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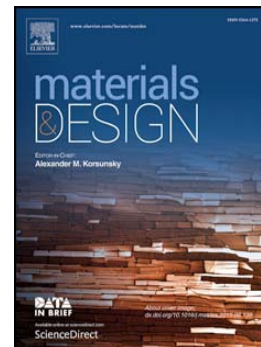
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## **Cu matrix composites reinforced with aligned carbon nanotubes: Mechanical, Electrical and Thermal Properties**

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**Abstract:** There are four technical difficulties in preparing carbon nanotubes/Cu composites: interface between carbon nanotubes/Cu, dispersion of carbon nanotubes (CNTs), densification of composites, and orientation of CNTs. Thus, Ni-Cu bilayers on Single-walled nanotubes (SWCNTs) was prepared through electroless plating to build up strong interaction between CNTs and Cu matrix. Powders were mixed through ultrasonic-assisted mechanical agitating to disperse SWCNTs homogeneously in Cu matrix. We employed hot forging to densify composite samples and Die-stretching to align SWCNTs. SWCNTs uniformly dispersed in the dense composites and aligned along stretch direction. The hardness and tensile strength increased 67.3 % and 30.4 % via the addition of 5 vol.% SWCNTs, respectively. The 5 vol.% SWCNTs/Cu composite were anisotropic in strength and conductivity. The mechanisms underlying the improved mechanical and conductive behavior were evaluated, and this research provides novel ideas and technology for the distribution and directional alignment of CNTs in the matrix.

### **1. Introduction**

Many electrical contact components such as pantograph sliders, high-voltage switches, rocket nozzle liners, and spot-welding electrodes require excellent comprehensive properties. They should be above 140HV in hardness, 320 W/mK in thermal conductivity, and 80% IACS in

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