

Nanotechnology In Food Packaging

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Abstract--Nano technology is one of the new methods in the food industry and help in the development of food packaging and food security, the improvement of plastic barriers and improve food safety and to warn consumers of contaminated food materials of great interest . Nano-composites are used for packaging and food safety. Nanotechnology is also used for the production of stronger flavored things. Today many companies improved the quality of their products and have dominated the market due to nanotechnology. In this decade, there has been widespread talk of smart packaging. In this paper, the impact of nanotechnology in food packaging has been studied.

Key word: Nano technology, nano material, smart packaging, nano packaging.

I. Introduction

Nowadays in This industrialized world time is a very valuable. People want to do their work simultaneously and take the most advantage of their time.

There are many changes in the food industry for many years, and because of this continuous change the packaging industry has made great progress For many years the human has been concerned with the protection of food and the packaging materials involved with it In this regard , there was this knowledge that was found and the food industry used this knowledge to improve and develop the human health. In today's world, glass and metal packaging has been replaced with plastic materials.

The emergence of nanotechnology has brought about the trend of rapid growth of the food industry. Nano technology has helped to raise some of the material properties of biodegradable packaging and anti-microbial activity has increased use Enzyme Nano technology has helped the biodegradable material to increase the anti-microbial activity.

Nanotechnology has helped to raise some of the material properties such as increased: Antimicrobial activity of the enzyme used in biodegradable and anti-microbial properties and also produce a film coating that is biodegradable.

II. Nano technology in food industry

The word Nano is derived from the Greek word Gnome and a nanometer is a thousandth of a thousandth of a thousandth of a meter .Nanotechnology is the size and

structure between approximately 1 and 100 nanometers in at least one dimension. When the particle size is reduced to the value it shows chemical and physical properties of materials obtained differently than macromolecules.

Nanotechnology was used for the first time by the United States Department of Agriculture Food. The use of Nanotechnology in the food industry is to enhance the quality and safety of food packaging and also to increase nutritional value, to preserve the aroma and taste of food and reduce costs in the food industry Nanotechnology helps to make low-fat ice cream.

Nanotechnology applications are currently on the detection of food pathogens and Food is a Nanotech sensor using Nano-sensors that are highly sensitive and fast. For example, a spray made using nanotechnology that includes Lumina scent proteins is designed to bind to the surface of microbes such as Salmonella, E. Cole. These proteins when linked with microbial contamination of food and drinks simply shine and are seen.

Nanotechnology already made progress in producing functional foods that your body will respond to the needs they also produce important role antibiotics to eliminate pathogenic bacteria in food Nanotechnology also have arisen the potential to produce new packaging , food packaging and with less weight and better resistance.

According to a study by Frost and Sullivan :now People demand greater protection from food packages that can be important to keep it fresh and packaged food security.

This is one of the reasons for increasing the use of nanotechnology.

Nanotechnology is supporting a chain from farm to table.

III. Nano-composite

Nano composite is defined as polymer band. The use of nano particles is to produce materials with improved properties. Films obtained from Nano composites have better mechanical properties barrier Of pure polymer .For Distribution patterns of platelets Nano composites process largely improve their performance properties such as:

High mechanical strength, Thermal stability, Chemical stability, Recovery and stability and good optical clarity are the properties. Nano composites act as a barrier to

gas Study shows the oxygen transfer rate In the Nano composite nylon is almost 4 times less than conventional nylon. The bio passes polymers the polymers directly can be obtained from biomass, (Polysaccharides, proteins pitted) that these polymers are readily biodegradable. Nano composites are composed of:

Polymer Composites with Nano-clay (Blocks are good for gas)

Nano silicon dioxide (used for abrasion resistance)

Titanium dioxide (for protection)

Titanium nitride (to help process and mechanical strength)

Packaging made of composite films contains silver nano particles and Nano-zinc oxide that makes a lot of loss of microorganism and thus prevent the orange juice into corruption. In some cases, the use of silver zeolite To create antibacterial properties of polymer composites It is usually used in composite packaging materials that have longer transport and Chitosan is a polysaccharide that is also a natural anti-microbial properties and has a Used in packaging films.

The biodegradable polymers and natural materials are combined with the Nano clay and created new materials has the ability to absorb Is an example Nano clay composite with starch or poly-lactic Enhances the mechanical properties It is also an excellent moisture barrier.

Also lots of new films producing Nano scale silicates are the decrease Leaking oxygen into the package and moisture out Result Is prevented in contamination of food. Nano composites can be well again and thus their use can reduce packaging waste It shows that the positive aspects of Nano composites.

Are search group at the University of Leeds in the UK has Magnesium oxide and zinc oxide nano particles are highly effective In removing microorganisms Generally it can be replaced.

Plastic materials that change color:

Today, considerable variation in the properties of organic polymer materials. A Material made of plastic food packaging is a good alternative. The problem of plastic permeability of Gas and other small molecule often the problems ignored because those are the benefits. Because is not known a pure polymer and arise food packaging film, multi layer mixtures polymer.

In industry the plastic packaging that change color makes changes to fundamental. These packages have the ability to change in case if the changes in food And consumers are aware of the changes to the materials in packaging Through the use of an electric potential electro chromic material For example, a group of scientists South Hamilton in England, Germany, A sample has made of films that Which is composed of a polymer with repeating units crystalline and high contrast ratio Light. These contrasts makes occur a wide range of optical frequencies this is reflected in the great diversity of the region are called patience and gap. Also embedded carbon nano particles among the parts of the crystalline is reflected light from the nano particles and

cracks and is scattered by the nano particles embedded between the spheres.

The electro chromic polymer:

These materials can absorb the light properties of Changes are reversible and Conjugated polymers are a type of electro ceramic by External stimuli are affected changes in reflection This reflection is dependent on the nature of the crack Thus, polymer changes in the color with changes such as oxidation or electrical modifications.

If the same material is used in the meat packing can combinethe Films with Mineral oxides Works As an ion storage device Prevent color changes in meat and food. Color change is an innovation that benefit consumers and producers from hearing and those consumers can to ensure This product was bought is new and completely healthy and has no health problems.

IV. Smart packaging:

Often judged are packaged foods on three based criteria:

Capabilities marketing environment.

More than a third of the food produced in the world perishes before reaching the hands of consumers. One of the main objectives of the packages is protecting against damage and corruption and reduce the amount of packaging materials that can be used to save Energy and raw materials with food science technology.

For example Aseptic packaging through this method we can reduce the thermal energy consumption of packaged food and this means 70% saving energy compared with conventional packaging and produce less waste.

If the food goes bad, smart wrapping will change color this paper was developed by scientists at the University Strachey Cold in Scotland. Smart labels indicate the freshness of food is up Due to the corruption problem that could be easily read in packaged food in different parts that the Consumer finds For example, add effective cooling unit, car transportation through the labels are easy to identify Smart food packaging can check out what's on it and microbial quality and safety of food products as well as important information can be packed obtain.

When the material is packaged consumer realized product quality is realized through a series of contractual pacification Of which is written on the product packaging For example, packaged milk usually lasts about 15 days But problems occur when the is stored product at temperatures above the limit In that case earlier than schedule distortion.

One of the benefits of smart packaging that the food situation report at the time of purchase to the consumer. Smart packaging utilizes chemicals Ensor sorbet sensors to monitor and address safety Researchers at Rutgers University in the United States are developing an electronic language for inclusion in the package. These are composed of Nano-size sensors that are sensitive to the fumes given off by strip of food

spoilage are Sensor bar. With there is in gas sensor that changes color, the brand the consumer can easily detect corruption.

Various indicators can be used in smart packaging to get more favorable results, including:

Leakage of carbon dioxide and oxygen, which can provide information about changes the gas in packaging Food, gives us his index can be for emulated a salable or a printed layer of amulet layer tablet form or used in a film.

Sensors for pathogens and contaminants in food, it is the transmission of electro chemical , Electro chemical biosensors based on optical systems such as polymers used for gas detection Vitality indicators designed to respond to chemicals released by food result of spoil a gas a For example, the hydrogen sulfide indicator can be used to determine the quality barley packaging.

Hydrogen sulfide vitality indicates or change colors based on the high levels of myoglobin chicken packaging in storage for use Sensitive indicator of microbial metabolites a swell as it is.

Pathogen indicators:

This system is based on polyethylene for packaging materials This method can id Among the materials that have been developed in Lawrence Berkeley National Laboratory and is included in the package identify the presence of pathogenic bacteria and pesticide residues can also find can be named the cross polymerized compounds and Poly diacetylene molecular with a deep blue when they come connected with poison changed to red.

V. Problems of Nano- technology

Some research shows that nano particles import of the digestive tract and membranes And cause harm to them .Some nano particles, such as Gold Nano particles create problems for the fetus.Nano particles include chemical and physical properties which can interact with living systems resulting in unexpected toxicity.And the current certainties that are there are the safety concerns about the use of nanotechnology. Scientists had to observe the consequences to searching and researching the use of nanotechnology.

And now there are great concerns about Impact of Nanotechnology on the digestive system. Scientists are trying to fill these gaps now.

Nano material in food may be absorbed easily from the gastrointestinal tract. Gold nano particles tested on mice have shown increased absorption in the digestive tract due to reduced size of the particles, smaller particles are absorbed faster than larger particles and the nano particles are ingested. These can enter the blood stream through the capillaries to the liver or enter through their respiratory system into the lymphatic system. We should provide an appropriate framework for risk assessment. In this they review toxic effects of nano particles in the food industry. Although there are limited data on the toxicity Nano foods found .

Studies conducted by the House of Lords Science and Technology Committee of the UK didn't find evidence of cases where nano material may harm human health.

Nowadays, intelligent packaging developments are a little ahead of time and it has rapidly found market acceptance. In addition it has limited the initial procurement costs.

European food safety Authority (EFSA) says:

The Recently developed Nanotechnology has made it possible for Food safety and feed applications for the requirement of a risk assessment.

Conclusions

Given the current situation their disadvantages and benefits of nanotechnology This technology has opened a new horizon for the food industry. With the help of this nanotechnology technique, long lasting products can be made and use them for a healthy and valuable diet and safely packaged food .

It has disadvantages that many areas of nanotechnology still remained screened and unclear hence should be paying more attention to this aspect. Above all, the culture of getting the customers habituated to the use of packaging materials is essential. A customer can get accustomed to this culture by using the powerful packaging that keeps food fresh and better than ordinary packaging. Also the food is healthier. For these products, the first step is to learn more about how to buy this kind of packaged food for healthier reasons. For example, to create awareness about the products we need an advertising plan to show that the consumer can buy food with nanotechnology packaged food by paying a little more money.

The benefit is to take advantage of food safety and also more lasting food products for the beneficial use of time. So there is no need to go daily to buy food products. Ultimately it creates less waste. It helps the environment by the use of biodegradable materials and ultimately saving more money.

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