

Bukti Korespondensi

Prosiding 4

**Oxygen permeability properties of nanocellulose
reinforced biopolymer nanocomposites**

Corresponding author. E-mail address:
ahmadilyas@utm.my (R.A. Ilyas)



Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr



Oxygen permeability properties of nanocellulose reinforced biopolymer nanocomposites

R.A. Ilyas^{a,b,*}, Ashraf Azmi^a, N.M. Nurazzi^c, A. Atiqah^d, M.S.N. Atikah^e, Rushdan Ibrahim^f, Mohd Nor Faiz Norrahim^g, M.R.M. Asyraf^h, Shubham Sharmaⁱ, Sneh Punia^j, Edi Syafri^k, Nasmi Herlina Sari^l, Mochamad Asrofi^m, S.M. Sapuanⁿ

^a School of Chemical and Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia (UTM), Johor Bahru, Johor 81310, Malaysia

^b Centre for Advanced Composite Materials (CACM), Universiti Teknologi Malaysia (UTM), Johor Bahru, Johor 81310, Malaysia

^c Centre for Defence Foundation Studies, Universiti Pertahanan Nasional Malaysia (UPNM), Kem Perdana Sungai Besi, Kuala Lumpur 57000, Malaysia

^d Institute of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia, Bangi, Selangor 43600, Malaysia

^e Department of Chemical and Environmental Engineering, Universiti Putra Malaysia (UPM), Serdang, Selangor 43400, Malaysia

^f Pulp and Paper Branch, Forest Research Institute Malaysia, Kepong, Selangor 52109, Malaysia

^g Research Center for Chemical Defence, Universiti Pertahanan Nasional Malaysia (UPNM), Kem Perdana Sungai Besi, Kuala Lumpur 57000, Malaysia

^h Institute of Energy Infrastructure, Universiti Tenaga Nasional, Jalan IKRAM-UNITEN, 43000 Kajang, Selangor, Malaysia

ⁱ Department of Mechanical Engineering, Main Campus, IK Gujral Punjab Technical, India

^j Department of Food, Nutrition and Packaging Sciences, Clemson University, Clemson, SC 29634, United States

^k Department of Agricultural Technology, Agricultural Polytechnic, Payakumbuh, West Sumatra 26271, Indonesia

^l Mechanical Engineering Department, Faculty of Engineering, University of Mataram, Mataram, Indonesia

^m Department of Mechanical Engineering, University of Jember, Kampus Tegaboto, Jember, East Java 68121, Indonesia

ⁿ Laboratory of Biocomposite Technology, Institute of Tropical Forestry and Forest Products, Universiti Putra Malaysia, UPM Serdang, Selangor 43400, Malaysia

ARTICLE INFO

Article history:
Available online 12 November 2021

Keywords:
Oxygen permeability
Nanocellulose
Biopolymer

ABSTRACT

Dry powder products are highly sensitive to oxygen and water vapour and must have a long shelf life. Currently, they are vacuum-packaged in sachets whose walls are made of a composite film that stops oxygen and water vapour from entering the package. Most of these composites are not biodegradable, a situation that the most agricultural company now wants to change to gain in sustainability. According to National Geography (2019), every year, about 8 million tons of plastic waste escapes into the oceans from coastal nations, with some estimates ranging to at least 400 years to break down. Over the years, there is huge interest in the development and use of bio-based packaging materials. how-