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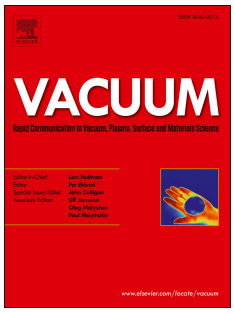

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Methane Gas Sensing Behavior of Lithium ion Doped Carbon Nanotubes Sensor

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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 (CH_4), 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 CH_4 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 CH_4 is necessary, especially in some inflammable and explosive areas. Nowadays, various CH_4 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