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Influence mechanisms of Cu or Fe on the microstructures and tensile properties at 350 °C 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 °C) 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 $\langle 111 \rangle_{\text{Al}}$ fiber texture in the AlN_p reinforced Al composites with Cu addition and a $\{110\}_{\text{Al}}$ $\langle 111 \rangle_{\text{Al}}$ 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 °C 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 °C. Nevertheless, after Fe incorporation, the tensile strength is increased to 140 MPa, coupled with the elongation of 7% at 350 °C.

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

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