The Influence of Heat-Treatment on the Phase Composition and Coefficient of Thermal Expansion of Fe_3Al – Type Alloy with Niobium Addition

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Iron aluminides belong to a group of intermetallic materials. Atoms of intermetallics are long-distance arranged that's why these alloys show some interesting properties as high temperature strength or corrosion resistance. Besides of beneficial properties iron aluminides have some disadvantages as e.g. brittleness at room temperature or a sharp drop in strength above 600 °C. It has been shown that the high temperature mechanical properties can be enhanced through third element addition.
The structure of Fe_3Al alloy with addition of niobium was studied in two states – as cast state and in state after stabilization annealing at 1000 °C for 50 hours. Phase composition was investigated for these samples, because it can affect the alloy properties. The phase composition was determined using scanning electron microscopy (SEM) equipped by energy dispersive analysis (EDX) and electron backscattered diffraction detector (EBSD). The influence of heat-treatment on coefficient of thermal expansion (CTE) was also studied. The CTE's were measured by means of horizontal dilatometer.

Keywords: Fe_3Al – type iron aluminides, niobium addition, phase structure, coefficient of thermal expansion

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