EVALUATION OF EFFECTIVE PROPERTIES OF METAL MATRIX COMPOSITE WITH INCLUSIONS SURROUNDED BY INHOMOGENEOUS TRANSIENT LAYER

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Synthesis in the thermal explosion mode or in the combustion mode is used to produce composites of different composition, including the Ti-C system. In equilibrium conditions, a composite consisting of a titanium matrix with carbide inclusions TiC is expected [1, 2]. However, due to nonequilibrium conditions realized in these technologies, nonequilibrium Ti_xC_y phases can form [3], the number of which varies depending on the synthesis conditions.

According to literature data, the following phases can be expected: TiC_2, Ti_3C_2, Ti_2C. [4, 5]

In this work, the effective properties of the composite based on titanium (perhaps with partially dissolved carbon therein) containing multiphase particles are estimate. The transition layer may consist of several successively formed phases (fig.1).

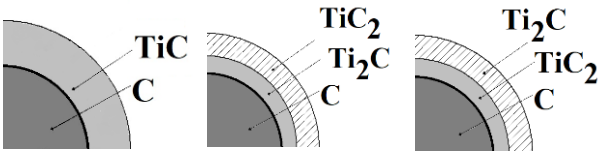

Figure 1. Scheme of spherical particle with the multiphase transition layer

The problem of particle inhomogeneity is solved using the method of replacing a non-uniform inclusion with an equivalent homogeneous one. The effect of the composition and size of the carbide phases on the effective properties (thermal conductivity and thermal expansion coefficient) of a composite material is studied.

The results of the study show the influence of the width, composition of the formed transition layer, and the order of the phases on the properties of inclusions formed during the synthesis of a composite material in the Ti-C system. The effect of concentration and size of particle on the effective properties of the composite was studied.

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