

Ag-Al-Co (Silver-Aluminum-Cobalt)

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Recently, [2003Mi] determined two isothermal sections for this system at 900 and 670 °C. No ternary phases were found at these temperatures.

Al-rich side are: Co_2Al_9 ($D8_d$ -type monoclinic), CoAl_3 ($D0_{11}$, Fe_3C -type orthorhombic), and Co_2Al_5 ($D8_{11}$ -type hexagonal). On the Co-rich side, CoAl ($B2$, CsCl-type cubic) has a wide range of homogeneity from 48 to 78.5 at.% Co.

Binary Systems

The Ag-Al phase diagram [Massalski2] depicts three intermediate phases: Ag_3Al (20.5-29.8 at.% Al; denoted β , body-centered cubic), Ag_2Al (22.9-41.9 at.% Al; denoted δ , close-packed hexagonal), and μ (21-24 at.% Al, stable below 450 °C; $A13$, βMn -type cubic). In the Ag-Co system, Ag and Co are virtually immiscible in the condensed state. The Al-rich region of the Al-Co phase diagram was reinvestigated by [1996God]. Three modifications of $\text{Co}_4\text{Al}_{13}$, all occurring in a narrow range of composition between 24 and 24.7 at.% Co, were found. The high-temperature $\text{Co}_4\text{Al}_{13}(\text{HT})$ ($\text{Os}_4\text{Al}_{13}$ -type) is stable below 1127 °C and decomposes eutectoidally at 1083 °C to the orthorhombic form $\text{Co}_4\text{Al}_{13}(\text{o})$ and the monoclinic form $\text{Co}_4\text{Al}_{13}(\text{m})$. The other phases on the

Ternary Isothermal Sections

With starting metals of 99.99% Ag, 99.999% Al and 99.9% Co, [2003Mi] induction-melted about 8 alloys. The samples were annealed at 900 °C for 24 h or at 670 °C for 90 h and quenched in water. The phase equilibria were studied with x-ray powder diffraction and scanning electron microscopy. The phase compositions were measured with energy dispersive x-ray analysis or by inductively-coupled plasma optical emission spectroscopy. The isothermal sections constructed by [2003Mi] at 900 and 670 °C are shown in Fig. 1 and 2. No ternary phases were found at these temperatures. Except in $\text{Co}_4\text{Al}_{13}(\text{m})$, the solubility of Ag in the Al-Co binary phases is less than 1 at.%.

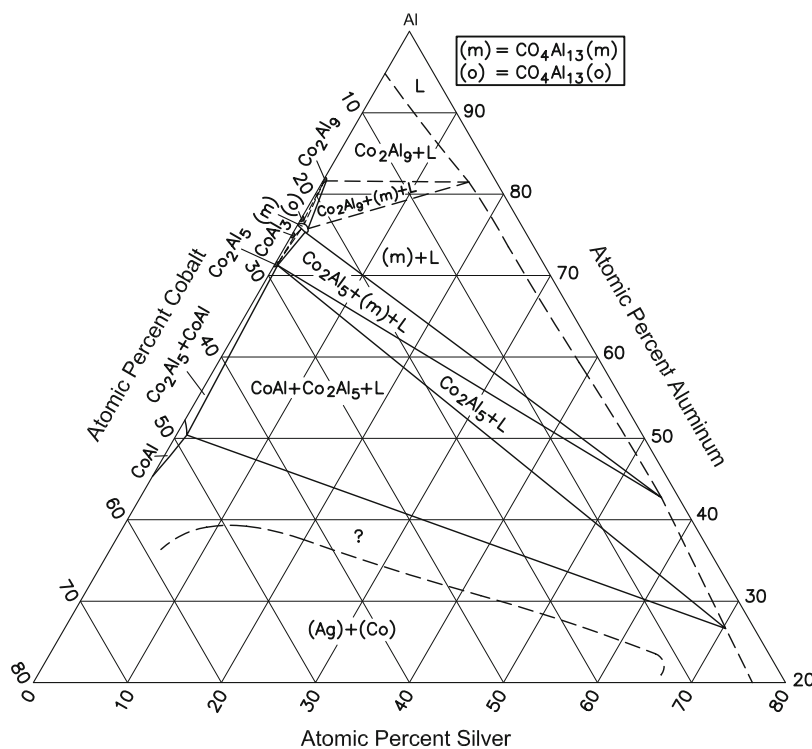


Fig. 1 Ag-Al-Co partial isothermal section at 900 °C [2003Mi]

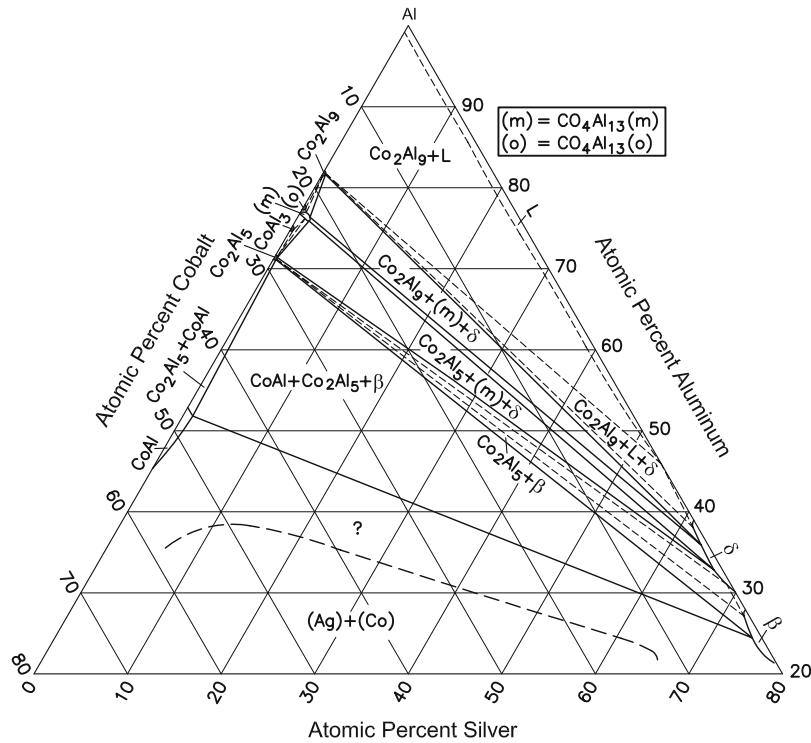


Fig. 2 Ag-Al-Co partial isothermal section at 670 °C [2003Mi]

References

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