The Effect of Niobium Addition and Heat Treatment on the Phase Structure of Fe3Al – Type Intermetallic Alloys

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The iron aluminides seem to be a promising materials for high-temperature applications. They have a wide range of positive properties, but unfortunately also some negative (for example low ductility at room temperature or sharp drop in strength above 600°C). The addition of third element into the alloy can be the way to improvement of the properties. Nb, Zr or Ta seem to be appropriate elements. The niobium addition to the Fe-Al matrix leads to the formation of Laves phase. If the Laves phase is presented in an appropriate shape, it could enhance high temperature mechanical properties. These properties are dependent on the structure of alloy – mainly on second phase distribution and type.Two alloys with different content of niobium were investigated. The influence of niobium content and heat treatment on the structure and mechanical properties of the alloys were studied. The phase composition was determined using scanning electron microscopy (SEM) equipped by energy dispersive analysis (EDX) and electron backscattered diffraction detector (EBSD). This paper is the first part of study and it deals with description of the alloy structure and phases in the investigated materials.

Keywords: Fe3Al – type iron aluminides, Nb addition, phase structure, heat treatment

Acknowledgment
This research was supported by Grant Agency of the Czech Republic through the Project No. P108/12/1452.

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Paper number: M201485