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Surface modified chitin with silane as reinforcement in cement mortar composites

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With increasing global concern over depletion of non-renewable fossil fuel and rising price for petroleum and petroleum derived products, present and future demands natural materials that are eco-friendly (with minimum waste disposal), having light weight, high durable with mechanical properties greater than or equal to those of traditional petroleum based materials. Chitin is such an abundant biopolymer found in cell walls and skeletal structure of numerous invertebrates. But one of the drawback in chitin whisker based composite is the presence of hydrogen bonds in chitin tend the fibers to agglomerate into bundles and unevenly distribute throughout the non-polar polymer matrix during compounding processing; resulting a weak interfacial adhesion. Therefore fiber treatment is beneficial towards improving the water resistance and wettability of the fiber surface by polymers and enhances interfacial adhesion. A coupling agent is a chemical that functions at the interface to create a chemical bridge between the reinforcement and matrix. Mainly organosilanes are efficient coupling agents and they have been extensively used in composites. The hydroxyl groups present on the surface of the chitin powder is allowed to condense with the hydroxyl groups of the silicates under alkaline pH conditions. In this study, chitin whisker surface was modified by the treatment with a suitable silane coupling agent. The properties of surface modified chitin characterized by PXRD, SEM, TGA and FTIR. This reinforcing material was used in mortar composites and the mechanical properties enhancement studied.

Biography

Anju Ramakrishnan is pursuing PhD from the Department of Chemistry, Indian Institute of Technology - Madras under the guidance of Prof. R Dhamodharan. She has extensive experience in preparation of nanocellulose using banana fiber, surface modification of cellulose and chitin extracted from various natural resources, using silane coupling agents.

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