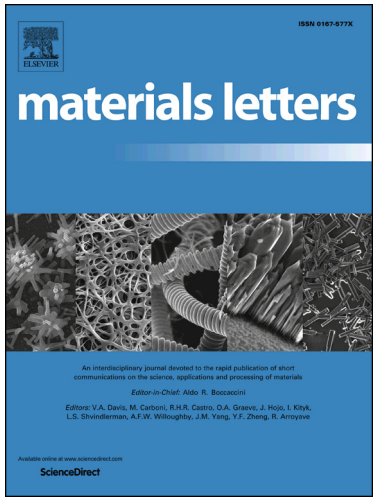

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Enhanced p-type NO_2-sensing properties of ZnO nanowires utilizing CNTs electrode

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Abstract

A novel room-temperature (RT) resistive-type NO_2 gas sensor was developed by utilizing ZnO nanowires as sensitive materials and metallic single-walled carbon nanotubes (m-SWCNT) as electrodes where both of them were fabricated by spray deposition process. The ZnO/m-SWCNT sensing devices showed better sensing response to NO_2, as compared to traditional ZnO/Au sensing devices, which possess opposite sensing response. This can be attributed to different Schottky junction barrier characteristics at ZnO/m-SWCNT interface. This work paves the way to explore effective sensing and electrodes for future novel NO_2 gas sensors in practical and rigid gas sensing system applications.

Keywords: Gas sensor; Metallic Carbon nanotubes electrode; ZnO nanowires; NO_2; Spray-deposition

1. Introduction

Chemical sensors play an important role in detecting and monitoring of poisonous and hazardous chemicals [1]. In resistive-type gas sensing devices, besides sensing materials, the electrode also plays a key role for determing the formed junction type and thus carrier transport characteristics during gas sensing process. Unfortunately, other than interdigital metal thin films (Au, Pt, Al *et al.*), little attention has been paid to developing new type of electrode materials. Carbon nanotubes (CNTs) have attracted researchers' attention in the field of gas sensing due to its high surface to volume ratios, high strength, large electrical, thermal conductivity and rigidity [2]. Specially, metallic CNTs are promising electrode candidates due to its high conductivity, excellent thermal conductivity and good flexibility [3]. Qu employed acetylcholinesterase/dendrimers polyamidoamine-Au/CNTs multilayer modified electrode in biosensors for carbofuran detection, which showed promising