Development Of Surface Enhanced Graphene Oxide For Ubiquitous Antibacterial Coatings

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Technology description

Background

Adhesion of bacteria to surfaces of human tissue, biomaterials and medical devices significantly increases the risk of infection in patients. Graphene oxide (GO) materials have demonstrated antibacterial properties across a spectrum of bacteria. However, the most proximal structure activity relationships that lead to antibacterial effects in GO are still elusive. Moreover, most of the reported GO materials exhibit antibacterial effects of only modest severity. A deeper understanding of the specific functional groups that explain the antibacterial effects of GO is crucial for developing an improved GO formulation to enhance the antibacterial effects for clinically important material surfaces.

Innovation

UCLA researchers in the Department of Medicine have developed a novel GO based material with significantly enhanced antibacterial effects. They identified carbon radicals (•C) as the key functionality to GO-induced antibacterial effects. To maximize the surface display of carbon radicals, hydrated GO (hGO) is coated on silicone or glass surfaces with a special method that allows direct contact of carbon radicals with bacterial surfaces. The bacterial killing efficiency exhibited by hGO is of a 10-fold increase over pristine GO. Moreover, the immobilization of the functionalized hGO on glass or silicone surfaces allowed the material to repel antibiotic-resistant bacteria by direct physicochemical interaction and damage to bacterial membranes, which was not seen under traditional resistance mechanisms.

Application area

Medical device coating

Antibacterial additives to biomaterials

Biosensors surface coating

Wound treatment

Water filtration

Advantages

Increased antibacterial efficacy
Effective against antibiotic-resistant bacteria
Efficient surface coating

Institution

University of California, Los Angeles

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com