

Accepted Manuscript

Methane gas sensing behavior of lithium ion doped carbon nanotubes sensor

Xiaoyu Chen, Zonghou Huang, Jia Li, Chunlei Wu, Zhan Wang, Yuming Cui

PII: S0042-207X(18)30265-3

DOI: [10.1016/j.vacuum.2018.04.053](https://doi.org/10.1016/j.vacuum.2018.04.053)

Reference: VAC 7958

To appear in: *Vacuum*

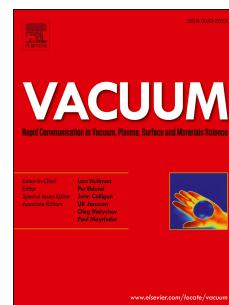
Received Date: 20 February 2018

Revised Date: 17 April 2018

Accepted Date: 28 April 2018

Please cite this article as: Chen X, Huang Z, Li J, Wu C, Wang Z, Cui Y, Methane gas sensing behavior of lithium ion doped carbon nanotubes sensor, *Vacuum* (2018), doi: 10.1016/j.vacuum.2018.04.053.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Methane Gas Sensing Behavior of Lithium ion Doped Carbon Nanotubes Sensor

Xiaoyu Chen ^{a*}, Zonghou Huang ^a, Jia Li ^a, Chunlei Wu ^a, Zhan Wang ^a, Yuming Cui ^b

^a *Jiangsu Key Laboratory of Fire Safety in Urban Underground Space, China
University of Mining and Technology, Xuzhou, Jiangsu 221116, People's Republic of
China*

^b *School of Chemistry and Materials Science, Ludong University, Yantai 264025,
China*

Corresponding address: drizzle13xy@126.com (X. Chen)

Abstract:

A sensor for detecting and estimating methane using Lithium ion doped carbon nanotubes as the sensing element has been developed. The sensitivity of the sensor increases linearly with the methane content in the concentration range of 50–500 ppm and the maximum sensitivity is about 14.48% at 500 ppm. Characteristics such as repeatability, selectivity, stability of the sensor have been investigated. The results indicate the sensor exhibits good sensitivity and selectivity to methane, and is repeatable and stable. A reliable and convenient method of developing a methane gas sensor has been proposed.

Keywords: Sensor; Methane; Lithium ion; Carbon nanotubes

1. Introduction

Methane (CH₄), as a colorless and odorless gas, is the major component of natural gas. It can cause asphyxiation in cramped or inadequately ventilated area. Besides, when the CH₄ concentration reaches to 4% in the air, this highly volatile hydrocarbon can easily form an explosive mixture with oxygen therefore cause a risk of explosion [1]. As a result, the detection of CH₄ is necessary, especially in some inflammable and explosive areas. Nowadays, various CH₄ detection techniques such as microbial biosensors [2], oxide semiconductor sensors [3-6], infrared and laser light emitting diode sensors [7,8] have been reported. However, most of the sensors are complex in operation and manufacture, and usually work at high temperature, which are not

Download English Version:

<https://daneshyari.com/en/article/8044122>

Download Persian Version:

<https://daneshyari.com/article/8044122>

[Daneshyari.com](https://daneshyari.com)