TECHNOLOGIES FOR OBTAINING BULK MATERIALS IN TI-AL-B-C SYSTEM

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Advanced materials and technologies for their production are under the great interest in the fields of materials science. The area of New/Nano Materials is quite wide and in this point one of the main segments is dedicated to the research and production of Nanopowders and Bulk Nanocomposites. Nanostructure materials are characterized with unique properties in particular, high strength, hardness, corrosion and wear resistance, super plasticity in some occasions. The great potential of mentioned and other new properties of nanomaterials are main reasons of increasing interest towards the research and practical application of such advanced materials. From the point of practical application, there is a big demand on bulk/three-dimensional nanostructure materials and the industrial technologies for their production. There are several conventional technologies for the production of materials: Mechanical alloying, Hot Isostatic Pressing, Spark Plasma Synthesis, etc. Presented work describes following convenient technologies for production of Bulk Nanomaterials: Self-Propagating High-Temperature Synthesis (SHS) and Explosive Compaction Technology (ECT). Compared to the above mentioned conventional methods the SHS and the ECT have significant advantages and are very convenient for the production of new materials.

SHS is the specific form of interaction between chemical elements, which ends up by formation of hard-melting inorganic compounds and composite materials [1-2]. This method is characterized with High productivity, Low energy consumption and High quality of final product; The ECT has specific advantages compared to the competitive technologies, which stipulates the attractiveness of this technology for production of bulk Nanocomposites [3-4]. Some of the important advantages of ECT are following: Generation of High density energy in short times, Adiabatic character of the process, Possibility to obtain bulk materials with large geometric size and different shape.

The results described in the work are connected to the production of Bulk composites in Ti-Al-B-C system with the above described technologies. The research is supported by Shota Rustaveli National Science foundation (Grant #YS15_2.2.10_84).

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