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# Fine scale γ´ precipitation in Haynes 214 Alloy

S. S. Babu, M. K. Miller and M. D. Rowe[†]
Metals & Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831
[†]Formerly at Haynes International, Kokomo, Indiana

The microstructural evolution in nickel base superalloys during heat treatment and weld thermal cycles are controlled by the decomposition of a γ phase to a mixture of γ and γ´ phases. The morphology and composition of the γ´ precipitates in two Ni-Cr-Al Haynes 214 alloys (Ni-26 wt.% Cr-4.5 wt.% Al-3 wt.% Fe based alloy) with minor additions Zr and B were characterized with a Local Electrode Atom Probe. Material in the solutionized condition and material that was rapidly cooling from high temperature showed the presence of fine 10-20 nm sized γ´ precipitates. The morphology of these γ´ precipitates indicates the possibility of spatial interconnection. Calculations using computational thermodynamic models indicated that these alloys will decompose rapidly on cooling below 940°C. Therefore, the microstructure evolution during solutionizing and cooling conditions are evaluated with two modes of decomposition, e.g. either with congruent ordering and spinodal decomposition or nucleation and growth of individual γ´ precipitates.