Effect of coupling agent on durian skin fibre nanocomposite reinforced polypropylene (Conference Paper) (Open Access)

Siti Nur E’Zzati, M.A., Anuar, H., Siti Munirah Salimah, A.R.
Department of Manufacturing and Materials Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, Malaysia

Abstract
This paper reports on the development of a composite-based natural fiber to reduce the reliance on petroleum-based product in order to amplify environmental awareness. The production of Durian Skin Nanofiber (DSNF) was conducted using biological fermentation method via rhizopus oryzae in order to obtain the nano dimension of the particle size. Polypropylene (PP) and DSNF were produced using Haake internal mixer via melt blending technique. The significant effect of maleic anhydride grafted polypropylene (MAPP) on the properties of PP/DSNF nanocomposite was investigated to study its mechanical properties which are tensile strength and thermal stability using thermogravimetric (TGA) and differential scanning analysis (DSC). The tensile property of PP nanocomposites increased from 33 MPa to 38 MPa with the presence of MAPP. The addition of MAPP also increased the thermal stability of PP/DSNF nanocomposite where the char residue increased by 52%. Besides that, the thermal degradation of PP/DSNF and PP/DSNF-MAPP were higher than PP where they exerted higher amount of weight loss at an elevated temperature. The percentage of crystallinity, %Xc, of PP nanocomposites improved with the addition of MAPP by 35% based on the differential scanning calorimetry (DSC) result. The SEM analysis showed that the PP/DSNF-MAPP exerts ductile fracture while PP/DSNF exerts brittle fracture. © Published under licence by IOP Publishing Ltd.

Indexed keywords
- Engineering controlled terms: Blending, Brittle fracture, Coupling agents, Differential scanning calorimetry, Ductile fracture, Fracture, Manufacture, Nanocomposites, Particle size, Reinforced plastics, Tensile strength, Thermodynamic stability, Thermogravimetric analysis
- Compendex keywords: Differential scanning analysis, Elevated temperature, Environmental awareness, Haake internal mixers, Maleic anhydride grafted polypropylene, Petroleum based products, PP nanocomposite, Thermo-gravimetric
- Engineering main heading: Polypropylenes

Cited by 0 documents
Inform me when this document is cited in Scopus:
Set citation alert
Set citation feed

Related documents
- Teniste strength of woven yarn kenaf fiber reinforced polyester composites
- Improving tensile properties of kenaf fibers treated with sodium hydroxide
- Effects of beating on the characteristics of malaysian durian (Durio zibethinus murr.) rind chemi-mechanical (CMP) pulp and paper
- View all related documents based on references

Funding details
Funding number Funding sponsor Acronym Funding opportunities
This work was financially supported by the Fundamental Research Grant Scheme (FRGS14-108-0349) from the Ministry of Education Malaysia. The authors would like to thank International Islamic University Malaysia for the research facilities in making this study a success.

---

**References (19)**


Optimizing the parameters in durian skin fiber reinforced polypropylene composites by response surface methodology

doi: 10.1016/j.indcrop.2014.01.016

Effective reinforcement of carbon nanotubes in polypropylene matrices

doi: 10.1002/app.30783

Impact of biofibers and coupling agents on the weathering characteristics of composites

doi: 10.1016/j.polymdegradstab.2015.06.015

Using POSS reagents to reduce hydrophobic character in polypropylene nanocomposites

doi: 10.1039/c3ta80001f
Environmental effects on the degradation behaviour of sisal fibre reinforced polypropylene composites

doi: 10.1016/S0266-3538(02)00080-5

View at Publisher

Chun, K.S., Husseinsyah, S., Osman, H.
Tensile properties of polypropylene/cocoa pod husk biocomposites: Effect of maleated polypropylene

ISBN: 978-303785771-7
doi: 10.4028/www.scientific.net/AMR.747.645

View at Publisher

Patpen, P., Abdul Rahman Rusly, A., Talib, R., Abdan, K.

Kenaf natural fiber reinforced polypropylene composites: A discussion on manufacturing problems and solutions

doi: 10.1016/j.compositesa.2007.01.001

View at Publisher

Lee, K.-Y., Blaker, J.J., Bismarck, A.
Surface functionalisation of bacterial cellulose as the route to produce green polylactide nanocomposites with improved properties (Open Access)

doi: 10.1016/j.compscitech.2009.08.016

View at Publisher

Tugiman, N., Mohamad, Z., Wan Abdul Rahman, W.A.
(Malaysia: Universiti Teknologi)

© Copyright 2018 Elsevier B.V., All rights reserved.