

Ultra-Sensitive Polybrominated Diphenyl Ether (PBDE) Detector

Tech ID: 30257 / UC Case 2018-242-0

BACKGROUND

Polybrominated diphenyl ethers (PBDEs) are a common brominated flame retardant, which are commonly found in consumer products. Because they are not chemically bound to polymers, PBDEs are blended in during formation and have the ability to migrate from products into the environment. Studies suggest that PBDEs pose potential health risks such as hormone disruptors, adverse neurobehavioral toxins and reproductive or developmental effects. For this reason it is important to have the capability to sense the presence of PBDEs even in low concentrations.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have Invented a highly sensitive nanostructured thin-film detector capable of identifying low concentrations (nano-molar) of Polybrominated diphenyl ethers (PBDEs) in aqueous solution. The invention utilizes a colloidal metasurface platform to carry out surface enhanced Raman spectroscopy in a small confined volume but over a large area. The metasurface is fabricated using an elastomer stamp that is coated with a monolayer of Ag nanocubes. This stamp can then be applied onto a gold or metallized surface containing the desired analyte to form a sandwich-type structure, encapsulating the analyte in the highly absorbing optical cavity of the metasurface. Following exposure of the sensor to a solution of interest, SERS measurements are taken using a 785 nm laser.

APPLICATIONS

The following applications include:

- ▶ PBDE sensor for drinking water and breast milk.
- ▶ Chemical sensor for oil refinery waste water and for halogenated soil contaminants

ADVANTAGES

The disclosed PDBE senor has the benefit of realizing orders of magnitude better signal-to-noise enhancements as compared to commercially available SERS based sensors. This improvement is due to the unique colloidal nanoparticles used in the fabrication process. The platform also provides a molecule-specific vibrational signature via the collection of Raman scattered photons.

STATE OF DEVELOPMENT

A working prototype of the invention has been realized.

INTELLECTUAL PROPERTY INFO

The invention is patent pending and available to license

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20190323967	10/24/2019	2018-242

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OTHER INFORMATION

KEYWORDS

PBDE, water quality, environmental

sensing, nano-materials, Surface

Enhanced Raman Spectroscopy

CATEGORIZED AS

- ▶ **Optics and Photonics**
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