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ABSTRACT BOOK

258 Cu Matrix Composite with Carbonized Polydopamine as Reinforcements

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The miniaturization of electronic chips induces high power density within electronic assembly. These properties require optimum effective thermal dissipation in order to ensure the durability of these devices. New heat dissipation materials with higher thermal conductivity and tunable coefficient of thermal expansion are required to replace heat sink materials like copper and aluminum. For these reasons, metal matrix composites, with carbon as reinforcements (R), arouse interest of industrial due to their potential performances. However, the manufacturing of these materials causes engineering problems such as R repartition and orientation inside the metallic matrix (M), and optimized M-R interfacial properties. Moreover, for nano size carbon reinforcement current studies show that it is difficult to obtain materials which combine superior transport, mechanical and thermomechanical properties. 2D carbon-like composite materials appear as a new way towards the synthesis of these materials. This study deals with an innovative and green way to produce Cu/2D carbon-like (nano)composite. Actually, in order to obtain optimized M-R interface, the reinforcements were synthesized directly onto the surface of the initial Cu powder. Firstly, an ultra-thin film of polydopamine (PDA) was deposited onto the Cu particles. Secondly, optimized thermal treatment, under reductive atmosphere, was performed leading to the carbonization of the PDA film (cPDA) which could be seen as N-doped carbon-like graphene. Finally, Cu/cPDA composite powders were densified in order to form bulk Cu/cPDA materials. The synthesis parameters and the properties of the Cu/cPDA powders and the bulk Cu/cPDA nanocomposite will be described.