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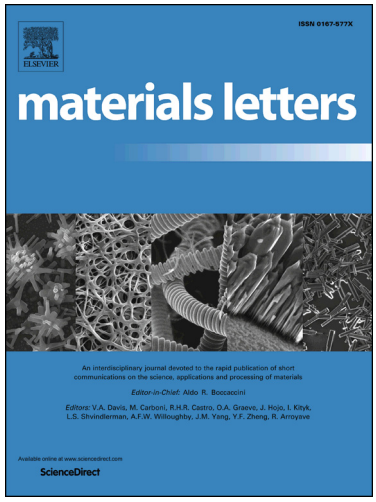

Large scale synthesis of 3D nanoflowers of SnO_2/TiO_2 composite via electrospinning with synergistic properties

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Large scale synthesis of 3D nanoflowers of SnO_2/TiO_2 composite via electrospinning with synergistic properties

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Abstract

Composite of two metal oxides, SnO_2 and TiO_2, is synthesized as 3D nanoflowers in large quantities by electrospinning technique. They show superior energy storage properties and photocatalytic performance than their components or conventional electrospun 1D nanofibers.

Keywords: Energy storage and conversion materials; Nanocomposites; Supercapacitors; Photocatalysis; Hybrid Materials

1. Introduction

Synthesis of a composite is proven to be one of the best method to synergistically combine properties of two or more materials [1-3]. Composite properties are achieved through many methods such as physical mixing of its components, chemical methods such as core/shell, nanoparticle-decorated nanowires and so on [4-6]. While the chemical methods offer superior properties, they are hardly scalable and often require a secondary processing to achieve the composite properties. Previous studies have shown composite formation in a single nanowire system in large quantities for various applications using electrospinning and hydrothermal methods [7-10]. Three-dimensional (3D) nanostructure such as nanoflowers have recently attracted great interest because their thin flake-like surface offer much higher surface area and improved physical properties than their 0D or 1D counterparts [11-13]. Many materials are chemically grown as 3D nanostructures with superior electronic, electrochemical, and photocatalytic performances compared to their 0D or 1D analogues [14,15]. However, a route for synthesizing composite materials in a 3D morphology in large quantities is still a challenge and such materials are expected to offer superior properties in advanced material applications. Electrospinning is a useful technique for producing fibers of organic or inorganic materials for many applications such as tissue engineering, drug release, textile, water filtration, energy and environment [16,17]. In this communication, we report 3D nanoflowers-like morphology of a