Preparation of Ti-Al-Si Alloys by Powder Metallurgy

Anna Knaislová, Pavel Novák, Filip Průša
Department of Metals and Corrosion Engineering, University of Chemistry and Technology Prague. Technická 5, 166 28 Prague. Czech Republic. E-mail: knaisloa@vscht.cz

Ti-Al-Si alloys are very prospective materials for many applications, particularly for automotive and aerospace industry, due to their low density, excellent resistivity to oxidation and heat stability. The main problem is high brittleness at room temperature and high mechanical characteristics persisting only up to 800 °C, which is limiting in some applications. Ti-Al-Si alloys were prepared by powder metallurgy using Self-propagating High-temperature Synthesis (SHS), which is considered as a first step in production consisting of SHS, milling and consolidation by Spark Plasma Sintering. In this experiment the observed subject was the microstructure and phase composition of Ti-Al-Si alloys in order to find optimum alloy composition for desired technology. Based on the results of this work, TiAl15Si15 alloy can be recommended due to fine microstructure composed of titanium silicide (Ti5Si3) particles in the matrix of titanium aluminide (TiAl). Concerning the production by SHS, the highest achievable heating rate can be recommended.

Keywords: Intermetallics, Powder Metallurgy, Reactive Sintering

Acknowledgement

This research was financially supported by Czech Science Foundation, project No. P108/12/G043.

References


