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Nanotechnology in the food sector: Tiny particles, big effects

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Nanomaterials and nanostructures are and always have been a natural part of raw materials and foods. Even unprocessed foods such as fresh fruits consist of structural components in the nano-scale. For example, proteins are generally globular structures 1-10 nm in size. The majority of polysaccharides and lipids are linear polymers with thicknesses less than 1 nm and are examples one dimensional nanostructures. Furthermore, many food processing operations such as grinding, coagulation, emulsifying or homogenizing produce new nanostructures. To distinguish natural occurring nanomaterials and nanostructures as well as those generated by conventional food processing from intentionally manufactured nanomaterials, the term “engineered nanomaterials” was introduced. By definition, an engineered nanomaterial needs to be intentionally produced in a defined size or size distribution for a specific purpose or function. Research activities on applications of engineered nanomaterials in the food sector include better pesticide efficacy and delivery improved production and processing techniques, modified taste, color, flavor, texture and consistency of food products, enhanced absorption of nutrients and bioactive compounds, reduced fat and salt content, improved shelf-life and safety of food products, novel food packaging materials and nano-sensors for better traceability and monitoring. Currently many nanotechnology applications in the food sector are at R&D or near-market stages. Only nanotechnology-derived materials for food packaging to improve mechanical and barrier properties and some delivery systems for biologically active compounds are available in some countries. However, data on the benefits, improvements and risks of nanotechnology applications in the food sector as well as their economic competitiveness are still almost lacking.

Biography

Ralf Greiner has completed his PhD at the University of Stuttgart in 1993. In 1990, he joined the Federal Research Institute of Nutrition and Food, Karlsruhe, Germany. From 2007 to 2008, he worked at the Federal University of Paraná in Curitiba, Brazil as a Visiting Professor for Biochemistry and Molecular Biology. He is currently the Head of the Department Food Technology and Bioprocess Engineering at the Max Rubner-Institut Karlsruhe, Germany. In addition, he acts as Editor for Food Control (Europe and South America) and is Honorary Assistant Professor at the University of Hong Kong, School of Biological Sciences.

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