MORGAN STATE UNIVERSITY
DIVISION OF RESEARCH AND ECONOMIC DEVELOPMENT
OFFICE OF TECHNOLOGY TRANSFER

Executive Summary

Nanoscale Scanning Electrochemical Microscopy (SECM) Electrode

Innovation

A novel method has been established for increasing spatial resolution of aptamer-based electrochemical sensing of target molecules from live cells using nanoscale electrodes as Scanning Electrochemical Microscopy **(**SECM) probes. This approach will also enable the mapping of a broad range of specific target molecules released from single cell surfaces with very high spatial resolutions which cannot be realized with the state-of-the-art ultra-microelectrodes. SECM electrodes with metallic nanowires, such as gold and platinum, were grown from tapered sharp tungsten electrodes using the Directed Electrochemical Nanowire Assembly (DENA) method. The nano-size tips of the fabricated DENA nanowire electrodes will enable high resolution detection of target molecules from a single cell surface, and this method will lead to the cost-effective fabrication of aptamer based nanoelectrodes as minimal quantities of noble metals will be used in their salt forms.

Market Need

The global single cell analysis market size is expected to reach $5.9 billion by 2025, according to a report by Grand View Research, Inc. The global single cell analysis market size was valued at $1.4 billion in 2016 and is likely to expand at a compound annual growth rate (CAGR) of 17.3% over the forecast period. Widening applications of single cell analysis in genomics, transcriptomic, proteomics, and epigenetic studies are anticipated to propel market growth. Another potential entry point is in the global liquid analytical instrument market size, which was valued at $395 million in 2017 and is anticipated to expand at a CAGR of 5.5% from 2018 to 2025. Increasing demand for liquid analyzers that lower processing costs and reduce non-compliant waste is expected to drive the market over the forecast period.

Intellectual Property

U.S. Patent Application No. 16/857,821 was submitted in April 2020.

Stage of Development

The apparent demand covers the nanoscale electrode itself, which can be incorporated into larger off-the-shelf systems, but a rough version of a larger system has been devised, effectively integrating the sensor itself to be used for multiple applications. The PI and his team have already produced over two dozen probes and are working towards enabling reproducible and large-scale assembly of a nanowire/insulator configuration, which may be marketed as a nanoscale electrode for multiple applications, or as part of a larger system.

Technology Transfer Opportunity

Both commercial entities and research institutions can benefit from the rollout of a single product or larger system. A licensee can take advantage of a customer base in one or more market verticals.

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Field(s) of Use

- Electro-chemical sensing
- Biotechnology

Key Words

- Electrode
- Single cell analysis
- Nanowire

Advantages

- Improved resolution
- Wider mapping of target molecules

Status

Patent Pending

Links

Inventor Bio
Patent Application

Reference Number:

IPD # 077/2019

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