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# THERMAL DILATOMETRIC ANALYSIS OF THE ALLOYS OF THE Cu-Sb SYSTEM (10 - 50 Wt % Sb)+

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Abstract: The results of the dilatometric measurements and their analysis are presented.They help to suggest more complete phase diagram in the mentioned concentration interval.

## 1. INTRODUCTION

The lack of the last phase diagram[1)] of the system Cu - Sb (Fig.1),proposed after more previous founded phase diagrams[2-4)], is the presence of unsure phase boundaries,as well as the eutectoid and peritectoid lines.

The subject of this article was to compare the phase diagram with the results of thermal dilatometric behaviour of the investigated alloys.

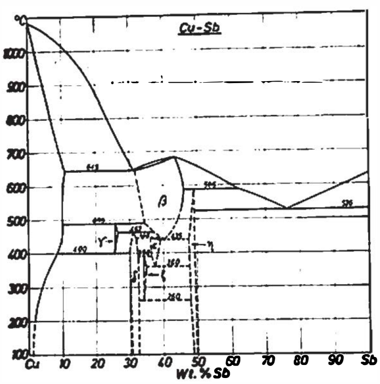


Fig.1
Phase diagram of the system Cu-Sb

## 2. EXPERIMENTAL PROCEDURE

The specimens were prepared by melting of granulated Cu and Sb metals (purity 99.99%)in graphit pot,in inert atmosphere,with inductive furnace,and formed by sucking the melted alloy in pyrex glass tube (Ø = 5mm). They ware heated to 380°C, left 770 hours at this temperature, and slowiy (48 h) cooled to the room temperature.

The maesurements of the thermal dilatation were made by electronic dilatometer "Netzsch" type 402 E; heating velocity: 5°C/min.

## 3. RESULTS AND DISCUSSION

The plots of the relative dilatation (Δl/l)-temperature

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dependence for the investigated alloys are presented on Figs. 2 and 3. The same scale is valid for each curve, when the zero of the scale is moved to the beginning of the each one. The concentrations in Wt % Sb are noted for each curve separetely.

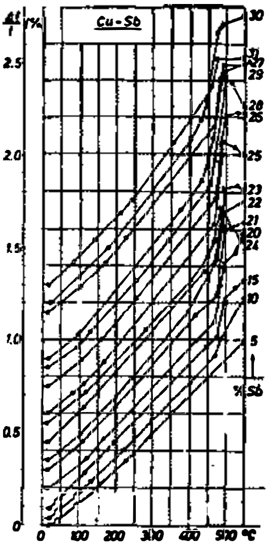


Fig.2

Temperature dependence of the relative dilatation for different alloys (10– 31 Wt % Sb)

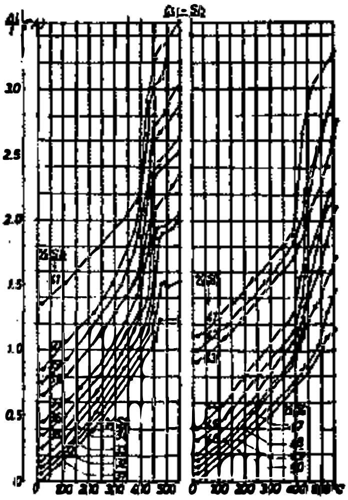

Fig.3

Temperature dependence of the relative dilatation for different alloys (31– 50 Wt % Sb)

From the values of Δl/l at chosen (corresponding) temperatures, the diagrams of Δl/l - concentration i.e. isotherms (Fig.4) are plotted.

For all the investagated alloys, the temperatures on which the change in the course of the plots Δl/l-temperature takes place, are located on the last diagram (Fig.1). In addition to such located temperatures, the probable place of eutectoid and peritectoid lines, as well as the phase boundaries are projected (Fig.5).

Comparing the projected phase diagram with the last one one can easily find that:

- There is no difference of the location of the phase boondares of $\hat{\sigma}$ and $\eta$ phases.

- The temperature interval and the region of the existence of $\zeta$ phase are extended.

- The temperature interval and the region of existence of $\gamma$ end $\epsilon$ phases are decreased.

