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Solute distribution in TiAl alloys

D. J. Larson and M. K. Miller, Oak Ridge National Laboratory, Metals and Ceramics Division, Oak Ridge, TN, USA

In TiAl-based alloys, as in most intermetallic materials, alloying elements are added to improve various properties including strength, ductility and environmental resistance. In order to understand the alloying effects of these additions, it is essential to know their distribution throughout the alloy (i.e., phase partitioning, interfacial segregation, precipitation etc.) and whether this distribution is strongly affected by annealing. Atom probe field ion microscopy is a powerful tool with which to study elemental partitioning and interfacial segregation because it can provide structural and chemical information about the microstructure of a material at the sub-nanometer level. In addition, because the atom probe is equally sensitive to all elements, it provides a means to investigate the behavior of light elements, such as boron. Atom probe field ion microscopy has been used to investigate elemental partitioning, precipitation and segregation behavior in several TiAl-based alloys doped with a variety solutes including Cr, Nb, Ta, W, Zr, Mo, Ru, B and O.

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Contact Author:
D. J. Larson
Metals and Ceramics Division
Oak Ridge National Laboratory
Building 5500, MS 6376
P.O. Box 2008
Oak Ridge, TN 37831-6376
Phone: (423) 574-5357
Fax: (423) 574-0641
E-mail: larsondj@ornl.gov