conferenceseries.com

Vimal Katiyar, J Material Sci Eng 2018, Volume 7
DOI: 10.4172/2169-0022-C7-109

Vimal Katiyar
Indian Institute of Technology Guwahati, India

Effect of functionalized biopolymers on stereocomplexation and properties of poly(lactic acid) nanocomposite films, trays and 3D printed implants

This presentation highlights the use of available bio-resources for value added sustainable polymeric products for engineering, commodity and biomedical applications. Biopolymers can be extracted from renewable feedstock such as plants, marine animals, insects, etc. It is noteworthy to mention that so far biopolymers extracted from these sources have limited applications in large scale plastic production. Among the available bio-based synthetic plastics, Polylactic Acid (PLA) has made its own place due to its biodegradability and potential to replace conventional fossil-based plastics. It is noteworthy to mention that properties such as melting point, heat deflection temperature and gas barrier properties limits its use in high temperature commodity and engineering applications. However, these limitations can be overcome by developing new class of high molecular weight stereocomplex PLA (sc-PLA). In this context, we have synthesized sc-PLA and its sc-PLA-bionanocomposites by using different bio-based nanofillers which include cellulose nanocrystals, silk nanocrystals, modified chitosan, etc. The GPC analysis reveals that the synthesized stereo-complex based bionanocomposites have molecular weight higher than 100 kDa. The formation of stereocomplex crystallites is confirmed by the XRD analysis. Melting point of the composite is increased even higher than 225 °C which suggests the formation of stereocomplex crystallites and the crystallization temperature is enhanced up to ~155 °C at nanofillers loading of 5 wt%. Due to the presence of various bio nanofillers, ultimate tensile strength is enhanced significantly. Based on the studies, it can be concluded that bio nanofillers are good candidates for enhancing the stereocomplexation in the PLA. In this talk, fabrication strategies for synthesis of stereocomplex-PLA-bionanocomposites and evaluation of their properties along with possible applications will be discussed. This talk will also include the processing of these bionanocomposites into caste films and injection molded products for biomedical applications.

Biography

Vimal Katiyar is a Coordinator of Centre of Excellence for Sustainable Polymers in the Department of Chemical Engineering at IIT Guwahati, India. He has published more than seventy peer reviewed publications in highly reputed journals such as *American Chemical Society* and Nature publishing journals. His recently featured book entitled as '*Bio-based Plastics for Food Packaging Applications*' is published by Smithers Rapra, UK. He is a co-inventor of numerous granted patents in various countries including India, USA, Canada, Europe, Japan, etc. His research group has received multiple national and international innovation awards in the development of bio-based polymeric products, nanobiomaterials and related technologies.

vkatiyar@iitg.ernet.in