

Society of Engineering Science 51st Annual Technical Meeting

1–3 October 2014

Purdue University, West Lafayette, Indiana, USA

Effects of solutes on migration of incoherent twin boundary in FCC metals

Mendelev, Mikhail, mendelev@ameslab.gov; Borovikov, Valery, Ames Laboratory US DOE, United States

ABSTRACT

Nanoscale twins form in many metallic materials, especially those with low stacking fault energy. Their presence can significantly enhance the strength of a material. However, Nanotwins are unstable and can be annihilated, e.g., by thermal annealing. We present the results of molecular dynamics (MD) simulations that demonstrate that additions of solutes can significantly stabilize nanotwinned structures. The MD simulations reveal that the mechanism of the solute drag on the twin boundary is associated not with the solute segregation on the incoherent twin boundary (ITB), but rather with changing of the ITB shape to accommodate as many solutes as possible.