

Co-Cu-Fe (Cobalt-Copper-Iron)

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The previous review of this system by [1992Rag] presented three isothermal sections at 1000, 900, and 800 °C, which were constructed on the basis of the vertical sections reported in earlier studies and of assessed binary phase diagrams. An update by [2002Rag] gave an experimental isothermal section at 1310 °C, computed isothermal sections at 900 and 650 °C, and computed metastable liquid miscibility gaps between 1347 and 1227 °C. Incorporating new experimental results, [2002Bam] made a thermodynamic evaluation of this system.

Binary Systems

The Co-Cu phase diagram is a simple peritectic system with a relatively flat liquidus, indicative of the tendency for liquid immiscibility. The Co-Fe phase diagram has a very narrow solidification range. The face-centered-cubic (fcc) form of Fe (γ) forms a continuous solid solution with fcc Co over a wide range of temperature. The Cu-Fe phase diagram has no intermediate phases. A metastable liquid miscibility gap is known in this system. See [Massalski2] for the above phase diagrams.

Ternary Isothermal Section

Using starting metals of 99.99% purity, [2002Bam] arc melted 16 ternary alloy compositions in the range of 2-37 wt.% Co and 2-42 wt.% Fe. The arc-melted buttons were remelted by electromagnetic levitation, superheated by about 100 °C, and cooled by controlling the gas flow rate. The temperature was monitored continuously by an optical pyrometer. The composition of the coexisting phases was measured. A thermochemical description of the system was developed, which included ternary interaction terms for the liquid and γ phases. The computed isothermal section of [2002Bam] at 1450 °C is redrawn in Fig. 1.

References

- 1992Rag:** V. Raghavan, The Co-Cu-Fe (Cobalt-Copper-Iron) System, *Phase Diagrams of Ternary Iron Alloys. Part 6*, Indian Institute of Metals, Calcutta, 1992, p 597-599
- 2002Bam:** M. Bamberger, A. Munitz, L. Kaufman, and R. Abbaschian, Evaluation of the Stable and Metastable Co-Cu-Fe Phase Diagram, *CALPHAD*, Vol 26 (No. 3), 2002, p 375-384
- 2002Rag:** V. Raghavan, Co-Cu-Fe (Cobalt-Copper-Iron), *J. Phase Equilibria*, Vol 23 (No. 3), 2002, p 253-256

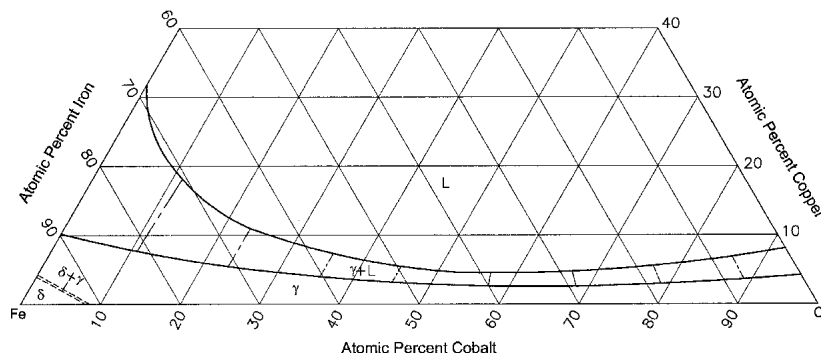


Fig. 1 Co-Cu-Fe computed isothermal section at 1450 °C [2002Bam]