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Natural fiber-reinforced bio-based polymer composites: A bright perspective of eco-friendliness, cost reduction and broader utilization

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Bioplastic, polymers that are biodegradable or based on bio-feedstocks, are considered as potential alternatives to conventional petroleum-based polymers since the latter have triggered concerns in terms of environmental contamination and greenhouse gas emissions. Due to increasing restricted availability of petrochemical resources, bioplastics have become strongly interesting for the public, research and plastic industries. Biodegradable polymers have many other desirable properties such as biocompatibility, chemical inertness and low toxicity. In this regard, polylactic acid (PLA) has been the frontrunner among many commercially biopolymers because of its outstanding physical and mechanical properties, good transparency, glossy appearance and high rigidity (for isomer of poly D-lactic acid). Its processing possibilities are very wide ranging from injection molding and extrusion over cast film extrusion to blow molding and thermoforming. It has some shortcomings as well, for example inherent brittleness, high

rate of crystallization, sensitivity to thermal degradation, low-impact strength and poor toughness. By blending bio-based polymers with both synthetic and natural fibers as well as nanoparticles to create a composite, the overall mechanical and degradation properties can be improved. However, the natural fibers (such as wood fiber) serve as good reinforcements and fillers in biocomposites for several reasons including low cost, fewer health hazards during processing, less abrasiveness to processing equipment, and good thermal properties. There is an increasing attention in research and development of fully biodegradable composites with the combination of PLA and natural plant fibers due to their good processability, renewability, recyclability, sustainability, reduced processing costs and reduced costs of waste disposal after service. This will guarantee a viable future for a variety of applications of the natural fiber-reinforced PLA composites.

Biography

Seyed Hamed Mahdavian received his BSc degree in Chemical Engineering from Amirkabir University of Technology, Tehran and his MSc degree in Chemical Engineering from Iran University of Science and Technology, Tehran, Iran. He has many publications including 15 high quality peer-reviewed papers in scientific journals and international conferences, a book chapter, and several research and technical reports. He received several honors and awards for his outstanding efforts in his research works. In December 2015, he was selected as the first person of superior industrialist and distinguished researcher in the Festival of Research & Technology of Oil Industry in Tehran, Iran. He has been invited to the several reputed international conferences as a keynote speaker. He is reviewer of several scientific journals and conferences. He has also joined to several famous international conferences as a member of the International Scientific Committee.

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