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Co-Chairs: Jong Ning Aoh, National Chung Cheng University; Zuyan Liu, Harbin Institute of Technology

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## **The microsegregation of solute elements in a Ni-based single crystal superalloy with pulsed magnetic field**

Y. J. Li; Y. F. Teng; X. H. Feng; Y. S. Yang, Institute of Metal Research, Chinese Academy of Sciences

### **ABSTRACT**

The influences of a pulsed magnetic field (PMF) on the microsegregation of solute elements during directional solidification of a Ni-based single crystal superalloy were experimentally investigated. The results show that the PMF significantly affects the microsegregation of Al, Ti, Co, Mo, and W elements in the alloy. However, the distribution behavior differs for both positive and negative segregation elements. With the PMF, the microsegregation of negative segregation elements, Co and W, was restrained effectively, while that of positive segregation elements, Al, Ti, and Mo, was aggravated. A segregation model was established to reveal the distribution mechanism of the elements with PMF. It is considered that, under the action of PMF, the jumping of solute atoms from the liquid phase to solid phase is hindered, but the jumping of solute atoms from the solid phase into liquid phase is promoted during solidification. As a result, the effective distribution coefficient of the solute atoms is reduced, which leads to the reduction of microsegregation of negative segregation elements and aggravation of microsegregation of positive segregation elements.

**KEYWORDS:** pulsed magnetic field, segregation, superalloy, distribution coefficient