

Chemical Engineering Doctoral Defense

A Novel Mobile Device for Environmental Hydrocarbon Sensing and Its Applications

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abstract

The accurate and fast determination of organic air pollutants for many applications and studies is critical. Exposure to volatile organic compounds (VOCs) has become an important public health concern, which may induce a lot of health effects such as respiratory irritation, headaches and dizziness. In order to monitor the personal VOCs exposure level at point-of-care, a wearable real time monitor for VOCs detection is necessary. For it to be useful in real world application, it requires low cost, small size and weight, low power consumption, high sensitivity and selectivity.

To meet these requirements, a novel mobile device for personal VOCs exposure monitor has been developed. The key sensing element is a disposable molecularly imprinted polymer based quartz tuning fork resonator. The sensor and fabrication protocol are low cost, reproducible and stable. Characterization on the sensing material and device has been done. Comparisons with gold standards in the field such as GC-MS have been conducted. And the device's functionality and capability have been validated in field tests, proving that it's a great tool for VOCs monitoring under different scenarios.

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