



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

Summary

This technology is a miniature, gel-filled, fluorescence-based biosensor for the detection of free metal ions in aqueous media.

Key Investigator

Richard Thompson

Field

Diagnostic sensor

Technology

biosensor

Technology Status

Proof of Concept, validated

Status

Available for licensing
Available for sponsored
research

Patent Status

US Patent issued 8,038,947,
issued 10/18/2011

UMB Docket Reference

RT-2007-027

External Reference

[Anal Chem. 1998 Nov. 15;70\(22\): 4717-23](#)

[Anal Chem. 1998 May 1;70\(9\): 1749-54](#)

[Anal Chem. 1999 Feb 1;71\(1\): 185-95](#)

[Methods Enzymol 2008; 450: 311-37](#)

Market

Biosensors have a broad scientific implication including the monitoring of plant and animal health, crop production, water and soil contaminant (e.g. mining, flooding, runoffs), heavy metal leaching (e.g. drinking water), nutrition, and medical as well as basic research. Bioavailable metal ions (e.g. Cu^{2+} , Zn^{2+}) 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. Losses of yield of 40% or more in many zinc deficient soils have a major economic impact. 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.

Technology

This technology is a novel fiber optic sensors (fluorescence/photoluminescence-based) that can determine analytes at low concentrations in real-time. This 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. This 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. An 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.

Advantages

- Novel approach with increased sensitivity to determine free metal ion concentrations in finite samples.
- Minute size of the sampling equipment and sample size provides portability, greater time efficiency, ease of use and is low-cost
- Broad applicability allows for use in research, medical procedures, safety checks, environmental sampling, farming, etc.