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IN SITU INVESTIGATION Y-AL-O THERMAL BARRIER COATING *

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To increase the power and efficiency of gas turbine engines (GTE), it is necessary to increase the temperature of the gases in front of the GTE turbine. In this regard, it is necessary to protect the parts of the gas turbine engine from exposure to high temperatures and gas flow. To date, to protect GTE blades, multilayer coatings are traditionally used, which consist of an inner layer based on MeCrAlY or NiAlPt system and an outer thermal barrier layer based on ZrO2-Y2O3 [1, 2, 3]. But this coatings can't protect aviation parts at 1500 C. Therefore, investigation to create new thermal barrier coatings for higher temperatures.

The thermal barrier coating of the Y-Al-O system deposited by arc-pvd was studied by using synchrotron radiation. Coating based on the Y-Al-O system was deposited on molybdenum substrates from two single-component aluminum and yttrium cathodes. The phase stability of the coating when the sample was heated to 1500°C in vacuum was studied by using synchrotron radiation. The coating after deposition has an amorphous structure. This structure saved up to 1000°C, crystallization occurs when the temperature reaches 1160–1170 °C. Other phase transformations in the coating during heating wasn't observed . The qualitative phase composition of the coating was determined, and the microstresses in the coating were evaluated. The results demonstrate the absence of microstresses in the coating. Based on the results of the research, a fundamentally new method for the synthesis of thermal barrier coatings based on the Y-Al-O system was developed, in which coating consists of oxides YAlO3 (mainly), Y2O3 and YAl2 intermetallic compound. Obtained results may be applying for develop new Thermal Barrier coatings for perspective aviation engine.

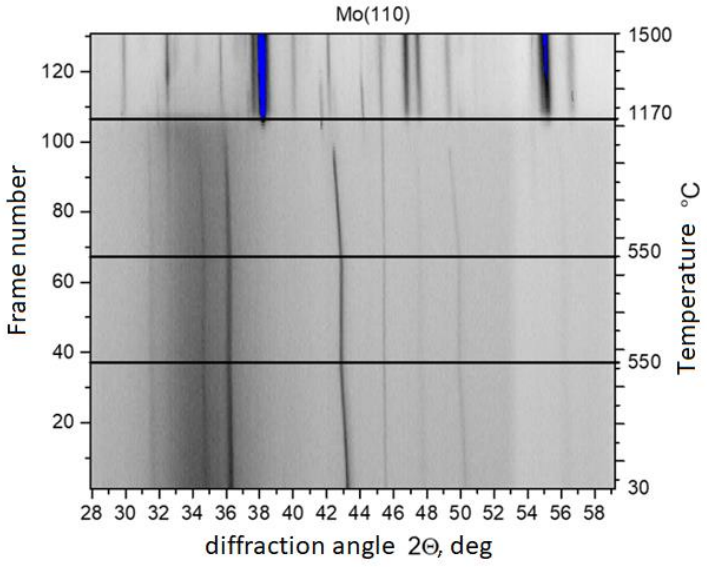

Fig.1. X-ray diffraction pattern of the YAlO sample in the representation of the projection of the intensity on the plane "diffraction angle-temperature".

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