

## ABSTRACT

The master's thesis contains: 121 pages, 30 figures, 38 tables, 48 sources.

ALUMINUM, WETTING, BORON CARBIDE, COMPOSITE MATERIAL, CLADDING, IMPREGNATION, AK12 ALLOY.

The purpose of the work is to develop composite Al-based materials by studying the structure and properties of  $B_4C$ -Al-Si and  $B_4C$ -Al systems. To achieve this goal, the following tasks need to be addressed:

- to apply a nickel coating on particles of boron carbide powder;
- to investigate the effect of thermal treatment of nickel-coated boron carbide powder on the process of impregnation and formation of microstructure and properties of composite material of the  $B_4C$  system-Al-based alloy;
- obtaining of  $B_4C$ -Al composites at elevated temperatures;
- to study the structure and properties of the obtained materials.

The object of the research is composite materials of  $B_4C$ -Al-Si,  $B_4C$ -Al systems.

The subject of the study is the regularities of microstructure formation and properties of  $B_4C$ -Al-Si,  $B_4C$ -Al composites obtained by impregnating boron carbide with AK12 and Al alloy.

Investigation of structure, mechanical properties, chemical and phase composition of composites was carried out using scanning electron microscopy; microhardness and compressive strength were determined.

The composite materials of clad powders were obtained with impregnation and at elevated temperatures.

It is established that the process of cladding of boron carbide powder contributes to the impregnation of boron carbide with aluminum and that with the increase in the soaking time, mechanical properties of the composite materials improve.

The research findings were published in 2 international conferences proceedings.