Ensuring Heat Resistance of Aviation Materials Using Protective Coatings Based on ZrO_2

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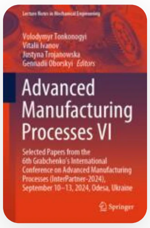

Advanced Manufacturing Processes VI

(Interpartner 2024)

Oleksandr Umanskyi, Natalia Zaichuk, Sergii Shymchuk, Ruslan Kostunik & Oleksandr Terentiev

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Abstract

The issue of improving the performance of aircraft is constantly attracting the attention of researchers, and research teams and large scientific institutions are working on their solutions. This is an urgent problem of our time. This scientific article discusses possible ways to solve this scientific and applied problem by improving the performance of aircraft engine parts by applying heat-resistant protective coatings. Such coatings are proposed to be used based on ZrO_2 with an appropriate amount of Ni (in this study, 10 and 30% Ni were added to the base coating to stabilize and improve plasticity, respectively) and CaO. The coatings were applied to the base material by plasma sputtering on the working surfaces of the parts. These so-called plasma zirconium coatings can be applied to parts of various shapes and materials. As part of our study, these coatings were applied to 100Cr6 steel and tested for heat resistance, preventing working surface oxidation and scale formation (scale resistance). The tests were carried out at 1000 °C, 1100 °C, and 1200 °C. The scientific results obtained will facilitate the selection of heat-resistant materials for the relevant parts using the import substitution principle, if necessary. They will allow controlling the gaps of joined parts within acceptable limits, knowing the changes in size and weight due to the formation of oxides.

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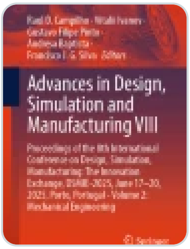

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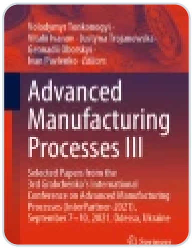

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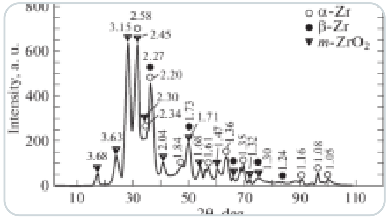

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Author information

Authors and Affiliations

Institute for Problems of Materials Science, National Academy of Sciences in Ukraine, 3, Omelyana Pritsaka Street, Kyiv, 03142, Ukraine

Oleksandr Umanskyi & Oleksandr Terentiev

Lutsk National Technical University, 75, Lvivska Street, Lutsk, 43018, Ukraine

Natalia Zaichuk & Sergii Shymchuk

National Aviation University, 1, Liubomyra Huzara Avenue, Kiyv, 03058, Ukraine

Ruslan Kostunik

Corresponding author

Correspondence to Natalia Zaichuk.

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