

Al-C-Co-Ni (Aluminum-Carbon-Cobalt-Nickel)

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Recently, [2006Mar] measured the shift in the Co_3AlC_x homogeneity region with the addition of Ni up to 3 at.% and the corresponding change in the Seebeck coefficient.

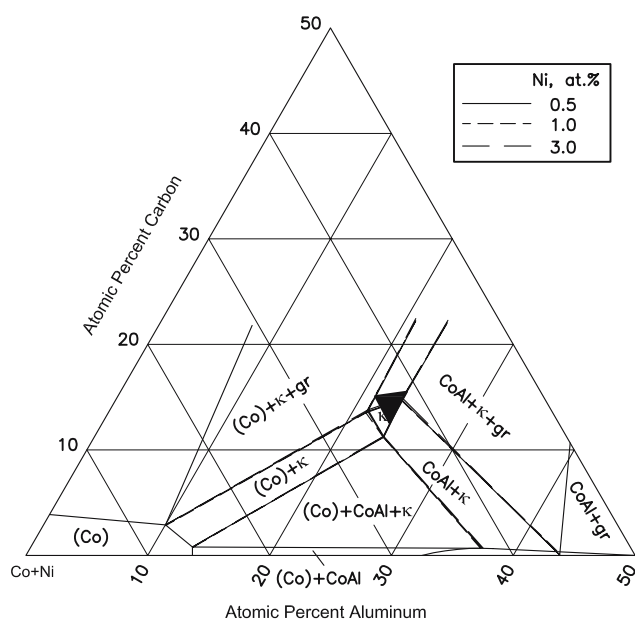


Fig. 1 Al-C-Co-Ni homogeneity range of ternary Co_3AlC_x (κ) (shaded), compared with the same in Ni-containing quaternary alloys [2006Mar]

Quaternary Phase Equilibria

An update of the Al-C-Co ternary system appears in this issue. With starting materials of high purity Co, Al_4C_3 , C, and Ni, [2006Mar] arc-melted under Ar atm three groups of four quaternary alloys each, containing 0.5, 1 and 3 at.% Ni respectively. All compositions were in the region of the Co_3AlC_x (κ) phase, with Ni substituting for Co. The alloys were annealed at 1200 °C for 72 h and furnace cooled. The phases were examined by x-ray diffraction, scanning electron metallography and energy dispersive x-ray analysis. In Fig. 1, the homogeneity region of the κ phase in the ternary alloys is compared with the region in the quaternary alloys. There is no significant shift or expansion of the κ region with the quaternary Ni addition. The region appears shifted slightly to lower C contents.

At 600 °C, the Seebeck coefficient for $\text{Co}_3\text{AlC}_{0.67}$ is 23.3 μV per K and increases slightly to 26.9 μV per K with the Ni addition.

Reference

2006Mar: T. Maruoka and R.O. Suzuki, The Phase Equilibria and Seebeck Coefficient of $(\text{Co},\text{M})_3\text{AlC}$ (M = Fe or Ni), *Mater. Trans.*, 2006, **47**(6), p 1422-1427