Disposable Impedance Biosensor for Cell Manufacturing

The developed biosensor for cell manufacturing yields a more accurate product, by wireless monitoring and control within the flow of the manufacturing system itself.

Inventors at Georgia Tech propose a method that may leverage the latest printed electronics (PE) technology to design, fabricate, and test a platform to monitor cell culture conditions in bioreactors. The method intends to integrate a wireless sensor platform into existing bioreactors via aerosol jet printing. The proposed project will use capacitive cell density sensors and resistive temperature sensors as markers to validate sensor accuracy and demonstrate the wireless data collection function. Theoretically, this platform technology would be compatible with any type of capacitive or resistive sensors that provide in-line, continuous monitoring of various culture attributes.

Summary Bullets

- **Multi-point measurements**- provide tempo-spatial profiles of culture attributes and can print a wide range of conductive and insulating materials on both rigid and flexible substrates with non-planar surfaces
- **Wireless** - collects the signal wirelessly via printed antennas to simplify the integration to different types of existing bioreactor technologies
- **Safe** - system does not apply contact, and minimizes any chance of harm or contamination to affect the cell culture

Solution Advantages

- **Multi-point measurements**- provide tempo-spatial profiles of culture attributes and can print a wide range of conductive and insulating materials on both rigid and flexible substrates with non-planar surfaces
- **Wireless** - collects the signal wirelessly via printed antennas to simplify the integration to different types of existing bioreactor technologies
- **Safe** - system does not apply contact, and minimizes any chance of harm or contamination to affect the cell culture
- **Versatile** - compatible with different types of sensors that detect as many as possible critical quality attributes

Potential Commercial Applications

- Cell therapy manufacturing
- Synthetic biology development

Background and More Information

Cell manufacturing is a sector of bioengineering geared towards delivering accurate and safe therapeutics in cell therapy. In existing processes, manufacturing components of the cell is a non-standardized process and often yields in an inefficient downstream process with long wait times for completed products. Additionally, it is often difficult to perform quality control on a process without standard and reliable benchmarks. To expedite the manufacturing process, a cost-effective solution for acquiring information inside large bioreactors is a pressing need for cell growth process monitoring and control.

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