THE STUDY OF BINARY ALLOY SYSTEMS Sn-Pb AND In-Pb BY XPS

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This report presents the results of studies of the surfaces of alloys $Sn + 8,96at.\%Pb$ and $In+51at.\%Pb$ by x-ray photoelectron spectroscopy (XPS, K-Alpha systems, UK) at room temperature on a device available at the Kabardino-Balkar state University. From the obtained results it is seen that on the spectra the doublets of photoelectron peaks of the core levels of tin and lead ($Sn3d$ and $Pb4f$, $In3d$) are observed.the surface of the sample before etching is characterized by the presence of compounds of the main components of the alloy with oxygen. Observed components of hydrocarbon contamination, as evidenced by the visible peaks of $O1s$ and $C1s$ in the spectrum recorded before ion-etching.

Thus, tin on the surface of alloys of the $Sn - Pb$ system is mainly in the oxidized state in the form of tin dioxide SnO_2 (486.1 eV). But a significant part of the tin remains in the metal state (484.5 eV). Indium is also on the surface of the alloys of the $In - Pb$ system in the form of InO. These results are confirmed by the values of the Wagner parameter. If we compare these results with the results for lead, we can see that almost all lead is on the surface in a metallic, non-oxidized state. The correction of the charge displacement of the binding energy along the $C1s$ line leads to the binding energy of the basic peak $Pb4f7/2$ equal to 137.2 eV, which is in good agreement with the literature data.

By methods of ion etching of the alloy surface and XPS, we have built the profiles of the components distribution in binary alloys $Sn + 8,96at.\%Pb$ and $In + 51at.\%Pb$.

The data obtained for both alloys show that lead is adsorbed positively, which is consistent with the position of thermodynamics on the surface activity of the component in binary metal systems: the component with a smaller ST is more surface-active.

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1. Pokrovsky N. L., Pugachevich P. P., Golubev N. Ah. Study of the surface tension of the In-Pb system. //Reports of the Academy of Sciences. USSR. 1968,N1. P.80-83.
2. Demeri M., Farag M., Heasley T..Surface tension of liguidy Pb-Sn alloys. -J.Mater.Sci. 1974,v9. N4. p.683-685.