

Development and characterization of bio nano cellulose reinforced polyamide nanocomposites prepared by electron spinning methodLovely Mathew^{1,2}, Cintil Jose³ and Sabu Thomas¹¹Mahatma Gandhi University, India²Viswajyothi College of Engineering and Technology, India³Newman College, Thodupuzha, India

Nature inspires us to develop new high performance materials from its renewable resources and among these cellulose nano whiskers are most popular due to their unusual properties and resulting applications. For environmental awareness and due to the international demand for green technology, bio nano composites have the potential to replace present petrochemical based materials. Their flexibility during processing highly specified stiffness and low cost make them attractive to manufactures. This century has witnessed ever increasing demands for the utilization of biomaterials as fillers in polymer composites. Bio fiber reinforced plastic composites are gaining more and more acceptance in structural applications and has recently intensified in various industrial field especially the polyamide composites gained much attention because of their versatile properties. In this work, cellulose nano crystals (CNC's) have been extracted from the bark of *Helicteres isora* plant by acid hydrolysis method and they have been used to reinforce polyamide (PA) by electro spinning method for the preparation of nano composites. The morphological, mechanical, and wetting studies of resulting nano composites have been investigated. From the morphological studies using SEM and AFM, it is observed that with an increase in CNC content, diameter of the produced polyamide nano composite fibers are decreased to some extent and the surface is smooth and has no cracks which indicated that the CNCs are well dispersed in the PA matrix without significant aggregation. The static water-contact angle measurement studies showed that with the addition of CNC's, contact angle values of the composites are found to be decreased, which pointed out the enhanced hydrophilic nature of the composite. With an increase in the filler loadings, the material resistance to nano indentation is also found to be increased. Some of the proposed applications for these products are as filters for the separation of sub-micron particles, as reinforcing fillers in composite materials, as wound-dressing and tissue scaffolding materials for medical uses and as controlled release materials for agricultural and pharmaceutical uses.

Biography

Lovely Mathew has completed her PhD from Cochin University of Science and Technology in 2006. She was the Professor of Chemistry Faculty in Newman College, Kerala since 1981. After her retirement in 2015, she is working as a Professor and Dean of research in an Engineering College in Kerala. She has published more than 20 papers in reputed international/national journals and has presented several research papers in various international conferences abroad. Her research area is natural fibre/nanocellulose reinforced polymer composites/nanocomposites. She has completed several major research projects funded by DST, UGC KSCSTE, etc. She is a registered guide of International and Inter University Centre for Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, Kerala, India.

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