

A BRIEF NOTE ON COPPER NANOPARTICLES AND NANOMATERIALS

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DESCRIPTION

Due to the widespread development and application of nanotechnology, special attention is paid to the metal nanoparticles, methods of obtaining nanomaterials made from them and their research. High dispersion leads to the formation of a large specific surface of metallic powders and increases the reactivity. Copper is widely used due to its high electrical conductivity and the manufacture of electronic equipment made from its alloys.

Nowadays, the current trend in the development of microelectronics and other fields gives advantages to the use of functional elements. Their size varies from 10 nm to 1 μ m. It is emphasized that the transition to Nano scale has a direct and significant impact on the functional characteristics of materials and application fields. At the same time, the fragmentation (thinning) of the structure as a result of intensive deformation must create a qualitatively new situation. This also leads to high strength and plasticity. There are various hypotheses about the properties of hardness, strength and plasticity of nanomaterials. These hypotheses are based on that the grain boundaries have certain "openness" to the movement of dislocations, the nanomaterial has a two-phase structure (grain inner crystalline and amorphous grain boundaries), these phases interact, the grain boundary slides and so on.

It is already known that the main task of Nano science and nanotechnology is the synthesis of nanostructured materials, study and use of their properties. At least one dimension of nanomaterials is expressed in nanometers. Nanostructure acts as a bridge between molecules and volume systems. Although individual nanostructures are composed of clusters, Nano crystals, Nano fibers, and nanotubes, a set of nanostructures consists of individual nanostructures with a definite arrangement, aggregates, and complex cages (super cages).

Therefore, in order to keep up with the high pace of Nano science, to use nanotechnologies and nanomaterial's at the required level, it is important that specialists trained today have extensive knowledge in this field. Numerous articles written in this field of science are serving and should serve the specialists working in various fields to know about Nano science, a number of its basic principles and material science.

Nanomaterial's have structural properties due to the presence of parameters related to both the structure as a whole and its individual elements. Since structural features, in turn, form the basis for the creation of nanomaterials, the properties of the system also significantly depends on the properties of nanomaterials. Each of the available nanomaterial is characterized by its own structure and properties. In determining the properties of nanomaterial's and Nano systems based on them, the measurement effect has a special place. This classification primarily involves the division of

nanomaterials into nanoparticles and nanostructured materials. Formation of the properties of nanoparticles and nanomaterials composed of them can lead to different results. High strength, extreme plasticity, rigidity, elasticity and other properties can be attributed to them. It should be noted that along with the increase in strength of nanomaterials, there is also an increase in plasticity. This feature of nanoparticles makes it possible to create both nanomaterials and compact nanostructured materials having high-strength, corrosion-resistance, and extreme plasticity.

It is known that the mechanical properties of materials are related to the structure associated with their methods of production. This includes pores, micro cracks, micro-stresses, structural defects, resizing of crystal grains, and so on.

Purpose of the study

The purpose of this article is to investigation of the role of grain size in the formation of properties of nanomaterials based on copper and nature of stress changes depending on the degree of deformation.

Solving the problem

The mechanical, tribotechnical, electrical and other properties of the powder compositions the components of which do not interact with each other are seriously affected by the dispersion or ratio of the dispersions of the components that make up the material. From this point of view, in order to study the effect of dispersion on the mechanical properties of the composition, it is more expedient to use copper-graphite composition, the components of which do not interact with each other and do not cause new phases in the sintering process.

Thus, the inclusion of graphite, a non-metallic material, into the charge plays a crucial role in the formation of the structure and properties of a number of powder materials. However, the inability to incorporate high amounts of graphite into the charge, and occurrence of violation of structural homogeneity after pressing and sintering, necessitate carrying out additional research in the field of preparation of powder composite material.

The presented working components are based on the researches on the development of a geometric structural model of a non-interacting copper-graphite composite material and the determination of the dispersion characteristics of the components that provide the required properties on the basis of this model. In order to determine the role of dispersion in these studies, it was considered expedient to create an ideal geometric model of the structure of copper-graphite composite material and assume that in this model the particles of both components are conditionally cubic.

Knowing that the copper-graphite composite material is a non-homogeneous plate of copper and graphite, and that the dimensions of the surfaces of copper and graphite particles on this plate depend on the dispersion ratio of the components, it is possible to confirm that the amount of load and stresses depend on the same factor.

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