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Development of organic and inorganic nanoparticles and their subsequent application in nanocomposites for food and non-food packaging systems

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In order to improve performance properties of packaging systems, nanotechnology has come up with its contribution by providing different types of nanoparticles to be used as fillers in polymer matrices. Nano-sized organic and inorganic particles have attracted much attention owing to their unique properties that vary from their bulk materials, thus facilitating their use in packaging industry, food industry and pharmaceutical industry. Recent studies reported that these nanoparticles incorporated in various polymer matrices result in packaging material with improved mechanical properties, thermal properties and improved barrier properties for the food packaging systems. As per studies, variety of inorganic nanoparticles viz. titanium dioxide, zinc oxide, magnesium oxide, gold and silver and organic nanoparticles such as starch and chitosan are available for reinforcing physical and barrier properties selectively for the food systems. Different methods are used for preparation of organic and inorganic nanoparticles. For starch nanoparticles, acid hydrolysis, reactive extrusion, gamma irradiation, ultrasonication, high power homogenization and nanoprecipitation are used for their preparation. Inorganic nanoparticles are prepared by sol gel method, mechano-chemical processing and physical vapor synthesis etc., depending upon the type of inorganic nanoparticle. Organic nanoparticles have an upper edge in terms of biodegradability over the inorganic nanoparticles, so they result in bio-nanocomposites when blended with a biodegradable polymer whereas the inorganic nanoparticles are extensively used as antimicrobial agents in the food packaging systems. The following paper summarizes the information available till date relating to organic and inorganic nanoparticles and contribution to packaging systems as a part of nanocomposites. This paper provides an overview of aspects related to organic and inorganic nanoparticles, including methods of preparation, reinforcing and other specific properties, characterization and application and prospects. Future researches need the area of organic and inorganic nanoparticles related to packaging technology are outlined.

References

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Biography

D C Saxena is dedicated to the continuing development and practice of creative teaching, innovative research and high impact public service programs that have improved food safety, food quality and processing. He has been a Visiting Faculty of Asian Institute of Technology, Bangkok, Thailand. His areas of interest for research includes utilization of starches for food and non-food applications from non-conventional sources, traditional product technology, dough rheology, grain quality assessment, design and fabrication of food processing equipment and has about 90 publications in reputed journals.

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