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Advanced Materials and Structures for High Temperature Applications (4)

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THE IMPORTANCE OF USING THERMAL BARRIER COATINGS IN AERO GAS TURBINE
ENGINES. CERAMIC MATERIALS FOR THERMAL BARRIER COATINGS: A REVIEW AND
CURRENT STATUS

Abstract

The main tendency in the development of aero engine manufacturing is a continuous increase in the turbine inlet temperature, which leads to further complexity of the design, an increase in the thermo-mechanical stress of gas turbine blades, the reliability of which has a great impact on the reliability and service life of gas turbine engines in general and aircraft flight safety. In this regard, the development and implementation of methods for increasing the strength properties, corrosion resistance of alloys, protective coatings and products are the most important in solving the problem of gas turbine durability. The main direction in solving the problem of the durability of gas turbines largely depends on the correct choice of the composition of the thermal barrier coating. Ceramic top coat materials used in Thermal Barrier Coatings are studied in this paper, with a focus on thermal and mechanical properties. Basically, a number of properties of the materials were taken into account, including melting point, thermal conductivity, thermal expansion coefficient, phase stability, thermal diffusivity, heat capacity, poisson's number, young's number. In the end, the studied ceramic oxide materials were compared for choosing the right material for the top layer of the thermal barrier coating.