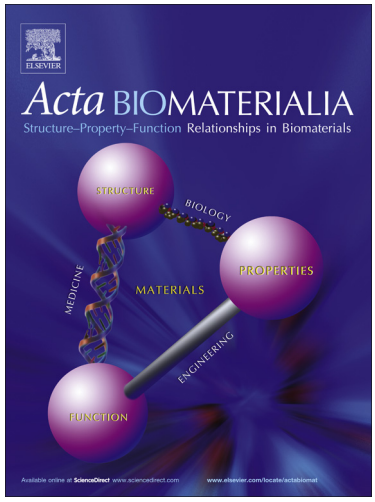

Full length article

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Electrofabrication of Functional Materials: Chloramine-based Antimicrobial Film for Infectious Wound Treatment

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Abstract

Electrical signals can be imposed with exquisite spatiotemporal control and provide exciting opportunities to create structure and confer function. Here, we report the use of electrical signals to program the fabrication of a chloramine wound dressing with high antimicrobial activity. This method involves two electrofabrication steps: (i) a cathodic electrodeposition of an aminopolysaccharide chitosan triggered by a localized region of high pH; and (ii) an anodic chlorination of the deposited film in the presence of chloride. This electrofabrication process is completed within several minutes and the chlorinated chitosan can be peeled from the electrode to yield a free-standing film. The presence of active N-Cl species in this electrofabricated film was confirmed with chlorination occurring first on the amine groups and then on the amide groups when large anodic charges were used. Electrofabrication is quantitatively controllable as the cathodic input controls film growth during deposition and the anodic input controls film chlorination.

In vitro studies demonstrate that the chlorinated chitosan film has antimicrobial activities that depend on the chlorination degree. *In vivo* studies with a MRSA infected wound healing model indicate that the chlorinated chitosan film inhibited