Commentary

iMedPub Journals
www.imedpub.com

British Biomedical Bulletin
ISSN 2347-5447

2023
Vol.11 No.1:003

# Targeted Nanomaterials Including Inorganic Nanomaterials, Organic Materials in Developing Sensors for Shelf Life of Food Products

**Zheyan Fang***

Department of Food Engineering and Technology, Tezpur University, Assam, India

**Corresponding author:** Zheyan Fang, Department of Food Engineering and Technology, Tezpur University, Assam, India, Email: zheyanjosh34@gmail.com

**Received date:** January 06, 2023, Manuscript No. IPBBB-23-15994; **Editor assigned date:** January 08, 2023, PreQC No. IPBBB-23-15994(PQ); **Reviewed date:** January 22, 2023, QC No IPBBB-23-15994; **Revised date:** February 01, 2023, Manuscript No. IPBBB-23-15994 (R); **Published date:** February 08, 2023, DOI: 10.36648/2347-5447.11.1.3

**Citation:** Fang Z (2023) Targeted Nanomaterials Including Inorganic Nanomaterials, Organic Materials in Developing Sensors for Shelf Life of Food Products. Br Biomed Bull Vol. 11 Iss No.1:003

## Introduction

Sensors for food analysis, biodegradable packaging, edible food packaging, intelligent packaging, and active packaging are just a few of the numerous food applications for which nanomaterials are extensively utilized. In addition, the food industry employs nanomaterials as nanoadditives, nanocapsules, gelating agents, nanocarriers, anticaking agents, and other applications. Food safety, preservation, and functionalization are the primary roles that nanotechnology plays in ensuring food security. For the purpose of ensuring the safe delivery of food products to end users, food quality and safety must also be measured. In this setting, spectrometric and chromatographic analytical techniques are frequently utilized to measure the stability of the food components. However, the development of sensors for detecting food components (vitamins), ethylene concentrations, volatile gases, biogenic amines, and toxins is directed by the time-consuming and laborious nature of the aforementioned processes. Because food produces a variety of volatile gases, amines, and other compounds when quality declines, the detection of these components can assess the quality of the food. Several amines, including trimethylamine, ammonia, and dimethylamine, are thought to be indicators of fish freshness in this regard.

## Properties of Gold Nanoparticles

Additionally, the measures of food quality (freshness and quality-degrading components) and safety are included in the shelf life analysis of food products, making it extremely important. The presence of any toxic components (patulin and Staphylococcal Enterotoxin B), the presence of undesirable food additives (Sunset yellow and tartrazine, orange II and rhodamine B), and other factors are typically included in the shelf life analysis of food products during storage. The undesirable food quality may develop throughout the entire storage life, beginning with the collection of raw materials, processing effects, storage time, or transportation, or both. Drugs, pesticides, various toxins, undesirable additives (such as colorants), and other external components can also shorten food products' shelf lives or cause issues throughout their entire life cycle. In this context, a variety of sensors are developed to evaluate the safety measures, spoiled food, and food freshness. Pathogens, adulterants, degradation metabolites, toxins, and allergens can all be detected through the use of sensors in the food industry. Direct (freshness, ripeness, microbial, leakage) and indirect (time-temperature indicator, radio frequency identification) freshness sensors can also be found in food. Transducing elements (electrochemical, optical, and mass-based biosensors) and bio recognition elements (antibody, DNA, and enzyme) are also the foundation of biosensors. Titanium dioxide, gold nanoparticles, silver nanoparticles, zinc oxide, quantum dots, and magnetic nanoparticles are some of the inorganic nanomaterials that can be used to create sensors for determining food products' shelf life and quality. Anatase, rutile, and brookite are the three phase structures of titanium oxide, a transition metal oxide. It is a cheap, non-toxic, inert metal that has the potential to fight off a variety of microorganisms. In addition to serving as a biosensor, titanium dioxide is frequently used as a sensor in a number of other applications, such as (i) determining the freshness of pork, (ii) determining the shelf life of mango, eggs, and fish, (iii) determining the presence of histamine in salmon fillet, and (iv) serving as a gas sensor to determine the freshness of fish. Silver nanoparticles are antiviral, antibacterial, anti-inflammatory, anti Shoes, clothing, paints, plastics, appliances, and other items can all benefit from silver nanoparticles' antibacterial properties.

## Development of a Sensor for Quality and Safety Detection

The properties of gold nanoparticles include chemically inert, biological compatibility, high stability, high surface area to volume ratio, high dispersity, non-cytotoxicity, plasmonic nanoparticles, strong scattering properties, and high electrical and heat conductivity. The biomedical application of ZnO NPs includes tissue engineering, anticancer, antibacterial, angiogenesis, drug delivery, immune therapy, gene delivery, biosensing, bioimaging, and antidiabetic. Electron transporting artificial nanocrystals are known as quantum dots. After colloidal synthesis, plasma synthesis, viral assembly, and electrochemical assembly, the quantum dots are made. In addition, graphene quantum dots are utilized as multifunctional sensors, an optical glucose sensor, a photoluminescent pesticide detection sensor, a visual copper ion detection sensor, and for phenols in olive oil detection. Quantum dots, on the other hand, are widely applicable to drug delivery, imaging, and sensor applications. Polymeric nanomaterials, such as dendrimers, hyperbranched polymeric nanoparticles, covalent organic frameworks, molecularly imprinted polymeric nanoparticles, and polymer nanocomposites, are examples of organic nanomaterials. The development of a sensor for quality and safety detection during food product shelf life makes use of titanium dioxide in conjunction with other materials. Nanosensors are a new technology with limited potential for biological systems. It may be challenging to differentiate sensor-induced aberrations from fundamental biological events because of the potential for some nanosensors to disrupt cell metabolism and homeostasis, altering cellular and molecular profiles. Nanosensors require a high degree of accuracy to be manufactured due to their small size and susceptibility to various synthesis procedures, posing additional technological challenges. Nanosensors face difficulties with dispersion, establishing repeatable calibration procedures, and utilizing preconcentration and separation processes. In terms of freshness monitoring, spoilage detection (volatile gas and amines), and safety measures to ensure the safe consumption of food products, the nanotechnology-based sensors are extensively utilized in shelf life analysis. A wide range of properties, including high catalytic activity, chemical property, biological activity, surface chemistry, photocatalytic activity, and others, can be exhibited by nanomaterials, including carbon allotropes, inorganic nanomaterials, and organic nanomaterials. In addition, the utilization of the specified nanomaterials in combination results in enhanced sensitivity for a number of food components, as well as increased selectivity, reproducibility, and sensitivity—all of which are essential characteristics for sensors. As a result, its improved properties, which result from the synergistic effects of combining nanomaterials, make it more appealing for food shelf life detection sensors. In addition, in order to guarantee the safe and healthy delivery of food to end consumers, more intensive research in this field will necessitate the production of these sensors on a large scale in the future.