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Investigating the Role of Combined Length Scale Effect on the Mechanical Properties of Ni/Cu Multilayer Structures

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Abstract : A series of length scale engineered multilayer material with temperature robust mechanical properties has been suggested. A range of polycrystalline copper sub-layers with the thickness varying from 1 to 25μm and buried in between two nickel layers was produced using electrodeposition dual bath technique. The structure of the multilayers was characterized using Electron Backscatter Diffraction and Scanning Electron Microscope. The interface effect on the hardness and elastic modulus was tested using Nano-indentation. Results of the grain size and layer thickness measurements, and indentation hardness have been compared. It is found that there is a combined length scale effect that improves mechanical properties in Ni/Cu multilayer structures.

Keywords : nano-indentation, size effect, multilayers, electrodeposition
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