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Modification of lignin-based blended with pbs/kenaf core fiber for biocomposites material

Harmaen Ahmad Saffian[1], **Hyun-Joong Kim**[2] and **Paridah Md Tahir**[1]
[1]Universiti Putra Malaysia, Malaysia.
[2]Seoul National University, Republic of Korea.

Statement of the problem: Approximately 50 million tonnes of lignin were generated annually by the chemical pulp industries throughout the world1. The delignification of wood fibres for the production of pulp and paper involved the application of Kraft pulping method. As a by-product of this process, Kraft lignin were generated in abundance annually. Owing to its abundancy, Kraft lignin is gaining favour among the researchers as a feedstock in a variety of fields, aiming to add value to this natural material[2]. Being biodegradable and CO_2 neutral, lignin-based materials are widely recognised as environmentally friendly apart from it relatively lower in cost and stabilizer properties compared to that of synthetic materials[3]. On account to that, application of this industrial by-product could be beneficial from the environmental and economic aspects. Lignin has been proved to have significantly affected the thermal and mechanical behaviour in different polymers4. Furthermore, lignin has also been used as compatibilizer between natural fibres and polymer matrix5. However, due to its poor dispersability in a polymer matrix and low miscibility with polymers, improvement has commonly been made through chemical modification. More potential applications of lignin can be discovered provided that the miscibility of ther lignin with other polymeric materials can be enhanced6. Therefore, this study aims to investigate the effects of incorporation of modified lignin in a synthetic polymer (in the form of copolymers, blends, and composites) on the mechanical and thermal properties of the end products.

Methodology: Maleic anhydride (MA) and lignin were modified using microwave oven method. The mixture was reacted in a microwave and irradiated for 20 min. Findings: Modified lignin-based has enhanced the mechanical properties of the biodegradable polymer after blending.

Conclusion: Modified lignin-based blended with biopolymer and natural fibre using twin screw extruder showed great potential in the production of insulation biocomposites.

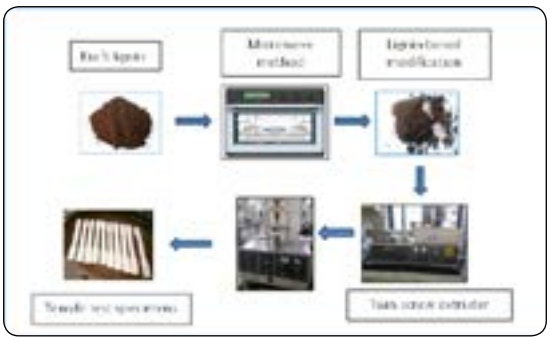

Figure 1: Mechanical properties of Modified Lignin-based for com material.

Recent Publications:

1. Rozite L, Varna J, Joffe R, Pupurs A (2013) Nonlinear behavior of PLA and lignin-based flax composites subjected to tensile loading. Journal of Thermoplastic Composite Materials 26:476–496.
2. Korich A.L, Fleming A.B, Walker A.R, Wangm J, Tang C., Iovine P.M (2012) Chemical modification of organosolv lignin using boronic acid-containing reagents. Polymer 53:87–93.

3. Sahoo S, Misra M, Mohanty A.K (2011) Enhanced properties of lignin-based biodegradable polymer composites using injection moulding process. Composites Part A 42:1710–1718.
4. Bertini F, Canetti M, Cacciamani A, Elegir G, Orlandi M, Zoia L (2012) Effect of ligno-derivatives on thermal properties and degradation behaviour of poly(3-hydroxybutyrate)-based biocomposites. Polymer Degradation and Stability 97:1979–1987.
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Biography

Harmaen Ahmad Saffian has completed his PhD from Universiti Putra Malaysia, Serdang, Malaysia. He is a Senior Research Officer in Institute of Tropical Forestry and Forest Products (INTROP), UPM. He has more than 20 years' experience in biocomposites. Many papers of his study are related to biocomposites material fabricated using biopolymer and natural fiber as filler. His PhD study was studied on biopolymer compounded with fertilizer for slow released control to produce Bioplastic Fertilizer (BpF) composites. Currently, he is focusing on lignin-based modification compounded with PBS and natural fibre for the production of insulating composite materials. He also has research collaborations with others universities such as Kasetsart University, Thailand, Tehran University, Iran and Seoul National University, Republic of Korea.

harmaen@upm.edu.my

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