

ABOUT MECHANISMS OF HYDRIDES FORMATION IN SYSTEMS METAL-BORON

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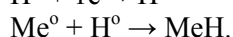
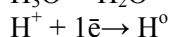
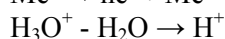
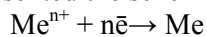
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Introduction

Electrochemical formation of hydrides can be presented the scheme:



Despite uniformity of these reactions in the presence of boron, process can be accelerated for the account of specific influence of a polycrystalline field of boron (or boron-ion) in communication by possibility of formation by boron enough the big spectrum of boron hydrides.

On the other hand, influence of boron on formation process of hydride phases Me-N can be connected with deformation of a crystal lattice of atoms of metal at boron introduction in its structure.

The question on boron condition in covering Ni-B is not absolutely solved, namely, there are no exact data about energy of interaction of structure of boron with nickel. Therefore for the decision of the mechanism of interaction of boron with structures Ni and hydrogen carrying out of additional researches is necessary, in particular, it is necessary to estimate the influence of boron not only on change of parametres of a lattice, but also to define thus the presence of relaxation processes at certain temperatures. On the other hand, absence of this information does not give possibility to make an estimation of influence of deformation of a crystal lattice of basic component Ni on formation possibility of hydride compounds of Ni-H type.

Results and discussion

The relative maintenance of boron in alloy Ni-B makes 0,5-1 %. However in recalculation on nuclear weight the parity of an alloying component increases approximately on 6-10 atm. %. It means, that on each 10-15 atoms of Ni as an introduction phase 1 atom of boron joins. In this case, in the presence of non-uniformity in distribution of a phase introductions (boron) arise non-uniform concentration of nuclear structures of the basic component with various degree of deficiency.

According to this assumption on defects with high potential energy hydrogen, forming hydride compounds with nickel will join. Besides it, on free chemical bonds the boron can attach hydrogen, changing stoichiometry of initial boron hydride. From thermodynamics positions, such transformations have high degree of probability as reactions of components in a double electric layer are caused by ultrahigh intensity of electric field, and also to local changes of the temperature, providing carrying over of a charge [Tbilisi]. According to our researches the increase in concentration of boron in an alloy leads to the sharp increase of dissolution of hydrogen in a covering for two reasons: 1) deficiency of structure owing to increase in number of microdistortions of a crystal lattice increases at increase in concentration of boron, and the probability of occurrence of structures with high value of potential, hence, grows; 2) by data of electron diffractometry researches for samples with high percentage of boron the big degree of "degradation" interference rings on electron diffraction patterns is observed, that it is possible to explain increase of degree of amorphity of structure of the sample. According to work data [Gelt] for amorphous structures the tendency to increase in degree of hydrogen absorption in comparison with crystal lattices is characteristic.

Acknowledgement of these mechanisms is the presence of metal-hydrogen compounds with very small energy of communication. Destruction of such hydrides can proceed at rather low temperatures, that in practice proves to be true kinetic researches at afterelectrolysis conditions of the samples received at electrocrystallization of Ni-B alloy.

Conclusions

The physical models of processes of the hydrogen diffusion, caused by formation of peaks of the internal friction corresponding to processes of interaction of interstitial atoms (boron, hydrogen) with metal structures on the basis of Ni and Cr are developed.