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Fibers and Polymers
Volume 21, Issue 6, 1 June 2020, Pages 1212-1221

Electrospun Porous Polylactic Acid Fibers Containing CdS for Degradation of Methylene Blue (Article)

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Abstract

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The immobilization of photocatalyst in polymer fibers has been found to improve photodegradation of dye and recyclability of material. In this study, porous polylactic acid (PLA) fibers were utilized as photocatalyst support using electrospinning technique to synthesis the fibers. The cadmium sulfide (CdS) was embedded in fibers at the amount of 1 wt%, 3 wt%, and 5 wt% as photocatalyst agent with absorption in visible light range. The electrospun fibers experienced increasing in diameter for 2.6 times (from 175 nm to 450 nm), due to incorporation of CdS. The synthesized CdS has band gap of 2.35 eV, and its presence in composite fibers can be detected by using energy dispersive X-ray (EDX) and X-ray diffraction (XRD) analyses. The photodegradation was performed under low-powered halogen lamp, with 90 % removal of methylene blue (MB) after 10 hours of irradiation using CdS(3 wt%)/PLA fibers. This result shows higher performance in comparison with PLA and CdS which could only remove 57 % and 65 % of MB, respectively. The recyclability of composite was tested with satisfying performance; with around 60 % of MB removal was maintained after five times of recycle experiments. © 2020, The Korean Fiber Society.

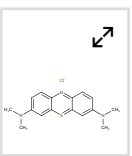
SciVal Topic Prominence

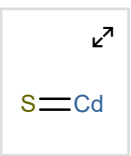
Topic: Cds Nanoparticle | Cadmium Sulphide | Quantum Confinement

Prominence percentile: 87.088

Chemistry database information

Substances





Author keywords

CdS | Electrospinning | Immobilization | PLA | Porous fiber

Indexed keywords

Engineering controlled terms: Aromatic compounds | Cadmium sulfide | Energy gap | Fibers | II-VI semiconductors | Polyesters | Sulfur compounds

Engineering uncontrolled terms: Composite fibers | Electrospinning techniques | Electrospun fibers | Energy dispersive x-ray | Halogen lamps | Methylene Blue | Poly lactic acid | Polymer fiber

Engineering main heading: Electrospinning

PaperChem Variable: Acids | Aromatic Compounds | Fibers | Methylene Blue | Performance | Polyesters | Removal | Sulfur Compounds

Funding details

Funding sponsor	Funding number	Acronym
	015MED-003	

Funding text

This study was supported by Universiti Teknologi PETRONAS-Universitas Pertamina joint research grant with cost center 015MED-003.

ISSN: 12299197
DOI: 10.1007/s12221-020-9756-4
Source Type: Journal
Document Type: Article
Original language: English
Publisher: Korean Fiber Society

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