- There are three new phases denoted by Θ, A and B. In the pretty similar concentration interval, Murakami and Schibata[5] have proposed the existence of Θ phase, but up to higher temperature. In the later ivestigations of Schubert and Ilschner[6] such a behaviour of the alloys was ascribed to different possibilities of cristalisations. They do not accept the Θ phase existence. We are not able to accept their explanation.

There are not previous propositions for the existence of the other two phases at 24 and 44 Wt % Sb.

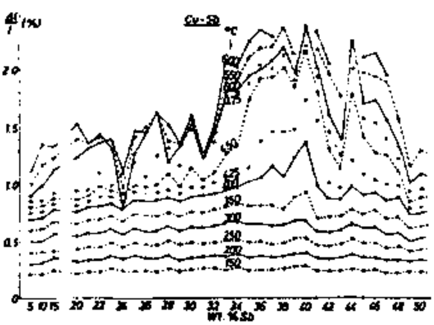

Fig.4

Dependence of Δl/l from the Wt % Sb concentration at different temperatures

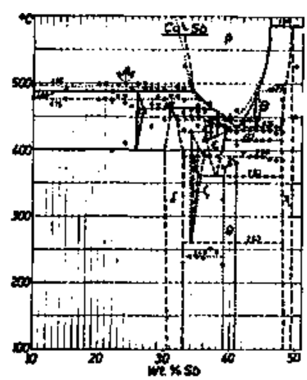

Fig.5

The suggested new phase diagram of the Cu-Sb system

4. CONCLUSION

In order to establish the new projected phase diagram, further investigations with different methods are necessary.

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The resulting data (Fig.2.) show that HMTTF-TCNQ exhibits two phase transitions at 49 ± 1 K and 43 ± 1 K.

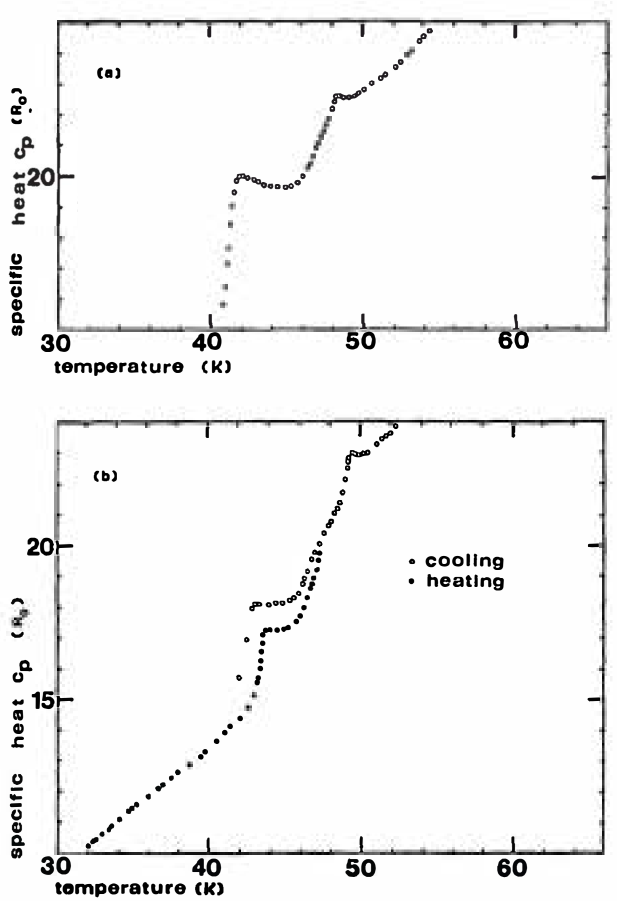


Fig.2. Specific heat data in the transition region.

(a) In the first run the points were taken in the cooling regime.

(b) In the second run besides cooling, 43 K transition region was covered in the heating regime, too. The shift of the peaks is less than uncertainty in temperature, so the question of hysteresis can't be resolved.

43 K transition is more pronounced than 49 K transition. The widths are comparable, but in detail 43 K transition appears to be almost twice wider than 49 K one. So, it seems that 49 K anomaly is an ordinary 3-D phase transition, which is supported by its sharpness, too. This interpretation contrasts, to some extent, interpretation by Megtert et al.(Ref.3.). On the other hand, our results are consistent with theoretical model for ordering in HMTTF-TCNQ developed by A.Bjeliš and S.Barišić (Ref.5.).

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