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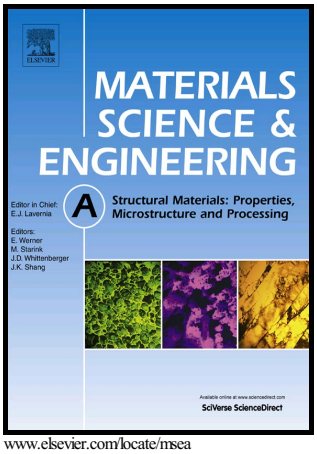

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A comprehensive analysis of mechanical characteristics of carbon nanotube-metal matrix nanocomposites

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Abstract

Founding structure-property relationships for metal matrix nanocomposites containing carbon nanotubes (CNTs) is a fundamental task for a reliable design of such new materials. An analytical model is presented to predict the elastic modulus, yield strength and ultimate tensile strength of CNT-aluminum (Al) nanocomposites. The influences of volume fraction, diameter, length, non-straight shape, coefficient of thermal expansion (CTE) and dispersion type of CNTs into the Al metal matrix on the overall mechanical behavior of nanocomposites are examined. Additionally, the effects of mechanical properties of Al matrix and temperature change on both the yield strength and ultimate tensile strength are explored. Generally, a good agreement is observed between the results of the present model and available experiment. The results obviously reveal that for a more realistic prediction in the case of ultimate tensile strength of