Contribution ID: **175** Type: **Poster Presentation**

Evaporation models for segregation

Tuesday, 9 July 2013 17:40 (1 hour)

Abstract content
   (Max 300 words)

The search for alloys with better material properties such as strength, wear and corrosion resistance continues to this day. In addition to these desirable properties, the search for ways to reduce production costs and time has led to a large amount of research being conducted on the processes which determines the material properties of metals and alloys. An important one of these processes is segregation. Surface segregation is commonly regarded as the redistribution of solute atoms between the surface and the bulk of the material, resulting in a solute surface concentration that is generally higher that the solute bulk concentration. To improve the interpretation of segregation data the influence of surface evaporation should be considered. In spite of the immense scientific and technological importance of evaporation, this ubiquitous phenomenon is not well understood from a fundamental point of view. Currently there are three theoretical approaches to study evaporation: Continuum Mechanics, Classical Kinetic Theory and recently Statistical Rate Theory. As part of the development of a model to simultaneously predict segregation and surface evaporation, these three evaporation models will be discussed. In addition predictions obtained from various evaporation models will be compared to experimental data of pure elemental evaporation as measured in a modified Auger system containing a quartz crystal resonator.

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Session Classification: Poster1

Track Classification: Track A - Division for Condensed Matter Physics and Materials