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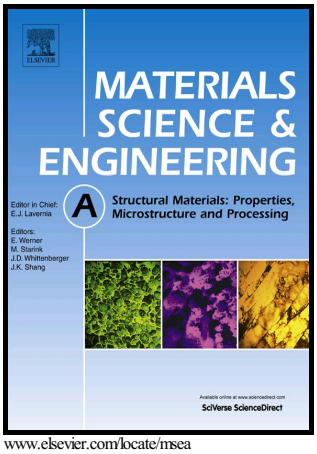

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A novel two-step mechanical milling approach and in-situ reactive synthesis to fabricate TiC/Graphene layer/Cu nanocomposites and investigation of their mechanical properties

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Abstracts

TiC-Graphene/Cu hybrid nanocomposites were fabricated from a mixture of Cu, Ti and Graphite (C) powders in three different TiC percentages (20, 40, 60 vol. %) by two-step ball milling for (8+8) h and in-situ reactive sintering. The microstructure of the synthesized composites was characterized using x-ray diffraction (XRD), scanning/ transmission electron microscopy (SEM/TEM), and mechanical properties were evaluated by microhardness and wear tests. Microstructural studies revealed that the fabricated composites were composed of a copper matrix together with the homogeneous distribution of the TiC nanoparticles and graphene layers (as un-reacted carbon) with minimal porosities. The TiC addition led to a reduction in the density of sintered composites. With the increasing of reinforcement's volume fraction, microhardness of the nanocomposites increased. Cu-40 vol. % TiC nanocomposite exhibited the