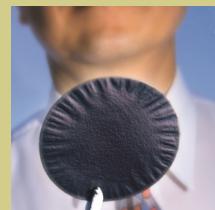




THE FLORIDA STATE UNIVERSITY

OFFICE OF IP DEVELOPMENT & COMMERCIALIZATION



Technology Opportunity

Reusable Colorimetric Fluoride Sensors

Fluoridation of drinking water has been effective in preventing tooth decay and improving overall dental health; however, overexposure to fluoride poses numerous serious health risks including brittle bone disease and increases in bone cancers. Thus, accurate detection of fluoride levels in water and food sources as well as in body fluids is essential.

To date, few fluoride sensors provide both colorimetric and fluorimetric detection. Dr. Sourav Saha has invented a new visual sensor that accurately detects the presence and concentrations of fluoride in aqueous environments.

The sensor is based on the discovery of a new method of colorimetric fluoride detection that uses electron deficient naphthalenediimide (NDI) receptors. Modification of these receptors has improved their sensitivity to a nanomolar level, making them 1000 times more sensitive than the EPA and World Health Organization standards. The resulting sensor undergoes a two-step color change to indicate the amount of fluoride ions present in the medium. The NDI receptors remain colorless in the presence of chloride, bromide, iodide, nitrite, nitrate, azide, acetate, phosphates, hexafluorophosphate, tetrafluoroborate, and triflate anions. The sensor device could be portable, such as a dip-stick or spot-test kit, and may be reusable.

Applications

- Medicine and health applications, both commercial and consumer-oriented, to test for the presence of fluoride in tap water, foods, blood and urine.
- Food industry applications, such as testing toothpaste, bottled water, and food products.
- Commercial product to enable water purifier manufacturers to test the effectiveness of their products more easily and at a reduced cost.
- Municipal water-testing applications, particularly field testing.
- Humanitarian application for use in developing countries with few or non-existent fluoride testing tools or standards.

Unique Advantages

- Offers both colorimetric and fluorimetric detection.
- Could detect fluoride presence and quantity in a variety of environments including water, food, gas/air, and body fluids.
- The sensors are easy to synthesize, environmentally benign, and can detect a range of fluoride concentration levels, with high sensitivity at extremely low nanomolar concentrations.
- Dip-stick and spot-test forms are easy to use, effective, and comparatively inexpensive to produce.
- Tests are reversible, reusable (with power source), and recyclable (disposable), thus reducing waste and costs.