ABSTRACT

The work contains: 116p., 41 fig., 26 table, 56 ref.

CRYSTALLISATION, COMPOSITE MATERIALS, LASER MELTING MICROSTRUCTURE, TITANUM MONOBORIDE, MASSIVE CRYSTALLISATION, HARDNESS, CRYSTALLISATION RATE,

Object of study is composite materials based on eutectic composition alloy Ti –TiB

The aim of this work was to study the effect of the kinetic parameters and heat treatment on the structure , physical and mechanical properties of a eutectic alloy of the Ti-TiB system.

The effect of technological parameters of the process of solidification of Ti - TiB colors obtained in conditions of electron beam melting, realized by the electron beam of a surface layer and by the method of 3D printing with laser heating on mechanical properties, microstructure and phase composition of the material was investigated.

It has been established that the microstructure of the eutectic alloy consists of an α-titanium matrix with chaotic fibers of titanium boride. It was found that the diameter of the fibers increases, and the number of fibers decreases, in across section from the side part of material to the central part, it can be explained that heat overflow is higher on the sides than in center.

It is proved that during the reflow of the surface of the plate TiB with an electron beam, the amount of fibers can be increased in 10 - 40 times as a result of the 100 times higher cooling rate of the melted layer.

It is shown by methods of microscopic and X-ray diffraction analysis that during surface treatment of the material with a laser beam that in formed reflowed layer which

is 25 – 55 mcm, is only single-phase titanium and also CSR size increases with holdup time of the laser in one point increase.

It has been discovered that after heating of the reflowed layer of the composite to temperature lower than the melting point of the material titanium monoboride is not released, but the CSR increases, which indicates an improvement of the structure