

COMPOSITIONS AND METHODS FOR PREPARATION OF COMPOSITE POLYMER FILMS ON NON-CONDUCTING SUBSTRATES, INCLUDING BANDAGES, AND THEIR USE FOR TREATING WOUNDS

Published date: Oct. 11, 2019

Technology description

Unmet Need

Infections are a devastating complication and major impediment to the success of implanted medical devices such as orthopedic prostheses and cardiac implantable electrophysiological devices (CIEDs). Specifically, prosthetic joint infection is one of the most difficult complications of total knee and hip replacement surgery. The current standard of care utilizes perioperative prophylactic antibiotics, but as many as 20,000 post-arthroplasty infections occur in the U.S each year. Moreover, the percentage of CIED infections is rising faster than expected when compared to the number of CIED implants. The root of these infections stems from bacterial colonization as a result of adherence and colonization of the implanted medical devices resulting in biofilm formation. These biofilms serve to protect the bacteria from immune responses as well as decrease their susceptibility to antibiotic treatment. Therefore, there is a need in the field to minimize biofilm formation on medical devices to prevent these infections.

Technology Overview

The inventors have developed an electrospun composite coating comprised of polymer nanofibers to locally co-deliver combinatorial antibiotics from the medical implant surface. The kinetics of antibiotic release can be adjusted by loading each drug into different polymers or by varying the polymer ratios. In a mouse-model with an orthopaedic-implant infection, three different combinations of antibiotic loaded coatings were highly effective in preventing infection of the bone/joint tissue and implant biofilm formation. Additionally, the inventors emphasize the biocompatibility with enhanced osseointegration.

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