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Tribological properties of copper matrix composites reinforced with homogeneously dispersed graphene nanosheets

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Graphene reinforced copper matrix composites (Gr/Cu) were fabricated by electrostatic self-assembly and powder metallurgy. The morphology and structure of graphene oxide, graphene oxide-Cu powders and Gr/Cu composites were characterized by scanning electronic microscopy, transmission electronic microscopy, X-ray diffraction and Raman spectroscopy, respectively. The effects of graphene contents, applied loads and sliding speeds on the tribological behavior of the composites were investigated. The results indicate that the coefficient of friction of the composites decreases first and then increases with increasing the graphene content. The lowest friction coefficient is achieved in 0.3 wt% Gr/Cu composite, which decreases by 65% compared to that of pure copper. The coefficient of friction of the composite does not have significant change with increasing the applied load, however, it increases with increasing the sliding speed. The tribological mechanisms of the composite under different conditions were also investigated.

Key words: Graphene nanosheets; Copper matrix composites; Tribological properties; Microstructure

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