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Microstructure, mechanical and tribological properties of TiAl-based composites reinforced with high volume fraction of nearly network Ti₂AlC particulates

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TiAl-based composites reinforced with different high volume fractions of nearly network Ti₂AlC phase have been successfully prepared by mechanical alloying and hot-pressing method. Their microstructure, mechanical and tribological properties have been investigated. Ti₂AlC network becomes continuous but the network wall grows thicker with increasing the Ti₂AlC content. The continuity and wall size of the network Ti₂AlC phase exert a significant influence on the mechanical properties. The bending strength of the composites first increases and then decreases with the Ti₂AlC content. The compressive strength of the composite decreases slightly compared to the TiAl alloy, but the hardness is enhanced. Due to the high hardness and load-carrying capacity of the network structure, these composites have the better wear resistance. And this enhancement is more notable at low applied loads and high Ti₂AlC content. The mechanisms simulating the role of network Ti₂AlC phase on the wear behavior and the wear process of TiAl/Ti₂AlC composites at different applied loads have been proposed.

Keywords: TiAl/Ti₂AlC composites; Network structure; Wear resistance

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