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Research of 3D graphene reinforced aluminum matrix composites by semisolid processing

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ABSTRACT

Graphene reinforced aluminum matrix composite is a promising material for many engineering applications due to its high strength, wearability, thermal conductivity and lightweight properties. Unfortunately, the uniform dispersion of the graphene is considered one of the big challenges since the graphene clusters tend to deteriorate the mechanical properties of the composite. In this study, a three-dimensional(3D) graphene has been synthesized by ion exchange resin and 3D graphene reinforced aluminum composite has been investigated. Compared with the 2D graphene sheets, 3D graphene can effectively prevent agglomeration, dispersed in aluminum matrix is more uniform. In addition, 3D graphene reinforced composite with localized reinforced zones within the composite was also investigated. The mechanical properties of the composites are measured by conducting a bend test, and microstructural analysis of the composite. According to the bending test and hardness test results, an enhancement in the strength is clearly observed. 3D Graphene reinforced aluminum matrix composites can be widely used in the aerospace, automotive, electronics, heat dissipation areas.