

3rd International Conference and Exhibition on Materials Science & Engineering

October 06-08, 2014 Hilton San Antonio Airport, USA

Influence of substrate on the efficiency of aluminide coatings and thermal barrier coatings

Gursev Pirge

Turkish Air Force Academy, Turkey

It has been an important target to increase the operating temperatures of the turbine engines with the aim of increasing efficiency and thrust and decreasing fuel consumption. A possible increase in the operating temperature makes it necessary and beneficial to use high temperature protective coatings on the hottest sections of turbine engines. Although there are other alternatives, aluminide diffusion coatings are still frequently used and are being applied to the majority of the first-stage turbine blades. The aluminum in the coating oxidizes to form a dense oxide layer, which acts as a stable barrier to oxidation of the base metal. Aluminide coating also provides some protection against hot corrosion and erosion. Pack cementation, which is usually used to deposit aluminide coatings, involves diffusion and the process being carried out at high temperatures for extended periods may lead to fatal degradation of the mechanical properties of the substrate alloy due to microstructural changes. Thermal barrier coatings have also been widely used in high temperature components of aircraft and industrial gas turbine engines. In this study, aluminide and thermal barrier coatings are applied on various nickel-based superalloys and stainless steels. This paper reviews two major types of protective coatings (aluminide coating and thermal barrier coating) on the alloys used in the hot sections of turbine engines and compares the effects of the substrate on the success of the protection. The experiment results showed that the substrate composition may influence the final microstructure of the system.

g.pirge@hho.edu.tr