Journal of Alloys and Compounds, 186 (1992) L17–L18
JALCOM 318

Letter

The binary system Sb–Ag: a revision of the Ag_3Sb phase boundaries

P. Feschotte, F. Monachon and Ph. Durussel
Institut de Chimie Minérale et Analytique, Université de Lausanne, 3, Place du Château, CH-1005 Lausanne (Switzerland)

(Received March 20, 1992)

1. Results

In spite of numerous preliminary studies on the Ag–Sb system compiled in refs. 1–3 (Fig. 1), the range of existence of the phase Ag_3Sb as well as a possible ordering transformation at 440–450 °C remained uncertain. By means of differential thermal analysis (DTA) heating curves (5 °C min^{-1}) on 0.2 g, carefully annealed probes (25 days at 300 °C, and 15 days at 500 °C) and with X-ray powder diffraction measurements at large angles, we obtained the modified range of existence of Ag_3Sb shown in Fig. 2. Ag_3Sb is formed peritectically at 562 ± 3 °C with an initial composition containing 21.2 at.% Sb.

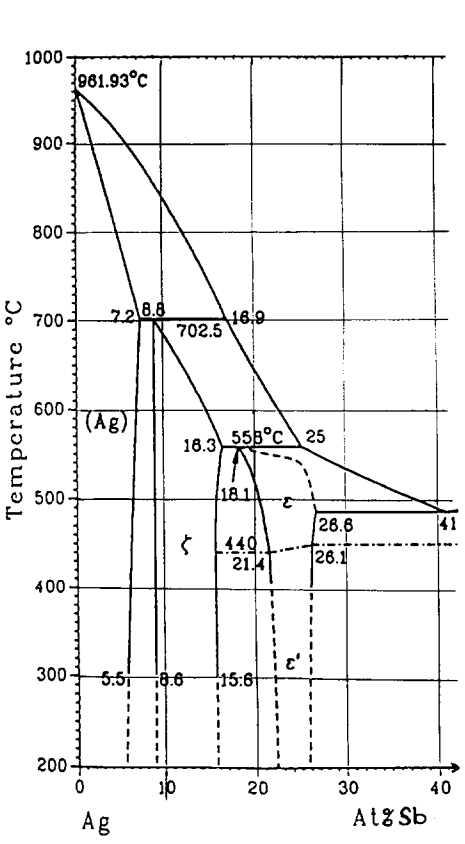
No thermal effect was observed on heating annealed specimens between 440 and 450 °C. Diffraction spectra both above and below 450 °C had identical lines and relative intensities, after rapid cooling in water.

2. Discussion

The assumption that Ag_3Sb undergoes a polymorphic transformation at 440–449 °C according to the variable composition was due to a simple thermal analysis using a millivoltmeter [4], *i.e.* in conditions indicating a rapid polymorphic transformation. No other DTA determination has been made since then.

If the supposed polymorphic transformation were connected with ordering, it is difficult to imagine why the ordered high temperature form of Ag_3Sb (quadratic deformed type $AuCu_3$) should rapidly change, giving the same diffraction diagram, without noticeable heat evolution. Our results confirm the range of existence of the hexagonal ζ phase between 8.7 and 15.5 at.% Sb at 300 °C as well as the same Ag_3Sb boundaries as given in ref. 4, namely between 21 ± 0.5 and 26 at.% Sb, a result surprisingly not taken into account

0925-8388/92/$5.00



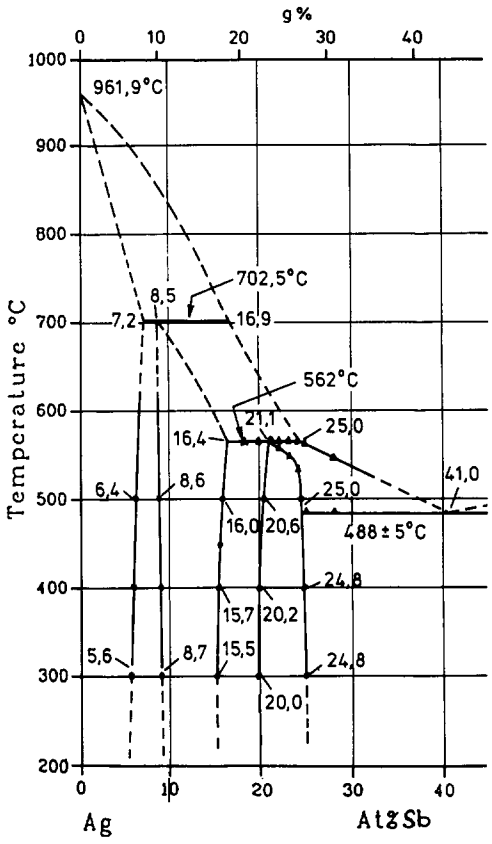


Fig. 1. Silver-rich side of the binary Ag–Sb diagram. (After ref. 3.)

Fig. 2. Our results observed by DTA and X-ray diffraction.

in their own detailed final diagram, probably because of an insufficient number of measurements.

References

1 M. Hansen, *Constitution of Binary Alloys*, 2nd edn., McGraw-Hill, New York, 1958.
2 R. P. Elliott, *Constitution of Binary Alloys*, First Supplement, 2nd edn., McGraw-Hill, New York, 1965.
3 T. B. Massalski, *Binary Alloy Phase Diagrams*, Vol. 1, American Society for Metals, Metals Park, OH, 1990, p. 89.
4 F. Weibke and I. Efinger, *Z. Elektrochem.*, *46* (2) (1940) 61–69.