FORMATION OF BORIDE SURFACE ALLOYS ON TI SUBSTRATE BY THE LOW-ENERGY HIGH-CURRENT ELECTRON BEAM *

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Due to the combination of high specific strength, creep resistance, excellent corrosion resistance and low thermal conductivity, titanium and its alloys are widely used in aerospace, biomedical, chemical, marine, automotive and many other industries. However, the low wear resistance of titanium alloys is a major drawback that limits their use, especially in friction and wear related applications. A promising method to improve the tribological properties is the formation of composite boride containing surface layers on the surface of titanium alloys. This approach has been successfully implemented by various methods for decades. However, the method of implementation of this approach, namely the formation of boride-containing surface alloys in a single vacuum cycle using intense pulsed beams of charged particles and plasma streams, is quite new.

The formation of boride-containing surface alloys on a titanium substrate was carried out using an electron beam machine "РИТМ-СП", which combines a magnetron sputtering system and a source of low-energy high-current electron beams in a single vacuum chamber [1]. A lanthanum hexoboride material with the properties required for magnetron deposition was selected as the boride-containing target for the magnetron. LaB_6(0.5)/Ti system has been investigated. Surface alloys formed by irradiation of the LaB_6(0.5)/Ti system with a low-energy high-current electron beam with energy densities of 3.5, 4.5, and 5.5 J/cm^2 have been studied. The results of studies of elemental and phase compositions of the formed surface alloys are presented.

REFERENCES

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