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STUDY OF THE INFLUENCE OF A POWERFUL PULSED ION BEAM ON TITANIUM DEEPLY-DOPED WITH ALUMINUM*

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The work studies the impact of high-intensity implantation of aluminum ions and the subsequent impact of a powerful pulsed ion beam on the microstructure and properties of titanium. The high-intensity aluminum ion beam formation was carried out using a method based on plasma-immersion extraction of ions from the free boundary of a vacuum-arc plasma, their acceleration in a high-voltage sheath layer, followed by ballistic focusing. Specimens of titanium were implanted for one hour at a temperature of 900°C with an irradiation fluence of 10^{21} ions/cm^2. Layers with a thickness of about 150 μm were obtained. The energy impact was carried out by a powerful ion beam with an ion current density on the target of 100 A/cm^2. The paper presents data on changes in the elemental composition, surface morphology, and microstructure of ion-doped and energy-modified layers. It has been established that the additional energy impact on the ion-implanted layer of a powerful pulsed beam improves wear resistance by 10 times. The synergistic of high-intensity ion implantation of aluminum and the energy impact of a pulsed ion beam improves the wear resistance of titanium by eighteen folds.

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