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Solid State Synthesis of Ti-Al Composites with Metal Fiber

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ABSTRACT

Ti-Al intermetallic compounds are the most promising aerospace materials because of their high specific strength and high heat-resistive property even though they are brittle. Forming a composite with ductile reinforcements is one of promising methods to prevent the brittleness. Sufficient stress transfer at the interface and no deterioration of the reinforcement are important in the composite. The latter is especially essential. Forming an intermediate layer and decreasing the temperature to form the composite are effective in preventing the interfacial reaction and in decreasing the deterioration.

Ti-Al intermetallic compounds can be formed at a lower temperature than 950 K using SHS from pure Ti and pure Al foils, reinforcement and the matrix can be reduced. SiC is a useful intermediate layer because it is very stable at an elevated temperature.

In this experiment, a new method since Ti-Al generates a moderate amount of heat. Therefore, if the creation of the Ti-Al compound matrix and the fabrication of a composite are carried out simultaneously, the reaction between the to form an SiC intermediate layer was developed, and the effect was examined. The SiC intermediate layer showed a rather good effect in the prevention of the reaction between the matrix and the W-reinforcement.