Phase compositions in Alloy 718: A comparison between APT/APFIM measurements and thermodynamic predictions

M. K. Miller and S. S. Babu
Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6376
E-mail: millermk@ornl.gov

In order to improve the properties of nickel-based superalloys, it is essential to determine the partitioning behavior of the solute additions within the microstructure. The techniques of atom probe field ion microscopy (APFIM) and atom probe tomography (APT) permit the solute partitioning and compositions of the coexisting phases to be determined with near atomic resolution in these complex engineering alloys. In Alloy 718, these techniques have revealed that the secondary precipitates have a dual nature and are combination of the DO_{22}-ordered $Ni_3(Nb+Ti)$ γ″ phase and the $L1_2$-ordered $Ni_3(Al+Ti+Nb)$ γ′ phase. The experimentally determined compositions of these phases will be compared to thermodynamic predictions.

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