Materials of Conferences

THERMODYNAMICAL PRINCIPLE OF INVESTIGATION OF PROPERTIES OF SOME REFRACTORY METALS

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Development of refractory metals leads to a technology problem of obtaining composite materials with demand of a system of physical and chemical properties. Perfection of the engineering intended for service conditions at heating in aggressive and erosive environments, supposes creation of technologies for their manufacturing.

Combination of unique properties of refractory metals [1, 2], such as high hardness and a high working temperature, became the basis for its intensive application at manufacturing of elements of flight vehicles and of details of power installations. In many industries the titan, either zirconium, or a hafnium and their alloys have an essential value. The hardness of materials decreases at the raised temperatures. Therefore there are problems of hardening of maintained details and knots of gears. Protective and strengthening covers are for this purpose intended.

For the purposes of protection of a surface and improvement of operational characteristics of refractory metals, and their alloys they are covered with protective materials [3]. Protective firm solutions increase wear resistance, strength and hardness of a surface of materials, raise their corrosion firmness, heat resistance and high-temperature strength, and thus do not weaken mechanical properties of materials.

Besides firm solutions in intermediate alloys intermetallic phases take place. Feature of intermediate phases is that they do not store crystal structure of metal, and have own crystal structure. Considerable influences on mechanical and physical properties of alloys renders an essential amount of intermediate phases, with a various chemical compound and structure.

The research problems and hypothetical purposes consist in an investigation of features of formation of covers films on the basis of metal alloy with niobium or molybdenum. Following problems according to a research subject in view should be solved:

1. To reveal temperature intervals and formation times for intermetallic phases and their radiance flux and thermal stability.

2. To investigate results of an ionic irradiation on structure of the laminas and to consider a capability of ionic modification of covers.

3. To determine the induced diffusive structural transformations into covers films on the basis of alloy, received by beam techniques.

4. To study structures of phase transformations depending on physical structure and a chemical compound of the initial basis.

5. To reveal growth rates of diffusive laminas, which are various and are determined by temperature and by time interval.

6. To investigate the processes induced by formation of covers films.

7. To establish the natural statistical laws of structural transformations in alloy in the course of a homogenizing annealing.

8. To study consecutive processes of phase transformations in alloy at annealing.

9. To compare expert evaluations of mobility of atoms in an alloy.

10. To investigate the dynamics of structure transformations on the basis of alloy of niobium or molybdenum, which depend on the basic metals of chemical elements, for example, Ti or Zr, so and from technology of their obtaining.

11. To find out the formations of alloy of Nb or Mo with a material of the basis and further in the course of an annealing formation of a layer on the basis of connections $Metal_xNb_y$ or $Metal_xMo_y$.

12. To study metastable conditions on the basis of alloy of niobium or molybdenum, arising at various heat treatments and to establish their influence on formation of a microstructure of alloy.

Hypothetically additional combinations with actuating of other components based according to the hypothetical proposal of other chemical elements, for example, C or B, can be possible.

Created structures may not be having thermodynamical stability. For obtaining a new result it is necessary to solve some of natural problems in which the thermodynamics of the laminas lies.

With influence applicative at strong action fields of force the laminas will be reformatting itself. In **the successful results** their metaphysics of laminas metaphase **may be able to stabilise**.

References

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