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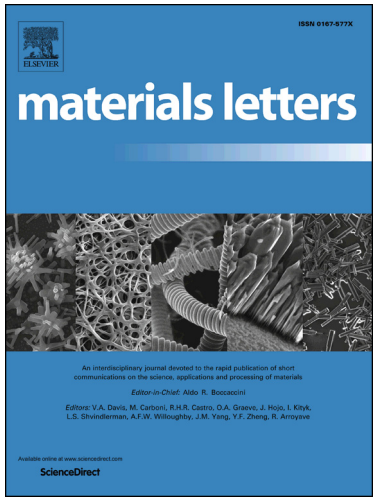

Influence of substrate morphology on alcohol sensing behaviour of p-type Co_3O_4

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Influence of substrate morphology on alcohol sensing behaviour of p-type Co_3O_4

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Abstract

An eco-friendly approach was adopted to fabricate porous $MgAl_2O_4$ ceramic substrate for designing a gas sensor. The active alcohol sensing component Co_3O_4 nanoparticles (Co_3O_4 NPs) were coated on dense and porous $MgAl_2O_4$ substrates using a wet chemical based dip coating technique followed by annealing in air at 400 °C. The morphology of the Co_3O_4 NPs found to be different for the porous and dense substrate. The Co_3O_4 NPs coated $MgAl_2O_4$ substrate-based sensor exhibited better alcohol sensitivity at low-temperature as compared to dense substrate counterpart. The porous substrate offers more active sites for gas adsorption and subsequent surface reaction leading to good sensitivity.

Keywords: Ceramics, Nanoparticles, Sensors, Porous materials

1. Introduction

In recent years, oxide semiconductors have been extensively studied for sensing toxic and explosive gasses [1-6]. The unique advantages of the oxide-based sensor are the fast response, excellent stability, and low-cost. Further, the sensibility of the conventional sensors mainly depends on the morphology, dimension, and porosity of the active materials. It was found that nanostructured porous oxide materials exhibit excellent sensing properties. Therefore, an enormous attention has been paid to synthesize nanostructured porous semiconducting oxides with high surface area.