SFU SIMON FRASER UNIVERSITY

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Low-cost, Selective Colorimetric Sensor Array for the Detection and Identification of Ammonia

Novel 3D printable Vapochromic sensing polymer that can be used to create sensor surfaces

Request an introduction

Reference: 2020-006

Source: Forance, https://stock.adobe.com/uk/103139845, stock.adobe.com

IP Status

Patented, Patent application submitted

Seeking

Development partner, Commercial partner, Licensing, University spin out

Background

Exposure to colorless ammonia gas may lead to damage to human organs or even death. The invention is the fabrication of a portable, reversible, selective, and sensitive vapochromic polymer that exhibits instant visual color change to both gaseous and aqueous phases of ammonia. These materials are designed to ideally be used as feeder stock in additive manufacturing processes, such as 3D printing to create complex sensor surfaces.

Tech Overview

SFU researchers have created a new immobilization technique for vapochromic coordination polymers (VCPs) through the creation of composite materials by mixing VCPs with polylactic acid (PLA). The composite materials that entrap the VCPs provide long-term physical immobilization that allows for a sensing surface that can be used to detect ammonia in gasses as well as ammonia dissolved in fluids.

These composite sensing materials can be used for 3D printing or additive manufacturing to create sensors with expanded geometric flexibilities. 3D printed sensor surfaces made from the VSM provide permanent immobilization and can detect ammonia as low as 5 ppm concentration.

Benefits

- Chemical sensors based on VCP will have a smaller footprint, operate at low power, are Inexpensive, and possible to communicate using a USB with a computer or mobile phone.
- Enhances the response time and reversibility of the sensor.
- Provides long-term and stable immobilization of VCPs
- Capable of detecting target analytes (e.g., ammonia) at low concentrations (e.g., 5 ppm)
- Effective as a sensing material even when comprised of low VCP concentrations of 2% wt. or less in the PLA matrix
- Synthesized VSMs and 3D printed VSM objects show novel capabilities in the amplification of weaker phosphorescence emissions that are not observable in the bulk VCP material

Applications

Gas sensors have been widely used for many applications in biomedicine, agriculture, power transformers, and automotive industries to detect analytes i.e. Ammonia, Hydrogen, Common Solvents (Alcohols, Esters, Amines), Chlorinated Organics, Organic Hydrocarbons (BTEX), Oxygen, Carbon Dioxide.

Patents

- PCT/CA2021/000007

Learn more about this opportunity

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