Metal matrix composite for additive technology of direct metal deposition

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Based on the world experience in the development of modern approaches to materials science and new technical solutions, it is necessary to recognize that it is impossible to manufacture units and separate parts from new structural and functional materials without developing additive technologies (AT). The full implementation of additive technologies in the production process will provide a revolutionary breakthrough in the industry.

Within the framework of this study, the goal was to study the possibility of using new metal-ceramic composite materials in the Direct Metal Deposition (DMD) technology and surfacing, based on the principles of heterophase laser powder metallurgy.

The work on the synthesis of metal matrix composite materials with a metal/intermetallic matrix and high (up to 75%) content of finely divided ceramics (TiB_2) particles was carried out. Experimental batches of NiTi-TiB_2 powders are obtained. The plasma spheroidization of the obtained powders was carried out.

Technological parameters of Direct Metal Deposition of the metal matrix composite are determined in a mixture with powders Inconel 625. Experimental samples of composite alloys are obtained. It is shown that the introduction of 5% NiTi-TiB_2 powders into the Inconel 625 matrix leads to the formation of a composite structure. The composites significantly increase the tensile strength, relative to the pure Inconel 625 alloy. A decrease in plastic properties and a doubling of the hardness have been established.

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