The Effect of Zirconium and Carbon Addition on Thermal Expansion of Fe3Al-Based Iron Aluminides

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Fe_3Al iron aluminides with Zr addition appear like promising materials for high-temperature applications. Carbon is often present in alloyed iron aluminides because of its occurrence in raw iron. Therefore Zr addition can lead to the formation of zirconium carbides in the structure of the alloys. Also other carbides can form depending on carbon amount. The size and distribution of carbide particles can affect high-temperature behavior of aluminides. Thermal expansion of alloys with 0.25, 0.5 and 1 at.% Zr was studied by means of coefficient thermal expansion (CTE) measurement. The structure of alloys was obtained by scanning electron microscopy. Energy dispersive analysis and X-ray diffraction were used for phase identification.

Keywords: Fe_3Al – type iron aluminides, zirconium and carbon addition, phase structure, coefficient of thermal expansion

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