Yan Huang, J Material Sci Eng 2016, 5:2 (Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.011

conferenceseries.com

International Conference and Exhibition on

Materials Chemistry

March 31-April 01, 2016 Valencia, Spain

Solute effect on grain boundary migration in ultrafine/nanostructured materials

Yan Huang
Brunel University London, UK

Interactions between solute atoms and grain boundaries have strong impact on the kinetics of grain boundary migration (GBM). It has been shown that GBM rate is dependent on boundary misorientation angle, rotation axis and geometry of boundary plane because solute boundary interactions are largely determined by these boundary features. Grain size also affects GBM kinetics but the effect has been mainly related to the change in boundary curvature. The present work was conducted to investigate the effect of solute atoms on GBM in ultrafine/nanostructured materials, focusing on features of solute segregation and consequently GBM kinetics. GBM kinetics during deformation and annealing in high purity Al-Mg and Al-Cu aluminium alloys was examines and analyzed. For alloys with small amount of solute additions, boundary segregation is found heterogenous in ultrafine/nanostructured materials due to the presence of excessive grain boundaries that can accommodate solute atoms. Grain boundaries with less or without solute segregation gain extra driving pressure for migration, leading to abnormal local grain growth. This contributes to the thermal instability of ultrafine/nanostructured materials. For alloys with saturated solute additions, boundary assisted precipitation takes place and Zener pinning dominates GBM behavior. The thermal stability of the grain structure depends on the kinetics of precipitate growth. The driving pressure for GBM is inversely proportional to grain size and the influence of ultrafine/nanostructure on the thermodynamics of GBM is also discussed.

Biography

Yan Huang is currently a Lecturer in the Institute of Materials and Manufacturing, Brunel University London. He has previously worked as a Technical Director at Confae Technology Ltd. (UK) from 2004 to 2010 and as a Senior Research Fellow at the University of Manchester from 1996 to 2004. He has extensive experience in physical metallurgy of light alloys and published over 70 peer reviewed journal papers.

Yan.Huang@brunel.ac.uk

Notes: