A novel nanocomposite based on 2D nanosheets, Ti3C2 MXene and 1D nanowires, KxWO for application in diabetes care

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Acetone existing in human breath is an effective biomarker of diabetes, which can be used for the early diagnosis and daily monitoring of diabetes. Comparing to the conventional method for diabetes diagnosis and monitoring that analyzes the blood glucose level in blood, detection of breath acetone is a very need of a method in view of its merits such as non-invasive, accurate, convenient, and inexpensive. Recently, our group has reported a new breath acetone sensor based on a novel nanostructured x7O22 (xO) which exhibits a very sensitive response to acetone at the room temperature. The lowest concentration of acetone can be detected down to 1.2 ppm with response time of 12 s. However, considering the screening purpose of diabetes, concentration of acetone 0.76 ppm is the key threshold to distinguish health person and highrisk of diabetes person. In order to increase the sensitivity of acetone detection furtherly, a new nanocomposite made by 2-D Mene, Ti3C2 nanosheets and 1D xO has been recently synthesized in our group. The initial sensing testing shows excellent acetone response, which can be down to 0.2 ppm. On the other hand, due to good electric conductivity of Ti3C2 nanosheets, the acetone sensor based on Ti3C2-xO has stable electric property and exhibits excellent selectivity as well. This study can improve the understanding of the new material and its acetone sensing mechanism, and thus give ideas for further increasing the sensitivity for acetone detection, eventually resulting in an advanced material capable to analyze acetone in the exhaled breath for disease diagnosis and monitoring purpose.

Biography

Danling Wang is an Assistant Professor of the Department of Electrical and Computer Engineering at North Dakota State University, where she has been since 2016. Dr. ang graduated from Department of Electrical Engineering in University of ashington, Seattle, in 201. Since 200, her research is focused on investigation of portable chemiresistive sensors particularly based on nanostructured materials such as metal-oxide semiconductors in application to explosive detector in industry and military, and breath analyzer for early stage disease diagnosis. The theme of her research is to create high performance sensor devices through exploring the relationships between the compositionstructure of materials and their electric, optical and electrochemical properties and studying the interaction between gas molecules and a solid-state film. The main goal of her research is to deliver in-depth fundamental research with regard to sensor materials and devices in application of disease diagnosis, health status monitoring, industrial and food safety.

SESSION SPEAKER