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**Preparation of graphene nanoplatelets reinforcing copper matrix composites by
electrochemical deposition**

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Abstract

An effective preparing approach of graphene-strengthening copper-based composites by a easy electrochemical deposition and atmosphere sintering is presented. The graphene-nanoplatelets/copper (GNP/Cu) powder shows homogenous dispersion of graphene in the matrix when the addition of graphene oxide (GO) is 25.0 mg/ml in the electrochemical deposited solution. The formation of the Ni decorating graphene nanoplatelets (Ni-GNP) and the oxygen-mediated Cu-O-C bond are promoted by electrochemical deposition. The crystal orientation relationship of $(\bar{1}\bar{1}\bar{1})_{Cu} // (10\bar{1}0)_{Graphene}$ and $(222)_{Ni} // (10\bar{1}0)_{Graphene}$ is observed, and the lattice misfit ϵ^* of Cu and graphene is 2.1 %. The bond strength between copper and graphene is increased by Ni-GNPs, Cu-O-C and the coherent crystal orientation relationship. Taking advantage of the GNP/Cu powders prepared by electrochemical deposition, the GNP/Cu composites with the hardness of 111.2 HV and the conductivity of 89.2 % IACS are prepared.

Key words: Copper-based composite; graphene; electrochemical deposition; bond; crystal orientation relationship

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