TECHNOLOGY

Analyte Sensor Device and miniaturized Gel Holders, Methods and Systems Utilizing the Same

OVERVIEW

Bioavailable metal ions (e.g. Cu2+, Zn2+) are essential nutrient required for the normal, healthy growth of plants, animals, and humans. Careful monitoring of these ions is often deployed to gauge levels within the environment to ensure safety as well as functionally adequate concentrations for economical utility. To quickly and easily monitor metal ions within an aqueous solution, a UMB inventor has developed novel fiber optic sensors (fluorescence/photoluminescence-based) that can determine analytes at low concentrations in real-time. In particular, the fiber optic sensors would be useful for the detection of ions in the environment (water tables, agricultural soils) and medical use (cerebrospinal fluids). Current methods of ion detection are time consuming, laborious, and expensive due to the requirement of large samples and specialized skills and equipment. The present invention however is simple to implement without the need for specialized training, low-cost in shipping due to the minute size of sensors, does not require processing, and measurements are taken quickly for high throughput of data. This invention is application for any process that may require the determination of free metal ions in pre-collected samples, with direct and practical implications for research studies focused in key areas such as nutrition and environmental.

APPLICATIONS

This invention has broad scientific implications including the monitoring of plant and animal health, crop production, water and soil contaminant (e.g. mining, flooding, runoffs), heavy metal leeching (e.g. drinking water), nutrition, and medical as well as basic research. Though current methods exist for metal ion detection, this invention supercede the limitations of time, cost, and labor required of more tradition methods due to the small size, portability, ease of use, sensitivity, and low-cost. A specific example for the utility of this invention is the detection of zinc ions, an essential micronutrient that has a major effect on crop production worldwide. Losses of yield of 40% or more in many zinc deficient soils have a major economic impact on the farmer due to the reduced income as a result of lost yield. Current methods of sample testing require large (10-50 liters) that must be shipped to specialized laboratories to be analyzed by skilled technicians to be processed and analyzed (e.g. stripping voltammetry). With the world population continuing to expand and the problems of producing extra food to provide an adequate standard of nutrition for this growing population, it is very important that any losses in production from a cause so easily corrected as zinc deficiency are prevented. With specific levels of metal ions important for safety and proper physiological functions, the introduction of an easy and economical tool would be highly favorable.

ADVANTAGES

-Offers a novel approach with increased sensitivity to determine free metal ion concentrations in finite samples. -The minute size of the sampling equipment combined with the reduced sample size provides portability, greater time efficiency, and ease of use which translates to a low-cost alternative to current methods. -Broad applicability allows for use in research, medical procedures, safety checks, environmental sampling, farming, etc.

STAGE OF DEVELOPMENT

Proof of concept validated.

R&D REQUIRED

More research and development is needed to develop final commercial product

- MEW

LICENSING POTENTIAL

UMB seeks to develop and commercialize via an exclusive or non-exclusive license agreement and/or sponsored research with a company active in the area.

CONTACT INFO

Office of Technology Transfer
620 W Lexington St., 4th Floor
Baltimore, MD 21201
Email: ott@umaryland.edu
Phone: (410) 706-2380

Additional Information

INSTITUTION

University of Maryland, Baltimore

PATENT STATUS

US Patent Application 8,038,947 issued 10/18/2011, filed 4/9/2008.

CATEGORIES

- Devices

INVESTIGATOR(S)

Richard Thompson

ATTACHMENTS

- Download RT-2007-027 - Technology Summary.pdf

EXTERNAL RESOURCES

- Determination of picomolar concentrations of metal ions using fluorescence anisotropy...
- Expanded dynamic range of free zinc ion determination by fluorescence anisotropy.
- Selectivity and sensitivity of fluorescence lifetime-based metal ion biosensing using a carbonic...
- Instrumentation for fluorescence-based fiber optic biosensors.

RT-2007-027