**Physico-Chemical nanomaterials science**

**Vapor-condensed composite materials Ni-Al2O3, NiCr-Al2O3 with oxide nanophase**

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High-speed electron-beam evaporation of metals and non-metals in vacuum (the deposition rate of atomic or molecular flows on a substrate can reach 150 µm/min) is a relatively new direction in materials science. These processes are currently widely used mainly for the application of protective coatings to gas turbine parts. New materials obtained by condensing vapor flows on a substrate heated to a certain temperature include dispersion-strengthened, layered, and porous materials [1-3].

The structure and physico-mechanical properties of bulk composite materials condensed from the vapor phase with a dispersed oxide nanophase: Ni – Al2O3, NiCr-Al2O3 in a wide (up to 40% wt.) range of Al2O3 concentrations are studied in this work. The dependences of the physico-mechanical properties of composites on the temperature of the substrate on which vapor flows are deposited are established. It is shown that in the above range of oxide nanophase concentrations, there is a smooth transition from dispersion-strengthened to microporous materials. The influence of the deposition temperature and vacuum annealing time on the morphology, micropore volume, and mechanical properties of the composites has been studied.

1. *N.I. Grechanyuk, P.P. Kucherenko, A.G. Melnik, I.N. Grechanyuk, Y.A. Smashnyuk, V.G. Grechanyuk Neu electron beam equipment and technologies for producing of advanced materials using vacuum melting and evaporation methods developed at spe eltekhmash / // The Paton Welding Jornal. – 2016. – № 5-6. – Р. 48-55.*

*2. N. I. Grechanyuk, V.G. Grechanyuk, E.V. Khomenko, I. N. Grechanyuk, V.G. Zatovskii, D. Kovalchuk The new condensed from vapor phase composite materials based on copper and their applications // Electrotechnica & Electronica. – 2016. – № 5-6. – P. 199-205.*

3. *I.N. Grechanjuk, V.G. Grechanjuk, L. Orac* Corrosion resistance in neutral saline fog of the composites Cu-Mo obtained by PVD method / //  Metallurgy and Materials science. – 2009. – № 5. –. Р 297-304