THERMAL EXPANSION INVESTIGATIONS OF Cu–Sb QUENCHED ALLOYS (24–45 Wt% Sb) FROM THE REGIONS WHERE THE β–PHASA EXISTS

G.Mavrodiev and M.Tolev

(Faculty of Physics; Skopje; Yugoslavia)

Abstract: The presented results, related to the alloys quenched from a given temperature to 0°C, confirm an remarkable structure transformation by heating of the quenched alloys, with very simillar metallographic structure at room temperature, which may be related to the egsistence of metastable phase diagram of Cu–Sb system up to 400°C.

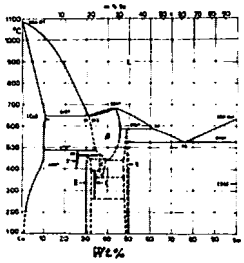


Fig.1

The phase diagram [1, 2] of mentioned composition interval (Fig.1) is characteristed with a numerous single i.e. two phase regions, as well as with very conditional borderes of them.

By previous investigations with quenched alloys (from the regions where the – phase exists) was confirmed imposibility of retaining at room temperature the β–phase structure [3–5] i.e. existence of new structures (metastable cubic and tetragonal phases [6, 7]).

On Fig.2 the plots of the Δl/l–temperature dependence for all the investigated alloys are given. They are

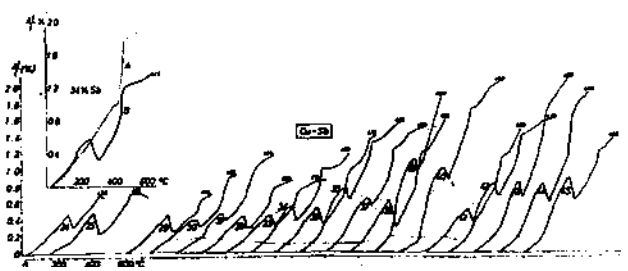


Fig.2

shifted one after another. Every curve starts on 20°C and same temperature scale is valid for every one of them. The Wt% Sb concentration in alloy is marked at each curve. At the top of each curve the temperature of quenching is given.

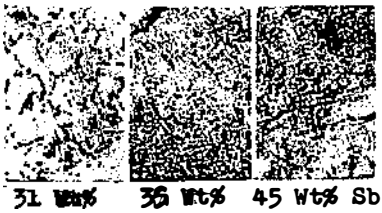
For all the curves it is very remarkable a special course, compared to that one, when the alloys are aged. It is evident from the aditional plots, inserted at the left top corner of the Fig.2, related to the alloy with 34 Wt% Sb. The plot A belong to the aged alloy 770 hours at 390°C, the plot B to the quenched alloy (445°-0°C).

From the characteristical parts of $\Delta l/l$-temperature plots (Fig.2) is evident that they depend on the alloy composition, i.e. of the peritectoid or eutectoid points (compositions) of δ, ξ, ϵ and β phase.

In the cases when the alloys are quenched from peritectoid temperature (465°C-or 445°C) and from eutectoid temperature (435°C), the courses of $\Delta l/l$-temperature plots are very simillar to those on Fig.2 (differences: near eutectoid points of ξ, ϵ an especially of β-phase 41 Wt% Sb).

By the quenching of the alloys from 420°C Fig.1. the $\Delta l/l$-temperature dependence is similar to that one of the aged alloys, except for the alloy with 41 Wt% Sb, for which a very feeble characteristical course of $\Delta l/l$ - temperature dependence exists.

The comparison of metallographic structures (Fig.3) for the pretty distanced alloys shows they are very similar. It is not the case when different thermal treatment



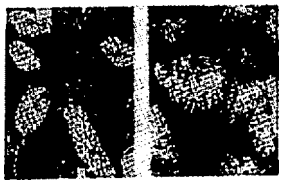
31 Wt% 36 Wt% 45 Wt% Sb

Fig.3

quenched notreated aged

Fig.4

are applied to the alloys (Fig.4). There are quite remarcable (white areas in the structure of the thermal untreated alloys (Fig.5) which is very similar to those on Fig.3.



35 Wt% Sb 42 Wt% Sb

Fig.5

C O N C L U S I O N

For whole the investigated interval (24–45 Wt% Sb) new structures are present, as it was partially pointed out from Osawa and Shibata [5], i.e. in a very large temperature interval (up tu 400°C) a metastable phase diagram would exists, the concretisation of which is of special interest for further investigations.

R E F E R E N C E S

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