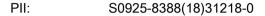
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DOI: 10.1016/j.jallcom.2018.03.341

Reference: JALCOM 45571

To appear in: Journal of Alloys and Compounds

Received Date: 5 January 2018
Revised Date: 25 March 2018
Accepted Date: 27 March 2018

Please cite this article as: P. Yang, X. You, J. Yi, D. Fang, R. Bao, T. Shen, Y. Liu, J. Tao, C. Li, S. Tan, S. Guo, Simultaneous achievement of high strength, excellent ductility, and good electrical conductivity in carbon nanotube/copper composites, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.03.341.

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ACCEPTED MANUSCRIPT

Simultaneous achievement of high strength, excellent ductility, and good electrical conductivity in carbon nanotube/copper composites

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Abstract

In this study, a novel mixing method that combines wet mixing and conventional ball milling followed by spark plasma sintering (SPS) was used to fabricate carbon nanotube (CNT)-reinforced Cu-matrix composites. The samples were characterized using scanning electron microscopy, transmission electron microscopy, Raman spectroscopy, and X-ray diffraction. In the CNT/Cu composites produced, the CNTs were uniformly dispersed whilst maintaining their integrity. Consequently, a combination of high strength, ductility, and electrical conductivity was achieved by a 2.5 vol% CNT/Cu composites (ultimate tensile strength 280 MPa, elongation 41.7%, and electrical conductivity (IACS%) 91.6%). These results could potentially be used to effectively ameliorate the issue of strength-ductility and strength-conductivity trade-offs in metal-matrix composites.

Keywords: Metal-matrix composites; Carbon nanotubes; Mechanical properties; Electrical properties.

1. Introduction

Copper is an attractive material that is used for a wide range of applications because of its excellent electrical and thermal conductivities and thermal stability. It is used in electronic devices and high-power facilities, as well as aerospace, transportation, and

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