

THERMAL CONDUCTIVITY OF METAL HYDRIDES (Review)

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The use of metal hydrides (MeH_x) in various technological systems such as - thermal pumps, transformers, accumulators of heat etc., causes necessity of research of various parameters of a cycle of absorption-desorption of hydrogen and thermal characteristics of MeH_x . For an evaluation of dynamic parameters of systems with metal hydrides by one from the basic characteristic is thermal conductivity (●). Authentic knowledge of this characteristic of metal hydrides allows with an adequate accuracy to conduct thermal and designer calculations of these products and systems and to determine optimum selection of MeH_x , etc.

The purpose of the given activity is an analysis of various methods of determination ● of metal hydrides, and also analysis of effect on this characteristic MeH_x , of the various factors. It is possible to make of the information, available to authors, the following conclusions concerning methods of definition of ● of MeH_x . There are two methodologies in research of heat conduction of these materials:

- Use of conventional methods of determination of thermal conductivity of materials (the hot wire method, stationary method, etc.);
- Determination of thermal conductivity MeH_x by the solution of inverse problems of heat conduction.

In the first case, by this methodology, in basic, is determined or effective of thermal conductivity, or ● of frameworks of metal hydrides, for what are carried out preliminary removing of hydrogen at heating of an investigated material. The greatest propagation in this case was received with a stationary method of investigation of ● of MeH_x . It bases on measurement of a gradient of temperatures and determination of balance of heat fluxes in the installation. Thermal energy may be put into an installation from both an external source and as result of processes of absorption/ desorption of hydrogen.

The second methodology of determination of ● of these materials allows to determine this characteristic MeH_x due to of experimental measurements of non-stationary temperature fields with the consequent solution of inverse problems of heat conduction at use of various mathematical models of heat and mass transfer.

In the report the outcomes of research of thermal conductivity of various MeH_x are systematized.

References

1. Isayev KB, Schur DV, Study of thermophysical properties of a metal-hydrogen system, International journal of hydrogen energy, 21, 11, 1129-1132, 1996, Pergamon
2. Matysina ZA, Zaginaichenko SYu, Schur DV, Hydrogen solubility in alloys under pressure, International journal of hydrogen energy, 21, 11, 1085-1089, 1996, Pergamon
3. Schur DV, Lavrenko VA, Adejev VM, Kirjakova IE, Studies of the hydride formation mechanism in metals, International journal of hydrogen energy, 19, 3, 265-268, 1994, Elsevier
4. Matysina ZA, Pogorelova OS, Zaginaichenko SYu, Schur DV, The surface energy of crystalline CuZn and FeAl alloys, Journal of Physics and Chemistry of Solids, 56, 1, 9-14, 1995, Elsevier