ABOUT TECHNOLOGIES FOR OBTAINING LASER TARGETS AND METHODS OF THEIR CERTIFICATION

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Modeling laser installations are used to conduct research in various areas of high energy density physics, problems of laser thermonuclear fusion, and also in the interests of the nuclear industry. All these studies use targets in various designs and compositions. The designs of laser targets, the requirements for their elements, and the choice of the most important characteristics of the target in the experiment depend on the specific area of research and the functional purpose of the target elements.

Each class of targets requires using a combination of methods and techniques for obtaining both individual elements and the target as a whole, and also the development of a sequence of technological operations that allow obtaining targets with design parameters that fully satisfy the requirements of technical specifications. In manufacturing targets, combinations of physical (vacuum deposition and sputtering methods, mechanical processing methods, laser processing methods, etc.) and chemical (synthesis of compounds, preparation of solutions, electrochemical polishing, etching and deposition of coatings (layers), etc.) technologies are used. To achieve the high requirements for the study of processes (parameters) occurring in high-temperature dense plasma formed as a result of the interaction of intense laser radiation with the target material (substance), it is necessary to use a set of complementary (cross) and high-precision (parameter measurement error less than 1%, with the prospect of transition to 0.5%) methods of comprehensive certification of target parameters and their certification at all stages of the life cycle: from substrate preparation to target installation in the interaction chamber of the laser installation. Research methods for each class of targets are selected in such a way as to make it possible to conduct cross measurements of the same target parameter in order to minimize the incorrect interpretation of the measurement results.

In this paper, using the example of currently manufactured laser targets, the results of the analysis of existing technologies for their production are presented, the main stages of target manufacturing and also technologies (existing and prospective) for the manufacture of individual target elements and methods for their improvement are considered.