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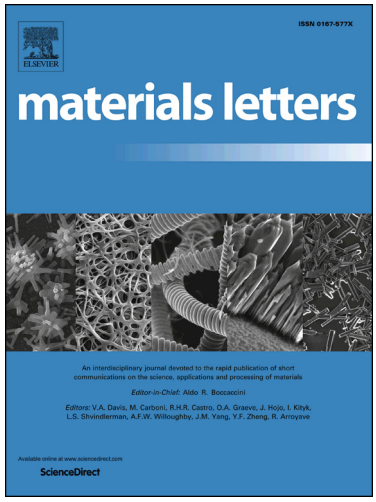

Controllable assembly of tin oxide thin films with efficient photoconductive activity

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Controllable assembly of tin oxide thin films with efficient photoconductive activity

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Abstract:

Cube-like, flower-like, urchin-like and spiky ball-like tin oxide nanostructural materials were synthesized via a simple one step hydrothermal method. The crystal structure, morphology and optical properties were investigated by XRD, FESEM and UV-vis. The optical analysis of these tin oxide samples show strong absorption in near-ultraviolet region and the band gap values lie in the range from 3.91 eV to 4.19 eV. Besides, the band gaps are different from samples with different shapes. When used as the photodetector materials for UV light detection, the tin oxide nanomaterials exhibited excellent photoconductive performance in terms of high sensitivity to the 254 nm and 365 nm UV light.

Keywords: Tin oxide; Semiconductors; Thin films; Photoconductive performance

1. Introduction

Tin oxide micro-/nanostructures have aroused considerable interest due to their potential applications in gas sensors, ultraviolet photodetectors, environmental monitoring and protection, solar cells, and so on [1-8]. Tin oxide is a typical n-type semiconductor with the wide band gap of about 3.6 eV (at 300 K), and it has high exciton binding energy of 1300 meV (at 293 K). These intrinsic properties render tin oxide an interesting candidate for fabricating high efficiency optoelectronic devices.

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