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Enhanced mechanical properties and viscoelastic characterizations of nanonecklace-reinforced carbon nanotube/copper composite films

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ABSTRACT

Necklace-shaped (NS) reinforced carbon nanotube/copper (CNT/Cu) composites are fabricated using the molecular-level decoration and consolidation techniques. The results show that the CNT/Cu composite with NS structures enhances the mechanical interlocking between the CNT arrays and the surrounding Cu matrix and yields a higher critical load, hardness and elastic modulus than conventional CNT-reinforced composites with a straight-shaped (SS) morphology. The mechanical properties and viscoelastic characterizations of the NS-reinforced CNT/Cu composites are examined via nanoindentation and dynamic mechanical analysis testing. It is shown that the embedded CNTs play a key role in raising the damping properties of the CNT/Cu composites by acting as a "load transfer" mechanism in releasing the excess stress within the Cu matrix.

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