

Baikov Institute of Metallurgy and Materials Science.

Activity on Phase Diagrams in 2010

New investigations of the phase diagrams

1. **Al-Cr-Sc-Zr system.** The phase equilibria in the Al-rich part of the quaternary Al-Cr-Sc-Zr system were studied. Extension of the Al solid solution area at 640, 600 and 500 °C and the solid phases in equilibrium with Al solid solution at these temperatures were established. The Al-rich partial isothermal tetrahedrons of the Al-Cr-Sc-Zr phase diagram at 640, 600 and 500 °C were constructed. (Rokhlin L.L., Bochvar N.R., Dobatkina T.V.)
2. **Mg-Sm-Tb system.** The Mg-rich part of the Mg-Sm-Tb phase diagram was studied. The boundaries of Mg solid solution at 500 and 300 °C were determined. The phase, which are in equilibrium in Mg solid solution were established. In the studied part of the system the invariant four-phase reaction of the transition type was discovered. The liquid surface, a number of the partial isothermal and polythermal sections in limits of the studied part of the Mg-Sm-Tb phase diagram were constructed. (Rokhlin L.L., Dobatkina T.V., Lukyanova E.A.)
3. **Al-Si-Mg system.** The Al part of the Al-Si-Sc phase diagram was studied. Existence of the ternary compound τ (Sc_2AlSi_2) in equilibrium with Al solid solution in the system was confirmed. The isothermal section at 550 °C and the liquidus surface of the Al-Si-Sc phase diagram were constructed. (Rokhlin L.L., Sukhanov A.V., Bochvar N.R., Tarytina I.E.)
4. **Lu-Pd system.** The Lu-Pd phase diagram in limits of 0-50 at.% Lu was studied and constructed. The studied part of the system was established to be characterized by existence of the Pd-base solid solution with solubility of 10 at.% Pd at 1000 °C and formation of several compounds between Lu and Pd, Lu_3Pd_4 , Lu_2Pd_3 , LuPd, LuPd_3 , $\text{Lu}_{10}\text{Pd}_{21}$. (Kolchugina N.B., Burchanov G.S.)

Crystal structure of the compounds

Compositions and crystal structures of the ternary compounds belonging to the $[(\text{PbSe})_5]_m[(\text{Bi}_2\text{Se}_3)_3]_n$ homological series were established. They were **$\text{Pb}_5\text{Bi}_6\text{Se}_{14}$** , **$\text{Pb}_5\text{Bi}_{12}\text{Se}_{23}$** и **$\text{Pb}_5\text{Bi}_{18}\text{Se}_{32}$** . The ternary compounds were determined to have monoclinic lattices with different parameters. (Shelimova L.E.)

Assessments

The reviews on a number of the phase diagrams in the frame of MSI Eureka were prepared. The reviewed systems are **Al-Cr-Mn**, **C-Co-W**, **C-Mo-W**, **C-Si-V**, **Co-Nb**, **Fe-Nb**, **Ir-Nb**. (Rokhlin L.L., Bochvar N.R., Dobatkina T.V., Kolchugina N.B.)