Scopus Search Sources Lists SciVal ↗ Create account Sign in

Document details

‹ Back to results | 1 of 1

Export Download Print E-mail Save to PDF Add to List More... ›

View at Publisher

Malaysian Journal of Analytical Sciences
Volume 23, Issue 5, October 2019, Pages 901-913

Extraction and characterization of microfibrillated and nanofibrillated cellulose from office paper waste (Article)

[Pengekstrakan dan pencirian mikrofibril dan nanofibril selulosa daripada sisa kertas pejabat]

Hanafiah, S.F.M.[a], Danial, W.H.[a], Samah, M.A.A.[a], Samad, W.Z.[a], Susanti, D.[a], Salim, R.M.[a], Majid, Z.A.[b]

[a]Department of Chemistry, Kulliyyah of Science, International Islamic University Malaysia, Kuantan, Pahang 25200, Malaysia
[b]Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, UTM, Johor Bahru, Johor 81310, Malaysia

Abstract

View references (10)

The tremendous increase in papermaking and cellulose production, both of which are sourced from wood pulp, has resulted in the severe exploitation of trees, thereby leading to environmental problems, including deforestation. Besides, the reduction of paper usage is not on the horizon. Thus, when it comes to the environmental issue, the extraction of cellulose from paper waste can be an alternative initiative to mitigate the negative impact of deforestation via the reuse of paper waste. In this study, the extraction of cellulose microfibres and nanofibres was achieved through the use of office paper waste as the source material. Alkali and bleaching treatments were employed for the extraction of cellulose fibres, followed by acid hydrolysis under controlled conditions for the isolation of the cellulose nanofibres. The alkali treatment was carried out using various concentrations of 2%, 4%, 8% and 16% of sodium hydroxide (NaOH) solution, while the bleaching treatment was carried out using sodium hypochlorite (NaClO) solution. The extraction of nano-fibrillated cellulose was achieved by means of acid hydrolysis with various concentrations of 5%, 15%, 30% and 60% sulphuric acid (H_2SO_4) under controlled conditions. The structural and functional groups were analysed using attenuated total reflection Fourier transform infra-red (ATR-FTIR) imaging, while a morphological analysis was performed using optical microscopy and transmission electron microscopy (TEM). The FTIR analysis indicated that the lignin, ink, fillers and other components had been removed after the alkali and bleaching treatments. The imaging analysis using an optical microscope showed that the extracted cellulose had a fibrous and rod-like structure, while the TEM images showed that the extracted cellulose ranged from micro to nano size down to ~20-30 nm depending on the concentration of acid used. The extraction of either micro-fibrillated or nano-fibrillated cellulose from office paper waste in this work might pave the way towards the alternative reuse of office paper waste for the production and application of cellulose materials. © 2019, Malaysian Society of Analytical Sciences. All rights reserved.

SciVal Topic Prominence

Topic: Cellulose | Cellulose derivatives | Nanocrystals CNC

Prominence percentile: 99.970

Chemistry database information

Substances

Metrics View all metrics ›

PlumX Metrics
Usage, Captures, Mentions, Social Media and Citations beyond Scopus.

Cited by 0 documents

Inform me when this document is cited in Scopus:

Set citation alert ›

Set citation feed ›

Related documents

Preparation and characterization of biodegradable sugarcane bagasse nano reinforcement for polymer composites using ball milling operation
Kathiresan, M. , Sivaraj, P.
(2016) International Journal of Polymer Analysis and Characterization

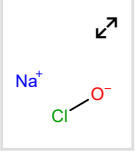
Nanocellulose
Singh, N. , Upadhyay, S. , Mishra, N.
(2019) Handbook of Ecomaterials

Cellulose Nanocrystal Isolation from Hardwood Pulp using Various Hydrolysis Conditions
Lin, K.-H. , Enomae, T. , Chang, F.-C.
(2019) Molecules

View all related documents based on references

Find more related documents in Scopus based on:

Authors › Keywords ›



Author keywords

Cellulose | Microfibrillated | Nanofibrillated | Office paper waste

Funding details

Funding sponsor	Funding number	Acronym
International Islamic University Malaysia		IIUM
Foundation for Fundamental Research on Matter	FRGS19-015-0623	FOM

Funding text

This study was supported by the Fundamental Research Grant Scheme (FRGS19-015-0623), Ministry of Education, Malaysia and International Islamic University Malaysia.

ISSN: 13942506
DOI: 10.17576/mjas-2019-2305-15
Source Type: Journal
Document Type: Article
Original language: English
Publisher: Malaysian Society of Analytical Sciences

References (10)

View in search results format >

All | Export | Print | E-mail | Save to PDF | Create bibliography

1 Nguyen, S.T., Feng, J., Le, N.T., Le, A.T.T., Hoang, N., Tan, V.B.C., Duong, H.M.
Cellulose aerogel from paper waste for crude oil spill cleaning
(2013) *Industrial and Engineering Chemistry Research*, 52 (51), pp. 18386-18391. Cited 138 times.
doi: 10.1021/ie4032567
View at Publisher

2 Riyad, A.S.M.
Scenario of paper waste recycling and reuse practices in Khulna City of Bangladesh
(2014) *International Journal of Scientific & Engineering Research*, 5 (3), pp. 705-711.

3 Chirayil, C.J., Mathew, L., Thomas, S.
Review of recent research in nano cellulose preparation from different lignocellulosic fibers
(2014) *Reviews on Advanced Materials Science*, 37 (1-2), pp. 20-28. Cited 119 times.
http://www.ipme.ru/e-journals/RAMS/no_13714/03_13714_cintil.pdf

4 Danial, W.H., Abdul Majid, Z., Mohd Muhid, M.N., Triwahyono, S., Bakar, M.B., Ramli, Z.
The reuse of wastepaper for the extraction of cellulose nanocrystals
(2015) *Carbohydrate Polymers*, 118, pp. 165-169. Cited 52 times.
http://www.elsevier.com.ezproxy.um.edu.my/wps/find/journaldescription.cws_home/405871/description#description
doi: 10.1016/j.carbpol.2014.10.072
View at Publisher