METHODS AND DEVICES FOR MEASURING SURFACE ENERGY AND SURFACE TENSION OF METALS AND ALLOYS

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The important properties of the dividing surface between the phases are surface energy and tension, adsorption of components, structure and composition of the surface layer. The original theoretical and experimental methods to determine the structure and properties of the interphase boundaries were elaborated. The special attention is spared to studies of the specific free surface energy (f_ω) and surface tension (σ) of the dividing surfaces between the phases in heterogeneous systems when researching such processes as sintering and curing of solid's surface defects, heterogeneous catalysis and modificating metals and alloys, welding and soldering various materials, forming and growing a new phase, creation of the composite materials and so on.

Experimental measurement of f_ω and σ of solids is difficult problem. Analysis of the many experimental methods for determining f_ω and σ gives the measurement error by these methods was 10-50 %.

In this work a description of the developed by the authors new methods, allowing to measure f_ω and σ of solid metals and binary alloys are presented. The most perspective method for measuring σ of solid metals and alloys is the compensation method of zero-creep (CMZC) elaborated in Kabardino-Balkaria State University. Basing on CMZC method the special schemes and devices were elaborated and more than 10 certificates and patents were obtained by authors. By this method the ST (σ) and it's temperature coefficients for 22 metals and 4 binary alloys were measured with error about 2 %. It should be noted that ST of a several solid binary metallic systems was determined for the first time. It was revealed a mutual surface activity of the components in In-Pb and In-Tl binary systems

We consider that in physics of the interphase phenomena the actual problem is elaboration of new and more perfect methods of measuring f_ω and σ of solid metals and alloys.