

Special Lecture

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Development of TiAl alloys for gas turbine engines

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Abstract

Research on developing new TiAl alloys for high temperature applications is introduced. At KIMS, we have developed new TiAl alloys which have excellent room temperature and high temperature properties. Especially, the new alloy showed excellent oxidation resistance in the temperature range from 900 to 1000°C by forming stable Al₂O₃ oxidation layer. Process development of casting, forging as well as 3d printing on the newly developed KIMS alloys was introduced. Especially, small size turbine wheel and blade were manufactured by centrifugal casting process. The results from the testing and validation of TiAl blade were shown that KIMS alloy can be used as a turbine blade above 900°C. In addition, we proposed some underlying mechanism of high temperature strength of KIMS alloy from TEM and SEM observations. Finally, the operation test of micro gas turbine is now under examination to confirm the possibility of the application of the new alloy in the gas turbine engine.