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NONISOTHERMIC SYNTHESIS OF TRIBOLOGICAL COMPOSITES BASED ON MAX PHASES AND ALMGB$_{14}$

O.K. LEPAKOVA, N.I. AFANAS'EV, R.V MININ

Tomsk Scientific Center of the SB RAS, Tomsk, Russia

Friction and wearing along with fatigue are the main causes of failure of mechanisms and parts. Development of new tribological materials with increased wear resistance at elevated temperatures, pressures and chemical environments is the urgent problem of materials science.

MAX phase composites have been actively studied as new antifriction materials, which due to their layered structure are considered to be promising tribological materials. The effect of addition of TiC, BN, and SiC to Ti_3SiC_2-based composites on tribological characteristics is investigated with the purpose of their use in high-temperature friction units and mechanical parts subjected to wear [1, 2]. Aluminum-magnesium boride $AlMgB_{14}$ is a chemical compound of aluminum, magnesium and boron characterized by high hardness (25-35 GPa), low density (2.66 g/cm^3), extremely low friction coefficient (0.04-0.05), and high plasticity index (H/E-0.14). High mechanical and, first of all, tribological characteristics open wide prospects for application as wear-resistant coatings, and also in the composition of composites.

The aim of this study was to obtain Ti3SiC$_2$-based composite with the addition of boride-aluminum-magnesium $AlMgB_{14}$ by SHS and study the effect of additives on the phase composition, microstructure and properties (primarily, tribological) of the synthesized composites.

In this work, composite materials were prepared by the SHS method using nanolaminate Ti-Si-C compounds with the addition of $AlMgB_{14}$, which expand the application field of antifriction materials due to their high resistance to chemical decomposition at elevated temperatures. Methods of obtaining ultradispersed superhard powders were developed. Physical and chemical mechanisms and control methods of SHS processes were established. The factors influencing the structure were investigated and the thermal resistance and physical and mechanical properties of synthesized materials were determined.

REFERENCES

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