LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (Artikel)	:	Analysis of Fe-doped ZnO thin films for degradation of rhodamine B, methylene blue, and Escherichia coli under visible light
Jumlah Penulis	:	7 Orang
Status Pengusul	:	~~Penulis pertama~~/ Penulis ke-5/ ~~Penulis Korespondesi~~ **
Identitas Jurnal Ilmiah	:	a. Nama Jurnal : Materials Research Express
		b. Nomor ISSN : 2053-1591
		c. Volume, Nomor, Bulan, Tahun : Vol. 8 , No. 11, November 2021
		d. Penerbit : IOP Publishing
		e. DOI artikel (jika ada) : https://doi.org/10.1088/2053-1591/ac33fe
		f. Alamat web jurnal : https://iopscience.iop.org/article/10.1088/2053-1591/ac33fe/meta
		g. Terindeks di Scimagojr/Scopus ~~atau di….**~~
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Nilai untuk Pengusul : (40% x 38,5) / 6 = 2,56			

Semarang, 26 Mei 2022

Reviewer 1

Prof. Dr. Drs. Wahyu Setia Budi, M. S.
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Reviewer 2

Prof. Dr. Kusworo Adi, S.Si., M.T.
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   Baik 9 dari 46 pustaka [illegible] dari 5 tahun terakhir
4. **Kelengkapan unsur dan kualitas terbitan:**
   Baik

Semarang, 26 Mei 2022
Reviewer 1

Prof. Dr. Drs. Wahyu Setia Budi, M. S.
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Total = (100%)	**40**			**38**
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   Paper ini membahas tentang analisis bahan ZnO yang didoping Fe dengan konsentrasi 0, 5, 10, 15 dan 20% untuk mendegradasi Rhodamine B, methylene blue dan Escherichia coli. ZnO yang didoping Fe merupakan bahan fotokatalis yang baik untuk mendegradasi berbagai polutan, bahkan dalam range di bawah cahaya tampak.
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Analysis of Fe-doped ZnO thin films for degradation of rhodamine b, methylene blue, and Escherichia coli under visible light

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Save all to author list

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Abstract

ZnO is a popular photocatalyst that is often used for the degradation of dyes and bacteria. However, the catalytic performance of ZnO is only optimal under UV light exposure. This study aims to determine the degradation performance of rhodamine b, methylene blue, and Escherichia coli using 0, 5, 10, 15, and 20% Fe-doped ZnO (ZnO:Fe). Deposition of thin film was carried out using the sol-gel method with a spray-coating technique, while the degradation was carried out under halogen light exposure for 3 h. The optical characterization results show that 20% Fe-doped ZnO has the highest transmittance and the lowest energy band gap of 3.21 eV based on Tauc's plot method. All thin films are hydrophilic with the largest contact angle of 68.54° by 20% Fe-doped ZnO and the lowest contact angle of 52.96° by 5% Fe-

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Dr Yi Cao received his bachelor's degree in 2001 and Master's degree (Supervisor: Prof. Xiqun Jiang) in 2004 from Nanjing University. He then obtained his PhD in 2009 from the University of British Columbia (Supervisor: Prof. Hongbin Li). After a one-year postdoc at the same place, he started his independent career at the Department of Physics, Nanjing University as a full professor in 2010. His work was recognized by several awards including the 2014 IUPAP Young Scientist Prize in Biological Physics, the 2018 Young Innovator Award in Nanobiotechnology by Nano Research, and the 2019 Young Scientist Award from the Biomedical Polymer Materials Division of the Chinese Society for Biomaterials.

Judy Wu, University of Kansas, USA

Dr Judy Wu is a Distinguished Professor of Physics at the University of Kansas. She received her PhD from the University of Houston. She is an experimental condensed matter physicist and is specialized in fabrication, characterization and device applications of thin films and nanostructures. Her current research focuses on understanding the interfaces in ultrathin metal-insulator-metal tunnel junctions including Josephson tunnel junctions, magnetic tunnel junctions, memristors for quantum and neuromorphic computing, and in graphene-based heterostructures nanohybrids quantum sensors including photodetectors, strain/bio/gas/chemical sensors.

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Table of contents

Volume 8

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◂ Previous issue Next issue ▸

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PAPER

Production and characterization of carbon nanotubes by methane decomposition over Ni-Fe/Al_2O_3 catalyst and its application as nanofillers in polypropylene matrix

Hermann E Alcázar[1], Emilio Chire[1], María M Vargas[1], Bryan L Villagarcía[1], John Neira[2], Andre Contin[2] and Leopoldo O Alcázar[1]

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Keywords: CVD, carbon nanotubes, Fe/Al_2O_3, Ni–Fe/Al_2O_3, catalyst, polypropylene, filler

Abstract

This paper studies the influence of metal precursors in the CVD´s catalyst synthesis of carbon nanotubes (CNTs) used as fillers in a polypropylene (PP) matrix (~0.3 wt%). Two catalytic schemes, Fe/Al_2O_3 (50:50) and Ni–Fe/Al_2O_3 (40:10:50), were prepared to determine the influence of the reduction temperature over the characteristics and mechanical properties of CNT as PP fillers. The conversion temperature was varied to see the dependance of the CNT structure to this variable (700 °C–750 °C–800 °C). CNTs products were characterized by SEM and Raman spectroscopy. The SEM micrographs showed a sharper fiber type CNTs for the bimetallic catalyst and the Raman confirmed that better crystallites are obtain over the Fe catalyst. The Fe–PP composite presented enhanced mechanical properties when compare with Fe–Ni–PP, with tensile strength, hardness, and impact properties are higher in 16%, 9%, and 9% respectively. Other carbonaceous materials, as CNF, with less crystallinity presented poorer mechanical properties. Finally, can be stated that for the use of CNF as fillers in PP composites a Fe/Al_2O_3 catalyst, and a reaction temperature 700 °C–750 °C will produce a CNF with 60 nm mean diameter, is better than the use of Fe-Ni based catalysts.

1. Introduction

Since 1991, when Sumio Iijima [1] announces a new fullerene, needle shaped material, named latter as carbon nanotubes (CNTs), the academic community discovered a fascinating area for pure and applied research. This is a remarkable material, that exhibits an extraordinary thermal conductivity, exceptionally high strength, stiffness, and resilience mechanical properties [2–4]. Its elastic modulus is about 1 TPa, comparable with diamond modulus (1.2 TPa) and 5 times stiffer than steel. Its tensile strength is also remarkable, about 60 GPa, which is 10 to 100 stronger than steel [5, 6]. This high mechanical performance can be explained by the outstanding mechanical capabilities of graphene and their correlation to CNTs from the continuum model [7]. Its low density is another beneficial, primarily where weight is crucial. These features encountered a broad range of applications, as in electronic sensors, optical devices, electromechanical actuators, electrochemical capacitors, and others. Due to these characteristics, CNTs seems to be an excellent reinforcement material but attention must be paid for an adequate dispersion in a matrix [8].

There are several routes for CNTs synthesis [9] like laser ablation, arc-discharge, or chemical vapor deposition (CVD), where the last one is the most promising for scaling [10]. In the synthesis process of NTCs by CVD method, the catalyst is deposited on the substrate and is placed in a tubular reactor for growth after the activation of the catalyst, that is carried through thermal annealing. First the reactor is inert-gas purged, removing all air. Then is heated up to activation temperature, using a mixture of inert gas and activation gas (i.e., H_2). The reactor is heated up to growing temperature between 600 °C to 1200 °C [11], within a mixture of a

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PAPER

I, N Co-doped hierarchical micro/mesoporous carbon modified separator for enhanced electrochemical performances of lithium-sulfur batteries

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Keywords: iodine, nitrogen, porous carbon, kelp, separator, lithium-sulfur batteries

Supplementary material for this article is available online

Abstract

Although the high discharging capacity and coulombic efficiency can be obtained by impregnating sulfur into various conductive porous hosts in lithium-sulfur (Li-S) batteries, the low sulfur loading content and volumetric specific energy diminish their advantages. To solve this problem, a modified layer is prepared by coating I and N co-doped hierarchical micro/mesoporous kelp bio-carbon on surface of the polypropylene separator. Furthermore, the composite porous carbon is obtained by one-step thermal pyrolysis of edible dried kelp. The modified layer on separator can effectively prevent shuttle of polysulfides due to the synergistic effect from the micro/mesoporous carbon structures (physisorption effect) and I and N co-doped electrochemical active sites in carbon matrix (chemisorption effect), allowing high capacity and high coulombic efficiency. In this study, we developed Li-S batteries with 80% sulfur loading content and the area loading is higher than 2.0 mg cm^{-2}, which are better than previous published ones. In addition, the cathode electrode could stabilize at 760 mAh g^{-1} after 200 cycles at 0.5 C and delivers a high retention specific capacity of 498 mAh g^{-1} after 500 cycles with a slight capacity attenuation of 0.07% per cycle.

1. Introduction

Sulfur, as cathode material in lithium-sulfur (Li-S) batteries, has high theoretical specific capacity (about 1670 mAh g^{-1}), larger than that of the conventional cathode materials, such as $LiCoO_2$, $LiFePO_4$ and $Li(NiCoMn)O_2$ etc [1–4]. And the energy density of Li-S batteries is about 2600 Wh Kg^{-1}, higher than that of the current commercial lithium-ion batteries [5–8]. Moreover, with the advantages of low price, abundant raw materials, and environmentally friendliness, Li-S batteries are considered to be one of the most promising next-generation high energy storage devices. In spite of possessing the capability of obtaining high energy densities, Li-S batteries still have some inherent shortcomings such as a notorious shuttle effect, poor conductivity of sulfur and obvious volume expansion, all of which are major factors that prevent sulfur from being a promising cathode material [1]. Especially for the shuttle effect, long chain polysulfide ions (S_n^{2-}, $4 \leqslant n \leqslant 8$) generated in the redox process of S_8 are easily soluble in organic electrolytes, resulting in loss of active substances and low coulombic efficiency [5–7].

Tremendous efforts have been made to address the above issues, and one effective approach is to impregnate sulfur into porous carbon hosts [9, 10]. The carbon can enhance electrical conductivity of cathode material, and the porous structures can accommodate active sulfur and the polysulfides intermediates. However, carbon with homogeneous nonpolar surface cannot afford a sufficient suppression effect to maintain polysulfides within the cathode. The polar inorganic materials, such as MoS_2, TiO_2, and N-doped carbon, have been developed to