A Novel Platform for the Measurement of Hydrogen Sulfide

Hayat, Moez

Hydrogen Sulfide (H2S) is a gaseous pollutant found in sewage, wastewater, and oil and natural gas fields. However, it is also produced by the human body where it acts as a gasotransmitter that is deeply involved in cardiovascular and Alzheimer's diseases. It is highly volatile as its hydrosulfide ion form readily protonates to H2S gas at a pKa of 6.9. This makes it difficult to accurately measure hydrogen sulfide as H2S gas is easily released from solution, resulting in a loss of sample. The current monobromobimane (MBB) method measures sulfide samples using High Performance Liquid Chromatography (HPLC). This is a complex and time consuming process which is inaccessible to many laboratories, and the nature of the instruments makes it impossible to measure samples on site. Dibromobimane (DBB) reacts with sulfide to produce the fluorescent molecule Bimane Thioether (BTE), whose fluorescence may be quantified using fluorometric methods; thus, making it possible to measure sulfide with a "Lab on a Chip" format rather than HPLC methods. DBB also extrudes sulfur from sulfhydryls, requiring a platform to separate hydrogen sulfide from samples before measurement with a DBB probe. This project established a "Lab on a Chip" device for the such sulfide measurement by demonstrating the feasibility of this approach.

Awards Won: