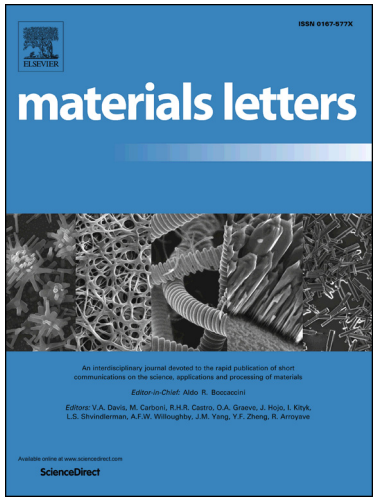

Preparation and gas sensing characteristics of $BiFeO_3$ crystallites

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Preparation and gas sensing characteristics of $BiFeO_3$ crystallites

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Abstract

Phase pure $BiFeO_3$ crystallites with different grain sizes and morphologies were prepared via hydrothermal and coprecipitation methods. The gas sensing properties of the as-prepared $BiFeO_3$ samples were investigated in different gaseous atmospheres containing ethanol, acetone, etc. The working temperature was set to 260 ^oC at which the sensitivity value reached a maximum. The results revealed that the sensor based on $BiFeO_3$ powders presented p-type behavior which exhibited high sensitivity with short response time and effective gas selectivity. Moreover, it was found that the sensor response was greatly influenced by the $BiFeO_3$ particle morphology, grain size and specific surface area. The gas sensing mechanism has been discussed.

Keywords: Powder technology; Sensors; Semiconductors; $BiFeO_3$ crystallites; Gas sensing property; Particle morphology

1. Introduction

Gas sensors have recently been playing an increasing role in environmental monitoring, chemical process control and medical applications. Study of metal oxide sensitive materials can be traced to the 1960s [1]. Since then, metal oxide semiconductor based gas sensors, including SnO_2, ZnO, Fe_2O_3, etc., are found to exhibit excellent sensing properties [2-4]. However, their long-term reliability, selectivity, and thermodynamic stability remain problematic, especially working in a humid environment [5]. To