The Torch
Vol. 3 (44)

Nanobiosensors in the detection of food contaminants

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Nanobiosensing technology is being utilised in food safety analysis to detect various sensitive contaminants in food materials. A sensor is a measurement system with a specific probe that detects a particular species or an element even at trace levels. Biosensors have been used to detect different biological components, such as viruses, bacteria, proteins, nucleic acids, and pathogens. Biosensors contain a bioreceptor and transducer that interact with specific analyte molecules, generating an electrical signal. A nano biosensor, also called a second-generation biosensor, consists of ultrasensitive nanoparticles and transducers. The major advantages of using nanomaterials in biosensing are their combined effect on biological receptor molecules and high surface-to-volume ratio. Synthesised nanoparticles, like metal nanoparticles, carbon nanoparticles, semiconductor quantum nanoparticles and magnetic nanoparticles have widely been used to detect food allergens.

Further, the organic nanofibre nanosensors have been used to detect organophosphate pesticide contamination in fruits and other stored products. Additionally, the organic nanofibre nanosensors aid in understanding the solubility and residual toxicity of different food products. These nanobiosensors have also been used to detect mycotoxins and different mycotoxigenic fungi in various food products. Nanoparticles as biosensors are also used to measure the presence of aflatoxin in pre-harvested and post-harvested food products. Therefore, the ability of nanobiosensors to detect even low concentrations of certain elements can be leveraged to aid in producing high-quality food products.

Keywords: Biosensor, Nanobiosensor, Synthesised nanoparticles, Organic nanofibre nanosensors

Citation:

Aniket Mahaveer Patravali. Nanobiosensors in the detection of food contaminants. The Torch. 2022. 3(44). Available from: https://www.styvalley.com/pub/magazines/torch/read/nanobiosensors-in-the-detection-of-food-contaminants.