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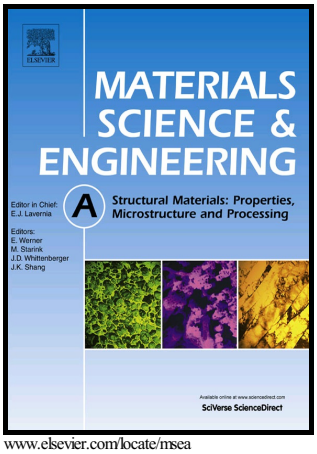

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Abstract

Unique architecture of reinforcement is explored for developing advanced metal matrix composites (MMCs). In the present study, Cu matrix composite reinforced by carbon nanofillers with reticulate structure was prepared by powder metallurgy. It was found that the high-efficiency strengthening effect was achieved by employing the hybrids of carbon nanotubes (CNTs) and reduced graphene oxide (RGO) as reinforcements in the Cu matrix. The tensile test results showed that the ultimate tensile strength of ~409 MPa was achieved in Cu matrix composite with 1.5 vol% of CNT-RGO hybrids, which is significantly higher than that reinforced with individual CNTs or RGO (~226 and ~259 MPa, respectively). Strengthening mechanisms including grain refinement, generation of dislocations by thermal mismatch, load transfer and Orowan looping system were discussed to understand the strengthening behaviors of CNT-RGO hybrids in MMCs. This work underscores the importance of interconnected architecture of reinforcements for improving mechanical properties of the composites and provides an insight to understand the strengthening behaviors of reticulate reinforcements in the composites.

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