New organic luminophores for optical detection of volatile compounds

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Abstract

Volatile acids (VA) such as HCl, TFA, etc., are common by products in industrial processes and biological reactions. Effective and low cost detection of is crucial for environmental monitoring and human health.

Biogenic amines (BA), such as ammonia, detection is one of the actual problems in food packaging applications. Classical methods of food quality control are time consuming, including expensive materials and technics.

Recent approaches show significant progress in VA and BA detection by using metal oxide resistive sensors. Organic compounds with advanced optical and structure properties are efficient alternatives for VA and BA detection.

Volatile acids vapors have been detected by metal organic compound (MOF) sensors using photoluminescence spectroscopy at room temperature. Despite the reversible signal, the concentration range of the MOF sensor and optical detection units are to be optimized.

Optical sensors for the detection of biogenic amines are becoming a real challenge for industrial and food safety applications. This is due to their simplicity, low-cost production technology, and ability to operate outside of laboratory conditions.

Pyridinium luminophores is a new class of materials with tuneable chemical structure and optical properties. Sensor properties of these materials have not been explored yet. This study presents fabrication of pyridinium luminophores and characterization by XRD, FTIR and photoluminescence (PL) spectroscopy. The material, tested PL spectroscopy at room temperature, exhibited outstanding sensitivity towards VA and ammonia, attributed to its chemical structure. These findings underscore the potential of pyridinium luminophores for effective detection of volatile acids and ammonia in hazardous environments.

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