

# Al-Co-Cr-Ni (Aluminum-Cobalt-Chromium-Nickel)

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The recent update on this quaternary system by [2006Rag] reviewed the results of [2002Bro], presenting two isothermal sections at 1000 and 900 °C and at a constant Ni content of 70 at.%. This update presents two isothermal sections determined by the same group [2006Bur] at 1100 and 1000 °C for a constant Ni content of 60 at.%.

## Lower Order Systems

In the Ni-rich alloys, the phases of interest are the face-centered cubic (fcc) solid solution (denoted  $\gamma$ ), the solid solution based on  $\text{Ni}_3\text{Al}$  ( $L1_2$ ,  $\text{CuAu}_3$ -type cubic, denoted  $\gamma'$ ), and  $\text{CoAl-NiAl}$  based CsCl-type solid solution  $B2$  (denoted  $\beta$ ). No ternary phases are known in this region.

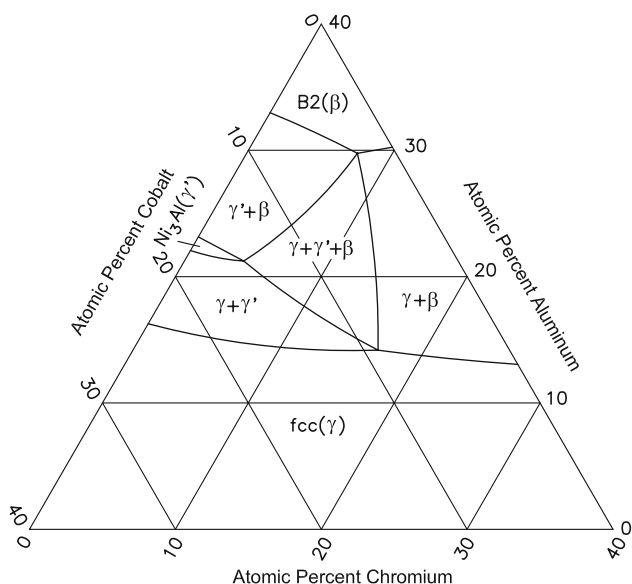
## Quaternary Phase Equilibria

With starting metals of 99.999% Al, 99.99% Co, 99.99% Cr, and 99.99% Ni, [2006Bur] induction-melted under Ar atm five quaternary alloys with Ni content approximately

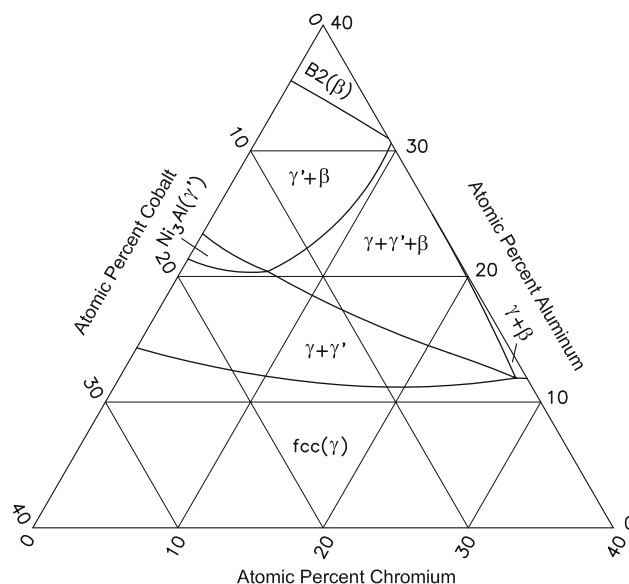
60 at.%. The alloys were annealed at 1100 °C for 10 h or at 1000 °C for 112 h and quenched in water. The phase equilibria were studied by scanning and transmission electron microscopy. Phase identification was done by selected area diffraction and phase compositions were determined with energy dispersive x-ray analysis. The phase equilibria were computed based on extrapolation of the interaction parameters of the lower order systems taken from literature. Comparison with experimental data showed good agreement. The isothermal sections at 60 at.% Ni and at 1100 and 1000 °C computed by [2006Bur] are redrawn in Fig. 1 and 2.

## References

- 2002Bro:** P. Broz, J. Bursik, and R. Picha, Theoretical and Experimental Study of the  $\gamma$  and  $\gamma'$  Equilibrium in Ni-Al-Cr-Co System, *Intermetallics*, 2002, **10**, p 635-639
- 2006Bur:** J. Bursik, P. Broz, and J. Popovic, Microstructure and Phase Equilibria in Ni-Al-Cr-Co Alloys, *Intermetallics*, 2006, **14**, p 1257-1261
- 2006Rag:** V. Raghavan, Al-Co-Cr-Ni (Aluminum-Cobalt-Chromium-Nickel), *J. Phase Equilib. Diffus.*, 2006, **27**(4), p 408-409



**Fig. 1** Al-Co-Cr-Ni computed isothermal section at 1100 °C and at 60 at.% Ni [2006Bur]



**Fig. 2** Al-Co-Cr-Ni computed isothermal section at 1000 °C and at 60 at.% Ni [2006Bur]