

BIO INSPIRED GREEN MICRO AND NANOCOMPOSITES FOR THE FUTURE
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Micro and nano bio inspired composite materials are the best future materials for the coming millennium. Cellulose fibers, chitin and starch in different length scales offer outstanding properties like stiffness, toughness and other mechanical properties. Composites from polymers (rubbers and plastics) and reinforcing fibers provide best properties of each. They replace conventional materials in many structural and non-structural applications. Both natural fibers and polymers are light, on combination they give composites of very high strength to weight ratio. In recent years composites made from natural (cellulosic) fibers and organic polymers have gained a lot of interest in construction and automobile industry. Unlike synthetic fibers, natural fibers are abundant, renewable, cheap and of low density. Composites made from natural fibers are cost effective and environment friendly. However, lack of interfacial adhesion and poor resistance to moisture absorption makes the use of natural fibers less attractive for critical applications. However, these problems can be successfully alleviated by suitable chemical treatments. This presentation deals with the use of natural fibers such as pineapple leaf fiber, coir fiber, sisal fiber, oil palm fiber and banana fiber as reinforcing material for various thermoplastics, thermosets and rubbers. The fiber surface modifications via various chemical treatments to improve the fiber-matrix interface adhesion on mechanical, viscoelastic, dielectric rheological ageing and thermal properties will also be discussed. Experimental results will be compared with theoretical predications. The advantages of hybridizing natural and glass fibers also will be scanned briefly. The use of these composites as building materials will be discussed. Finally recent developments in cellulose nanocomposites, chitin nanocomposites and starch nanocomposites will also be presented.

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