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# Facile synthesis of hierarchical carpet-like WO<sub>3</sub> microflowers for high NO<sub>2</sub> gas sensing performance

Lifeng Han <sup>a,b</sup>, Junli Chen <sup>b</sup>, Yonghui Zhang <sup>b</sup>, Yingliang Liu <sup>a</sup>, Li Zhang <sup>a,\*</sup>, Shaokui Cao <sup>a,\*</sup>

<sup>a</sup> School of Materials Science and Engineering, Zhengzhou University, Zhengzhou 450001, P. R. China

<sup>b</sup> 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](mailto:lizhang9@zzu.edu.cn); Prof. Shaokui Cao, e-mail: [caoshaokui@zzu.edu.cn](mailto:caoshaokui@zzu.edu.cn)

## Abstract

The hierarchical carpet-like WO<sub>3</sub> microflowers were synthesized via a facile one-step hydrothermal method by using oleic acid as a oriented growth reagent. The as-synthesized WO<sub>3</sub> 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<sub>3</sub> microflower sensor exhibits a gas sensing response of about 228 when exposed to 10 ppm of toxic NO<sub>2</sub> gas at 200 °C.

**Keywords:** WO<sub>3</sub>; 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<sub>3</sub>), a wide band gap n-type semiconductor, has been considered to be a promising sensing material for the detection of NO<sub>2</sub> [7]. So far, many synthetic approaches, such as hydrothermal, CVD, acidic

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