

Recent trends in application of nanotechnology in food processing

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ABSTRACT

Food is the substance or material consumed by the consumer to provide a nutritional support for the body and pleasure. The “right to an adequate standard of living, including adequate of food”, as well it is the “fundamental right to be free from hunger”. The application of nanotechnology in food processing may help to consumers to control their food habits and balance the dietary and also care the consumers need and safety. For the present growing population, an appropriate incorporation of food additives for consumers were very essential, especially who suffering from different chronic diseases and imbalanced food. To meet out the present growth nest, nanoscience and nanotechnology may play a vital role to surrogate the future needs of the hamlet. Among different processing methods, food encapsulation, smart packaging and different sensors will boost the technology to the greater heights.

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INTRODUCTION

The National Nanotechnology Initiative (NNI) defines the nanotechnology is the understanding and control of matter at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale^[1]. The nanoscale is expressed or coined in different ways, one nm is one thousandth of a micrometre (μm), one millionth of millimetre (mm) and one billionth a metre (m). The expression nanoscale is used to refer to objects with dimensions on the order of 1-100 nm. To distinguish the nanoscale, it must be noticed that a strand of DNA is 2.5nm wide; a protein molecule is 5 nm wide^[2]. It can be manipulated at the atomic or molecular scale by multidisciplinary approach^[3]. The arrangement of those molecules at a single strand and design complex of systems may differ with specific feature required by understanding the individual molecular structures and its forces caused on the material^[4].

Background of nanotechnology:

The coining of word nanotechnology began with the physicist Richard Feynman in 1960^[5] and Professor Norio Taguchi (1974) expanded and highlighted with more relevant as atom by atom or molecule by molecule^[6]. In

later days, Drexler (1981) expressed the scale in microscopic level^[7]. But at present it is diversified into most of the booming cutting edge areas by manipulation or self-assembly of individual atoms, molecules, or molecular clusters into structures to create materials and devices with new or vastly different properties^[8]. This revolution may change the present scenario, especially in the food industry by developing different processed food products during process, packaging, transportation, and consumption. But most of the meals are consumed by the consumer containing fats, liposomes, flavours and other components are ranging from 50nm to 500nm^[9]. Therefore, the application of nanotechnology would differ with the consumer or condition requirement especially in food industry. But food safety and food security are the need to the future thrust in particular to the nanotechnology concern. The major cause of foodborne illness commonly called “food poisoning”, is by bacteria, toxins, viruses, parasites, and prions can be monitored by nano sensors^[10]

Importance of nanotechnology:

Food is the depending factor through agriculture, by increasing in food supply, which means forward and backward linkages. This growing trend would sustainable by using proper agricultural practices. This approach helps to the consumer demand, encourages acceptance and local self-reliance. The Institute of Food Technologists (IFT)