-Si alloys prepared by reactive sintering, milling and Spark Plasma Sintering is described. The TiAl10Si30 alloy was evaluated as the best alloy from tested ones, because was the most resistant to the stresses. Stress was induced into the oxide layer by repeated annealing and cooling.

Keywords: Cyclic oxidation, Parabolic constant, Reactive sintering, Intermetallics

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