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Abstract
This research utilizes both the nanoindentation and molecular dynamics (MD)simulation to study mechanical properties of multilayer thin films . The main content is divided into two parts: the experiment and the simulation. In the experimental part, using the atom force microscope (AFM) and Nanoindentation endures the experiments of semiconductors(Si,Ge,C)and metals (Ag、Al、Ni).There are three kinds of thin films in experiment,including single layer ,bilayer and tri-layer. The experiments focuses on different loads , load rates,hold times and fatigue influence on the physical characteristics.Young’s modulus,the hardness,elastic-plastic property and stress-strain relation of those films are discussed . In the simulation part,the molecular dynamics simulate the deposition and nanoindentation of the specimen semiconductor,The simulated parameters for includes nanoindentation loads,system temperature,load rate and hold time.The hardness,Young's modulus,the elastic-plastic behavior and the adhesive are carried out to underatand the mechanical behavior and deformation of multilayer thin films.As well,the MD results will be compared with the experimental results.Furtheremore,the mechanical characteristic of the multrlayer thin films will be revealed by nanoindentation.
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