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## Strengthening mechanisms of highly textured Cu/Co and Ag/Al nanolayers with high density twins and stacking faults

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### ABSTRACT

Metallic nanolayers have attracted increasing attention as they provide unique opportunity to investigate the influence of layer interfaces on mechanical properties of metallic nanocomposites. High strength is often achieved at small (several nm) individual layer thickness ( $h$ ). Recently, we discovered high-density stacking faults in FCC Co in highly (100) textured Cu/Co multilayers. In contrast in (111) textured Cu/Co nanolayers, Co remained its stable HCP structure at large  $h$ . The two Cu/Co systems have very different size dependent strengthening behavior. HCP Cu/Co has much greater peak strength than FCC Cu/Co. The large discrepancy in their strengthening mechanisms is discussed and compared to those of highly textured Cu/Ni multilayer systems. In another highly textured nanolayers system, Ag/Al, epitaxial interfaces were observed across various  $h$  (1–200 nm). High-density nanotwins and stacking faults appear in both Ag and Al layers, and stacking fault density in Al increases sharply with decreasing  $h$ . At smaller  $h$ , hardness of Ag/Al nanolayers increases monotonically and no softening was observed. These studies allow us to investigate the influence of layer interfaces, stacking faults and nanotwins on strengthening mechanisms of metallic nanolayers. This research is funded by DOE–OBES.