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Influence mechanisms of Cu or Fe on the microstructures and tensile properties at 350℃ of network AlN_p reinforced Al composites

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Abstract

In this work, the influences of alloying elements like Cu and Fe on the microstructures and tensile properties (at 350℃) of network AlN_p reinforce Al composites have been studied. After alloying element introduction, Cu atoms tend to segregate on the AlN_p/Al interface, while Fe atoms not. Meanwhile, the α–Al grains show a $<111>_{Al}$ fiber texture in the AlN_p reinforced Al composites with Cu addition and a $\{110\}_{Al}$ $<111>_{Al}$ texture in the AlN_p reinforced Al composites containing Fe, which are different from the random α–Al orientations in the AlN_p/Al composites without element addition. The tensile properties of AlN_p/Al composites containing alloying elements at 350℃ are affected by the preferred orientations of α–Al grains and the changes of dislocation density. The elongation of the composites containing Cu increased remarkably from 3.5% to 14% with just little tensile strength sacrifice at 350℃. Nevertheless, after Fe incorporation, the tensile strength is increased to 140MPa, coupled with the elongation of 7% at 350℃.

***Keywords*:** AlN; Al composites; interface; element segregation; preferred orientations