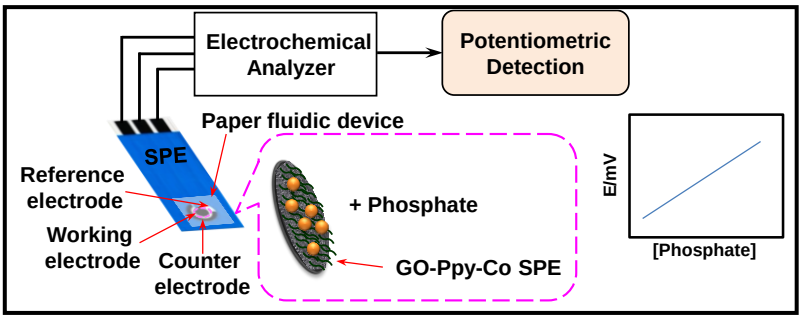
Technology Overview

Disposable, Digital Phosphate Sensor

OTT ID - 1513

TECHNOLOGY

Inventors at UW-Milwaukee (UWM) have developed a highly sensitive, digital, graphene based electrochemical sensor for the detection of phosphate in water. The sensor is designed to detect phosphate levels as low as 10^{-10} M (mol/L) using layers of graphene oxide, polypyrrole and metal. It is specific and can avoid interference from potassium chloride present in the solution.



Phosphate is a well-known contaminant of water which in excess leads to eutrophication, or an excess of nutrients in the water. The UWM phosphate sensor is easier to use and more sensitive compared to other reported devices, many of which focus on a colorimetric assay. It uses a simple digital potential readout through a voltmeter rather than voltammic stripping. The system can be hand held for mobility or mounted as a semi-permanent device. Positive test results have shown that, this device can provide an accurate and inexpensive alternative to the current products on the market.

FEATURES AND BENEFITS

- **Highly Sensitive** – Detects phosphate levels as low as 10^{-10} M (mol/L), several orders of magnitude lower than other devices
- **Low Cost** – The material used are readily available and only a voltmeter is needed for detection
- **Disposable and Easy-to-Use**– Sensors can be fabricated for one time use for quick and easy set-up. Can be hand held or mounted.
- **Pre-Calibrated and Quick** – Sensors can be supplied pre-calibrated that can save time
- **Multiple Applications** – Residential, industrial, environmental, governmental and research use

INTELLECTUAL PROPERTY

- PCT Filed Oct. 2018, PCT/US2018/046322

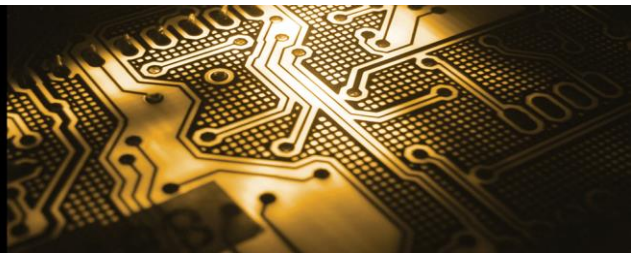
This technology is part of an active and ongoing research program at UWM and is available for developmental research support and/or licensing under non-exclusive terms.

MARKET POTENTIAL

Drinking water treatments, Waste water treatments, Aquaculture operations, Aquariums, Analytical and Pharmaceutical laboratories, Fertilizers industry

UWM RESEARCH FOUNDATION

Technology Overview



CURRENT DEMANDS AND MARKET NEEDS

Many states have bans on the use or sale of phosphorus, and the EPA is working to develop total phosphorus limits. Reliable phosphate sensors could be utilized by government agencies, drinking water and wastewater treatment facilities, aquaculture operations, greenhouses, aquariums, environmental groups, and researchers.

Major causes of phosphates from humans include partially treated or untreated sewage, runoff rom agricultural sites, and application of lawn fertilizers. Eutrophication of bodies of water can lead to an imbalance in the nutrient and material cycling process and reduced stability of the ecosystem.

The global market for water analysis instrumentation is projected to reach $3.6 billion by 2020. Water analysis is critical in residential, commercial, and industrial sectors

LEAD INVENTOR

Dr. Woo-Jin Chang is currently an Associate Professor of Mechanical Engineering at the University of Wisconsin-Milwaukee. He holds a Ph.D. in Biological Engineering from Inha University (Republic of Korea). Dr. Chang has multiple research interests including biosensors, BioMEMS and microfluidic device development, field effect transistor (FET) biosensors, microfluidic aqueous two-phase extraction systems and microfluidic cell culture and monitoring.

For further information please contact:

Smruti Patil, PhD, IPMM
Licensing Associate
UWM Research Foundation
1440 East North Avenue
Milwaukee, WI 53202
Tel: 414-906-4657
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