EuroSciCon

EuroSciCon Conference on

Biochemical, Chemical Engineering & Mass Spectrometry

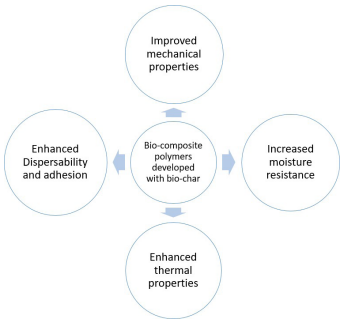
November 19-20, 2018
Prague, Czech Republic

Michael Lubwama et al., Arch Chem 2018, Volume: 2
DOI: 10.21767/2572-4657-C4-011

EFFECT OF RICE AND COFFEE HUSK BIOCHAR FILLERS ON THE PROPERTIES OF POLYPROPYLENE BASED BIO- COMPOSITES

Michael Lubwama, Vianney Andrew Yiga and Peter Olupot
Makerere University, Uganda

In recent years, the use of various natural reinforcing fibers such as hemp, jute, flax, sisal and kapok in thermoplastics has gained acceptance in commodity plastics. However, still various fibers and particulate fillers need to be explored. Amongst the used, polypropylene is an outstanding commercially available thermoplastic material with wide range of applications. Not much work has been done on biocomposite polymers involving biochar as a filler material. In this work, rice and coffee husks as well as their biochars were used as reinforcement to produce biocomposite polymers using compression molding. Filler material loading varied between 0-20 percent in 5% intervals. Dispersability tests were carried out. Thermal properties were determined using thermogravimetric analysis and burning tests, chemical properties were determined using a burning test and mechanical properties were determined using a universal testing machine. Results showed that biochars, owing to their morphological structure, were found to have dispersed more uniformly in the resin than raw material husks. The colour patterns of the developed biocomposite polymers were similar to the patterns exhibited by the respective fillers used. Compared to those made with raw material husks, biocomposite polymers made with biochar had improved moisture resistance properties, owing to the destruction of hydrophilic groups during the carbonization process and increased lignin compositions. The developed biocomposite polymers had favourable young's moduli, tensile strengths, elongations at break and notched impact strengths. Filler content had no effect on the transition temperatures. Increasing filler contents led to a decrease in crystallization and melting enthalpies and thus a decrease in the meltable matrix. Generally, higher filler content led to higher young's modulus, lower tensile strength and elongation at break, lower crystallization and melting enthalpies. There wasn't a significant correlation between the filler content and the impact strength.



Biography

Michael Lubwama completed his PhD in Mechanical Engineering in 2013 from Dublin City University, Ireland. He is a lecturer at the Department of Mechanical Engineering, Makerere University. He is also the Deputy Center Leader of the Africa Center of Excellence in Materials, Product Development, and Nanotechnology.

mlubwama@cedat.mak.ac.ug