# HYDROGEN IN LANTHAN-NICKEL STORE ALLOYS

Z.A.Matysina, S.Yu.Zaginaichenko, D.V.Schur, V.K.Pishuk, R.S.Biryukova

Dnepropetrovsk State University, Dnepropetrovsk, Ukraine
Institute for Problems of Material Sciences, Kiev, Ukraine

It is common knowledge that hydrides are the sources of pure hydrogen necessary for various technologies, engineering and for research purposes. The store of hydrogen in bound state are practically infinite.

The multicomponent composition of hydride systems makes possible the creation of stores with controlled content of hydrogen. The systematic study of hydrides could give new practical implementation. The lanthan-nickel systems based on $LaNi_5$ alloy hold much promise along this line. In $LaNi_5$ alloy the lanthan atoms could be partially substituted by atoms of rare-earth metals R=Nd, Pr, Sm, Er, Y, Gd and nickel atoms by atoms of metals Me=Al, Cu, Fe, Mn, Si. Such additions can stabilize the structure, increase the hydrogen absorptivity, reduce the material cost.

The theory of hydrogen solubility in alloys of D2d structure of $CaZn_5$ type ($LaNi_5$ alloy and this alloys with impurities has such structure) have been worked out in present paper. The thermodynamic potential of the system have been evaluated on the assumption that hydrogen atoms are located in interstitial sites of two types. The equilibrium state equation determined the P-T-c diagram have been found. The isothermals and isopleths of hydrogen solubility have been investigated. We have defined the parameters influenced on the character of their functional dependences, on their level, slope and non-linearity. It has been elucidated the effect of metals impurities on the run of isothermals. The possibility for hydrogen accumulation in investigated systems is accounted.

The calculation results have been compared with experimental data for hydrogen solubility in binary $LaNi_5$, $LaCu_5$, $LaCo_5$ alloys and various ternary phases of examined structure.

References

1. Schur DV, Zaginaichenko SYu, Adejev VM, Voitovich VB, Lyashenko AA, Trefilov VI, Phase transformations in titanium hydrides, International journal of hydrogen energy, 21, 11, 1121-1124, 1996, Pergamon
2. 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
3. Isayev KB, Schur DV, Study of thermophysical properties of a metal-hydrogen system, International journal of hydrogen energy, 21, 11, 1129-1132, 1996, Pergamon
4. 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
5. Matysina ZA, Zaginaichenko SYu, Schur DV, Hydrogen solubility in alloys under pressure, International journal of hydrogen energy, 21, 11, 1085-1089, 1996, Pergamon