

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advanced Materials and Structures for High Temperature Applications (4)

Author: Ms. Maryna Hrekova
Yuzhnoye State Design Office, Ukraine, hrekovamaryna@gmail.com

METHOD OF HEAT-PROOF NICKEL ALLOYS MECHANICAL PROPERTIES IMPROVEMENT
FOR ROCKET ENGINES

Abstract

A method of nickel melt treatment with powder compositions of nanodispersed range is proposed which allows improving quality of mechanical and performance properties of gas turbine engines blades. Study subject is heat-proof ZhS6K nickel alloy. As a basis of modifier nanodispersed modifier of Ti(C,N) titanium carbonitride was accepted with particles size of 200 nm. The modifying with dispersed tableted compositions was performed. The Ti(C,N) tablets were obtained by plasma chemical synthesis at a specific high-frequency unit. A technology of powders modifier injection into melt was developed. The proposed technology allows injecting required amount of the modifier with minimal carbonitride losses and guarantes homogeneous distribution in the melt. It was found that complex ZhS6K alloy modifying effects highly dispersed structure forming with homogeneous distribution of addition agents. As a result of modifying more developed grain boundary structure was formed which resulted in improving set of mechanical properties of the ZhS6K alloy. The obtained results has allowed increasing durability of gas turbine engines blades under operations at 22%.