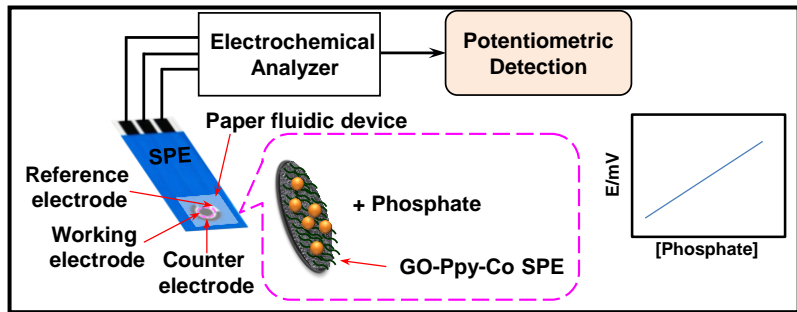


## Phosphate Sensor

OTT ID #1513

### TECHNOLOGY

Our inventors have developed a highly sensitive electrochemical sensor for the detection of phosphate in water. The sensor can detect phosphate as low as  $10^{-10}$  M (mol/L) using layers of graphene oxide, polypyrrole, and metal. This sensor is also specific, avoiding interference from potassium chloride present in a 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 voltammetric stripping. The system can be hand held for mobility or mounted as a semi-permanent device. This device can provide an accurate and inexpensive alternative to the current products on the market.

### FEATURES/BENEFITS

- **Sensitive** – Detects as low as  $10^{-10}$  M (mol/L), several orders of magnitude lower than other devices
- **Inexpensive** – Only a voltmeter is needed for detection and the materials used are readily available
- **Disposable** – Sensors can be fabricated for one time use for quick and easy set-up
- **Pre-Calibrated** – Sensors can be supplied pre-calibrated and are easy to use
- **Multiple Applications** – Residential, industrial, environmental, governmental and research use

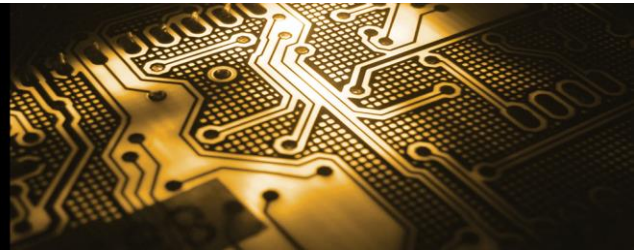
### INTELLECTUAL PROPERTY

US Provisional Patent Application Pending

This technology is part of an active and ongoing research program and is seeking partners for development of the final product. It is available for developmental research support/licensing.



## Technology Overview



### MARKETS

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. 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.

Major causes of phosphates from humans include partially treated or untreated sewage, runoff from 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.

### 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.

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