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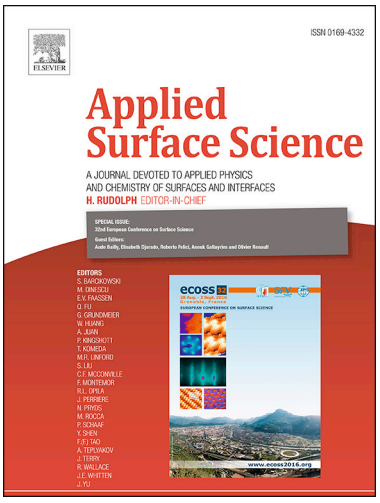

Full Length Article

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Nano-sized amorphous carbon covered surface formed by selective laser melting of ink-printed (SLM-IP) copper (Cu) nanoparticles (NPs)

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Abstract

In this paper, a nano-sized amorphous carbon covered surface was fabricated by an additive manufacturing process of selective laser melting of ink-printed (SLM-IP) copper (Cu) nanoparticles(NPs) in ambient condition. This technique synthesizes pure Cu by chemical reduction route using an organic solvent during laser melting. Additionally, the polymer in the solvent was decomposed by the thermal energy, which resulted in the formation of nano-sized amorphous carbon. Consequently, two layers of copper and carbon were fabricated on the substrate of stainless steel which was illustrated by the cross-section SEM. The upper layer of carbon possesses super-hydrophobic and high-light absorptance properties. The reaction products were characterized by the analyze of XRD, XPS and EDS. The contact angle and dynamic behavior of water droplet on the fabricated surface were carried out to demonstrate the super-hydrophobicity. The study provides an easy and flexible method for the fabrication of the functional surface by laser sintering in air ambient.

Keywords: copper, amorphous carbon, nano-particles, selective laser melting, super-hydrophobic