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CARBON NANOTUBES AND THEIR NANOCOMPOSITES FOR CARBON DIOXIDE SENSING

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Abstract. *In this paper we present some applications of carbon nanotubes and carbon nanotubes-based matrix nanocomposites in sensing of carbon dioxide. The design of surface functionalization of carbon nanotubes in order to improve the sensitivity and selectivity for carbon dioxide sensing is presented. Experimental results of* CO_2 *sensing have proven high sensitivities for the functionalized films. Novel concepts for differential resonant sensors aiming the reduction of base-line drift during long term operation are described. Advantages versus drawbacks regarding the using of carbon nanotubes in gas sensing are presented in the last section of this review.*

Keywords: carbon nanotubes, matrix nanocomposite, surface functionalization, HSAB, carbon dioxide sensing

1. Introduction

Carbon nanotubes (CNT), discovered by Sumio Iijima in 1991 [1] are fullerenes–related structures with the diameter of a few nanometers.

Due to their unique geometry and dimensions, carbon nanotubes exhibit remarkable electrical, thermal, chemical, optical and mechanical properties [2, 3].

In the last decade, the CNTs have become a very important material for a wide range of applications like nanoelectronics, optoelectronics, polymer matrix nanocomposites electrochemical capacitors, sensors (gas sensors and biosensors), field–emission displays, hydrogen storage, nanoscale reactor, photovoltaic devices, transistors, Schottky diodes, electrodes.[4-6].

The CNTs can be classified into two types: single-walled carbon nanotubes (SWCNTs) and multi-walled carbon nanotubes (MWCNTs) [7, 8].

Due to the extreme high surface-to-volume ratio, carbon nanotubes have generated huge interest among researchers, focused on exploiting these materials for the development of new gas sensing structures.

In this paper, we review some applications of carbon nanotubes (pristine or functionalized) and their matrix nanocomposites in carbon dioxide sensing.

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