

*Materials of conference***INTERACTION BETWEEN COMPONENTS AT METAL COMPOSITES PRODUCTION**

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An effective combination of metallic and non-metallic components of various composition in particular proportions offers an opportunity for finished materials' physical-mechanical and radioprotective properties' change in the proper direction. As a non-metallic component large grains and fine grades of rocks and minerals, glass and ceramics industries' wastes are used. One of the most important problems of chemistry and technology of metal composites is the problem of bond character and adhesion power between the components. The bonding between the phases in heterogeneous systems is determined by the ratio of surface energies, surface-tension value between the phases and is carried out both by means of Van der Waals' forces and carrier compounds and solid solutions formation. For the estimation of a possible interaction between the phases in metal composites it is admitted to consider the characterized by the limiting wetting angle wetting between the components. A good wetting of metal-like carbides and nitrides by refractory metals compared to the wetting of fire-resistant oxides by them is explained by the metallic bonding in the lattice of these compounds, their inclination to form solutions with metals and exchange reactions between them.

Thus, considering wetting as the main precondition for the formation of a solid structure, all metal composites should be divided into two main groups:

- 1) metal composites, wherein the non-metallic phase is wetted by a molten metal well;
- 2) metal composites, wherein the wetting of a non-metallic phase by a molten metal is not too much [1].

The composites of metal-bond metal-like refractory compounds, i.e. most carbides and silicides having the interstitial alloy structure and also borides and silicides, are referred to the first group. Due to its good wetting by molten metals a tight and stable bond between the metal and metal-like phase is typical of the metal composites of this type. Such metal composites sinter at the temperature that is a little higher than that of binder metal melting point. The formed at that fluid metal phase wets the surface of the metal-like compound searching into the finest cracks and its grains' surface irregularities and providing thus the highest strength of the composite. At that, the formation of some carrier compounds and subsolution is possible.

The second group combines metal composites on the base of oxides. The last ones are wetted by the molten metals not properly, hence, to reach a stable

bond between the metal and non-metallic component is not possible, as a rule. For this reason at sintering of metal composites of the oxide – metal compositions at the temperature exceeding the binder metal melting point the metal runout occurs. To avoid such a phenomenon the metal composites of the oxide type are burnt at the temperatures, which are lower than those of the metal's melting point, at which the metal is in a plastic, but still solid state.

For the wetting quality improvement between refractory metals and high refractory oxides in the process of metal composites' sintering the oxides should have a high-surface area. Sometimes the oxides forming together with the basic one the solution phase are introduced into the metal ceramic composition. The additions of its oxide are made to the metal, if this oxide can interact with the basic one of the system. The alloying additions are made to the basic metal; at that, the alloying metal should be an oxygen hungry one, that promotes the oxide's wetting by the alloy being formed.

The oxide oriented metal composite will be strong and tight when the metal and non-metallic component form an intermediate layer connecting both phases. Such an ideal case is the introduced oxide and binder metal one solid-solution formation, for example, cermet of the corundum – chrome composition.

To a certain extent the properties of metal composites are determined by a range of physical-chemical processes taking course when heated:

- 1) wetting of the ceramic phase by the metal;
- 2) chemical interaction of the phases;
- 3) mutual solubility of the phases [1].

The properties of metal composites can be changed when choosing different metal-non-metallic components relations, that is easy to achieve by powder technique practice.

When melting during the burning-in, the metal particles of the metal composite act as a binder wetting and connecting the grains of the other component or making a chemical compound with it. As the result of their interaction new materials possessing specific properties and not being simply a sum of metal's and non-metallic component's properties appear [2].

For the time being the formulation of metal composites is to a large extent selected empirically, but still there are some theoretical preconditions. The determinative factor in the binding material choice is its ability to wet the non-metallic component. The wetting can be attended in the metal composite by a chemical change between the components (they are the phases as well) with the formation of a new phase in the form of a new compound or a solid solution. The better the wetting, the higher the quality of the metal composite obtained.

In the sphere of obtaining composite materials high temperatures most of the components are thermodynamically nonequilibrium ones, able to undergo different reactions with each other at the phase boundary. Physical-chemical phenomena taking course on the components' boundary surface are rather complex and nowadays studied not well enough. Generally, the accumulation of experimental data on the interaction between the most advanced metals (aluminum, magnesium, nickel, titanium and some others) and fibers – boracic, carbon, glass. But it should be noted that nowadays there is some calm in composite materials studying, and the top of the investigations falls on 70-80s when the majority of the data were got and some theoretical developments were started both in our country and abroad.

References:

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#### **DATA PROCESSING SYSTEM RELIABILITY ANALYSIS BY NETS WITH WINDOWS VISTA OPERATING SYSTEM CONTROLLED COMPUTERS**

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The computer network reliability is assured by the whole system of hardware and software tools providing concurrent processing of various privacy information by a user group without access violation. It is especially typical of the Windows Vista operating system, which has an entirely reworked network architecture called to simplify and enhance operational reliability in the net with the help of Vista maximally.

The Windows Vista controlled correctly set network usually works without failures, but problems and errors still spring up. For their detection in the Vista system there are diagnostic aids. The primary diagnostics is performed in the “Network management and public access center” window and in the viewer of the full size net card. If there are network connect problems there will be corresponding graphic symbols. The receiving of more accurate information about the network connection state is seen in the “Network connection state” window, where the key connection parameters IPv4, IPv6, data processing

rate are specified, and in the network operation run-time the number of sent and accepted bytes is fixed.

In the “Network connection data” window current values of the TCP/IP key parameters are viewed. When data reduction error rising, the troubleshooting procedure is fired. This program's operating results are reflected in the “Network diagnosis” window, where the list of problems is seen and recommendations on their correction are presented.

The connection ensuring can be executed by the “ping” command. This command lets validate the availability of connections with another computer on its name or IP-address. This is the primary network connection diagnosis asset. The “ping” command causes sending special packets to another computer, which, having got them, sends them back. The packet transit time and message about the packets' being lost is shown in the screen. The connections with a local area network computer and the Internet are controlled by the “ping” command.

The “ping localhost” command sends packets “to itself”, that allows checking the TCP/IP work on the local computer. The transit time should be less than 1 msec.

In the “Task manager” window, “Net” tab, the control over the network adapters' work is carried out. There is a list of network connections and their activity graphs, which define the net use intensity and its zero error capacity, here. The detailed analysis of the net adapter work presents more than twenty additional net parameters. The “ipconfig” command reflects the TCP/IP work parameters.

The “tracert” command allows tracing the path from one site to another and detecting the place, where the connection break occurred. In solving complex data processing reliability problems in the network the Windows Vista help system can explain rather extensively and deeply.

The available firewall provides protection from an unauthorized intrusion into the computer network. The firewall is realized both by hardware and software, performing the role of unauthorized users' attempt avoidance to get the access to the connected with the Internet private IP network – especially the intranet. All the messages, which don't meet the specified security criteria, coming from or entering the intranet, are stopped by the firewall. The internetwork security methods including the packet filters and application gateways are a reliable barrier for illegal requests.

The reliability is generally associated with the ideas of stability and system operational safety. It is measured as the function of time taken between failures and is denoted by the term of “Meantime between failures” (MTBF). The database integrity and the possibility of warning about the expected hardware failures are the other two reliability aspects. The SMART (Self-Monitoring, Analysis and Reporting Technology) and RAID systems guarantee the work continuity