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Conductive Nanofiber Composite Fabric Biosensor and Method for its Fabrication (2020-066)

Biosensor that will be used as a point of care diagnostic to monitor infections in chronic wounds and monitor bacterial growth

Market Overview

This biosensor provides a means for rapid, sensitive, and specific detection of bacterial strains at the point of care. It is capable of detecting pathogenic bacteria through an impedance method by tracking the phase and magnitude response from a generated sinusoidal signal. Current approaches to infection assessment rely on imaging technologies or swab cultures, which are effective but expensive in time and personnel costs. Additionally, assessment in a clinical setting is subjective and highly based on skill level of the clinician. This creates the need to develop a technology that facilitates improving patient outcomes and limiting medical costs. The global biosensors market is expected to reach $36 million by 2027, growing at a CAGR of 7.9%. In this high demand market environment, Clemson University researchers have created a method to produce nanofiber-based impedance and electrochemical biosensors that can be tuned to specific bacterial species and quantification that can be accomplished to provide information about current state as well as growth rate.

Technical Summary

This technology includes a method to produce nanofiber-based impedance and electrochemical biosensors. It is capable of producing biosensors that can detect pyocyanin from pseudomonas aeruginosa, potassium ferricyanide, and methylene blue. Solution blow spinning of nanofibers is used to develop conductive electrical nanofibers and provide dielectric substrate for the biosensor electrodes. Carbon nanotubes have been used as a conductive filler material to generate conductive nanofiber mats.

Application

Biosensor, Wound Healing

Development Stage

Proof of Concept

Advantages

- Has the ability to monitor bacteria growth with a wearable application
- Can utilize solution blow spinning to incorporate nanoparticles for antimicrobial and antioxidive properties
- Allows not only for the detection of bacteria, but also any precursors that can predict an infection not mature yet

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
N/A	United States	N/A	N/A	2020-066	Dr. Jordon Gilmore

About the Inventors

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Dr. Jordon Gilmore received his Ph.D. in Bioengineering from Clemson University in 2015. Before returning to Clemson University as an assistant professor, Gilmore worked at the Multiscale Manufacturing Lab. His research interests include orthopedic tissue engineering, biomedical textiles, bioinstrumentation and control engineering.

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