Dy-Sb (Dysprosium-Antimony)

H. Okamoto

The Dy-Sb phase diagram in [Massalski2] was redrawn from [1980Mir]. [1988Fer] discussed that DySb_2 may exist in a metastable state or under high pressures in view of other rare earth-antimony systems. [2010Lon] assessed this system thermodynamically. The data of [1980Mir] were used as the phase boundary data. $\alpha\text{Dy}_4\text{Sb}_3$ was stable down to low temperatures in [1980Mir] diagram. However, [2003Mor] found that this phase becomes unstable at low temperatures (already unstable at 827 °C). This feature is reflected in the Dy-Sb phase diagram calculated by [2010Lon] (Fig. 1).

The αDySb liquidus in Fig. 1 has an unusual shape on the Sb rich end. The liquidus would cross the 100% Sb line when extrapolated to the Sb-rich side unless an extreme change of slope is introduced. The occurrence of this type of situation is thermodynamically very unlikely [1991Oka]. The original phase diagram of [1980Mir] is preferred for the liquidus shape in this range. Further experimental data are required for confirmation. Some phase boundary data are available in addition to those used by [2010Lon], but they are not useful in settling this problem: [1967Gam] reported a Dy-Sb phase diagram, but it was for the Dy-rich side only. The phase diagram reported by [1979Mir] was apparently superseded by [1980Mir].

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Fig. 1 Dy-Sb phase diagram