

Synthesis and evaluation of antimicrobial effects of silver/copper/graphene oxide composite

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In recent years, there have been a lot of problems associated with bacteria, especially super bacteria, which have a strong resistance against antibiotics. They are currently considered to be an urgent global issue due to the lack of effective treatments. Graphene oxide (GO), a two-dimensional carbon material, displayed inhibition effects of bacterial growth on its surface. The inhibition effect was demonstrated on GO nanowalls with both Gram-positive and Gram-negative bacteria. In addition, metal nanoparticles such as copper and silver have also well known as antibacterial agents for centuries. Herein, we successfully synthesized silver and copper nanoparticles supported onto GO surface (Ag/Cu/GO) by an effective chemical reduction method and demonstrated the antimicrobial effects against several species of bacteria. Ag/Cu/GO composite was characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), and energy dispersive X-ray spectroscopy (EDS). We showed its antibacterial activity towards *Escherichia coli*, *Methylobacterium sp.*, *Sphingomonas sp.*