**Influence of grain size and crystallographic structure of graphite on the phenomenon of fragmentation of TiC - Fe composite layers**

An abrasive wear constitutes one of the main processes of the construction elements destruction. Since this destruction occurs mainly on work surfaces of details, it inclines the development of materials with surfaces or phases reinforced by ceramic phases. For producing such materials the methods allowing to obtain laminar materials with the application of such techniques as: laser plating, thermal spraying, hardfacing and welding. An interesting alternative seems to be the use of casting techniques using reactive casting coatings. The technological process is based on covering the cavity of the casting mold with a coating containing substrates of TiC formation, and then pouring it with a liquid alloy. The synthesis reaction is initiated as a result of the heat supplied by the alloy, and its course is so high exothermic. Enthalpy of TiC formation is equal - 187 kJ / mol, which in turn leads to the release of a large amount of energy on the heat method in the area of the in situ composite layer, resulting in the production of composite layers with a heterogeneous structure. This phenomenon is called fragmentation of the composite layer. This paper attempts to evaluate the effect of grain size and crystallographic graphite structure on the course of TiC synthesis reactions. For this purpose, flake graphite of various grain sizes and commercially available amorphous graphite were used for the research. The heat reaction measurements carried out by means of thermal analysis showed significant differences in the enthalpy values ​​obtained. These results became the basis for the preparation of reactive casting coatings based on water solutions with carboxymethylcellulose and the addition of selected graphite and titanium powders. The composite layers produced in Fe-based castings were characterized by a homogeneous structure with a thickness of up to 1.5 mm. Structural investigations performed by X-ray analysis (XRD) and microstructure using scanning electron microscopy showed the presence of TiC ceramic phases. This proves the occurrence of the synthesis reaction in the cavity of the casting mold. Mechanical tests carried out using the Vickers method in the area of ​​the composite layer showed a significant increase in hardness compared to the base alloy.