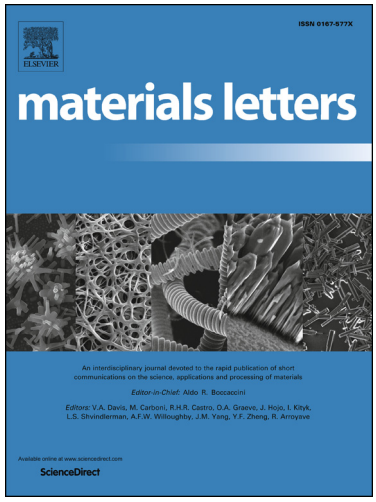

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Lifeng Han, Junli Chen, Yonghui Zhang, Yingliang Liu, Li Zhang, Shaokui Cao

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Facile synthesis of hierarchical carpet-like WO_3 microflowers for high NO_2 gas sensing performance

Lifeng Han [a,b], Junli Chen [b], Yonghui Zhang [b], Yingliang Liu [a], Li Zhang [a,*], Shaokui Cao [a,*]

[a] *School of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450001, P. R. China*

[b] *College of Materials and Chemical Engineering, Zhengzhou University of Light Industry, Zhengzhou 450002, P. R. China*

*Corresponding authors: Prof. Li Zhang, e-mail: lizhang9@zzu.edu.cn; Prof. Shaokui Cao, e-mail: caoshaokui@zzu.edu.cn

Abstract

The hierarchical carpet-like WO_3 microflowers were synthesized via a facile one-step hydrothermal method by using oleic acid as a oriented growth reagent. The as-synthesized WO_3 microflowers show a triclinic crystal structure and are basically hierarchical assemblies of carpet-like nanosheets made up of the subunit of bundle-like nanowires. Based on the morphology evolution process, a possible crystal growth and nanostructure assembling mechanism were proposed. The prepared WO_3 microflower sensor exhibits a gas sensing response of about 228 when exposed to 10 ppm of toxic NO_2 gas at 200 °C.

Keywords: WO_3; Carpet-like microflowers; Nitrogen dioxide; Gas sensors; Hydrothermal synthesis.

1. Introduction

Oxide semiconductor materials have been widely investigated for application in detecting toxic gases [1-3]. To fully utilizing their gas detecting capacity, Oxide semiconductors are often prepared into less agglomerated configurations, especially the outstanding porous structure with high surface area [4]. Therefore, the fabrication of nanomaterials with hierarchical high surface area structure by facile synthetic methods will be a meaningful and interesting work [5,6]. Tungsten oxide (WO_3), a wide band gap n-type semiconductor, has been considered to be a promising sensing material for the detection of NO_2 [7]. So far, many synthetic approaches, such as hydrothermal, CVD, acidic