

Strength Enhancement and Structure Design of Cu/Ni Multilayers

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Abstract:

This paper outlines the simulation of nano-frictions of Ni/Cu/Ni thin films using 2D Molecular Dynamics Simulations (MDS) and, examines the nucleation and movement of dislocations and the effects of the interface on the mechanical properties of the film. This research aims to discover the micro-mechanisms of strengthen enhancement of Cu/Ni multilayers. The results show that many dislocations are aligned along the interface or in the Cu film, agree well with T.Foecke's observations. The Cu film can absorb the strain energy during deformation, and can improve the tribological properties of Cu/Ni multilayers. The role of the interface in strength enhancement can be summarized by two parameters: wavelength and wavelength ratio between adjacent layers. For Cu/Ni multilayers, the critical wavelength is approximately 10 nm, the critical wavelength ratio is 1.

Keywords: Molecular Dynamics Simulation, interface, multilayers