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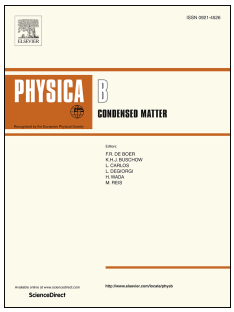

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Molecular dynamics study of plasticity in *Al-Cu* alloy nanopillar due to compressive loading

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Abstract:

In this paper, compressive loading effects on the plasticity of *Al-Cu* alloy varying the crystal orientation of *Al* and alloying element (*Cu*) percentage are investigated using molecular dynamics approach. The alloying percentage of *Cu* are varied up to 10% in <001>, <110> and <111> crystal loading direction of *Al*. Present results indicate that the alloy nanopillar has highest first yielding strength and strain along <110> and <001> direction, respectively. Further, the dislocation density and dislocation interactions are studied to explain the compressive stress-strain behavior of the alloy nanopillar.

Keywords: *Al-Cu* alloy, Nanopillar, Molecular dynamics, Compressive loading, dislocation

1. Introduction

Nanostructures of metals and alloys such as nanowire, nanoribbon, nanopillar etc. are given prodigious importance due to its wide variety of application in MEMS/NEMS[1]. In many applications, nanostructures are subjected to compressive loading and nanopillars are designed for this purpose[2,3]. Compare to traditional bulk counterpart, the nanostructure materials are more suitable to carry the compressive load due to its enhanced mechanical

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