

# Preparation, Characterization and applications of turmeric composites with Iron Oxide, on shelf life of fruits

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## Abstract

Nanotechnology is super natural spell making not only revolutionizing medical sciences but also making better commercial uses. Recently, chitosan has received increased attention for its commercial applications in the biomedical, food, and chemical industries. Use of chitosan in food industry is readily seen due to its several distinctive biological activities and functional properties. The antimicrobial activity and film-forming property of chitosan make it a potential source of food preservative or coating material of natural origin. This study investigated the preservation activity of composite of turmeric and iron oxide nano particles prepared through green synthesis and co precipitation method, to increase shelf life of fruits and size of nano particles analyzed by characterization technique XRD. Moreover composite have anti-fungal and anti bacterial activity as well. A chitosan coating retarded water loss and the drop in sensory quality, increasing the soluble solid content, titratable acidity and ascorbic acid content. This research reveal that applying a chitosan coating effectively prolongs the quality attributes and extends the shelf life of banana and strawberry fruit. The results showed that application of chitosan coating effectively maintained quality attributes and extended shelf life of the fruit upto seven days without the use of refrigerator.

**Keywords---** *Nano Composite, Shelf life, XRD, FTIR*

## I. INTRODUCTION

The quick advancement of nanotechnology has changed numerous spaces of nourishment science, particularly those that include the preparing, bundling, stockpiling, transportation, usefulness and other wellbeing parts of sustenance. A wide scope of nano organized materials (NSMs), from inorganic material, metal oxides and their nano composites to nano natural materials with bio active specialists has been connected to nourishment business. Notwithstanding the gigantic advantages of nano technology brings to the table which are developing concerns related to developing nano technology, as the amassing of NSMs in human bodies and nature can cause a few well being and security dangers. Thus, security and well being worries just as administrative strategies must be considered while fabricating, preparing wisely and effectively bundling and devouring nano handles nourishment items

## II. LITERATURE REVIEW

The synthesis of nano structure materials specially metallic nano particles, has accrued utmost interest over the past decade owing to their unique properties that make them applicable in different fields of science and technology. The limitation to the use of nano particles is the paucity of an effective method of synthesis that will produce homogenous size and shape nano particles as well as particles with limited or no toxicity to the human health and the environment. The chemical method is

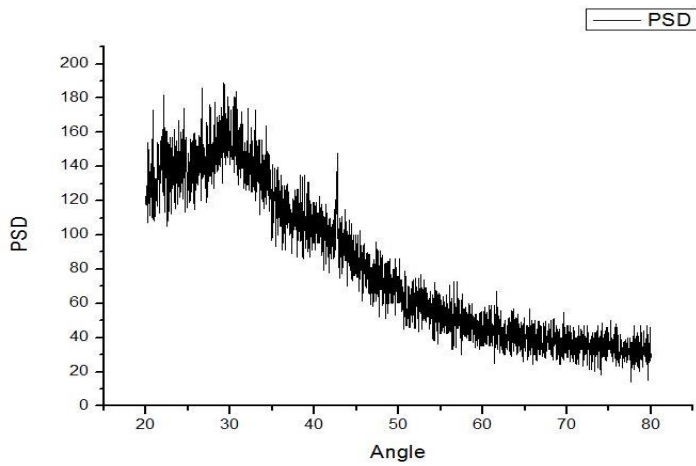
relatively more accurate and precise method for the production of nano particles. It is easy method to apply. The bio mineralization further of these nano particles provide more accurate results.

## III. METHODOLOGY

Took the 10g of NaOH and 10g of Iron nitrate. Made the solution of NaOH in 500ml and iron nitrate in 200ml. Done the titration of both sodium hydroxide and iron nitrate. Put iron nitrate into the beaker and NaOH in the burette. Dropped the the solution drop by drop and checked the change in color. effect on signal quality over far distances even without the presence of large quantities of AWGN is known as fading. The well known and most important reason of fading is multipath phenomenon.

## IV. RESULTS AND DISCUSSIONS

Made the solution of composite of iron oxide and turmeric and then soaked the bananas in the solution. Checked the results on daily basis for consecutive 7 days. The crystal structure of the products was characterized by X-ray Diffraction (XRD). The patterns with were recorded in the region of  $2\theta$  range 10 to 800. The morphology of the Fe<sub>3</sub>O<sub>4</sub> materials were examined by Scanning Electron Microscope. (SEM). Transmission Electron Microscope (TEM) JEOL JEM 1400 was used for characterizing the size of nano particles.



## V.CONCLUSION

Food is any substance which contains nutritional value, when consumed they are ingested by the organism they breakdown to produce energy and sustain life .The energy is produced at the cellular level due to many pathways. Healthier the food is, more energy is produced to maintain the metabolism of the body. The basic secret of nanotechnology and food industry is that the cellular level of human cells and food products components which are of Nano-scale and micro scale can easily interact with the nano particles which incorporates nanotechnology in all sectors of the food industry which includes, processing, packaging, safety and security. Packaging is revolutionized due to the integration of Nano-composites, Nano-sensors, bio-degradable Nano-composites for leakage proof, gases free, and pathogen less food packaging. They act as barrier for exchange of gases and maintain the quality of food using Nano-clays, the formation of bacterial and fungal organisms or any kind of pathogens and toxins are terminated using antimicrobial packaging using silver, titanium oxide, zinc oxide and other bio-Nano-particles. Biodegradable

Nano-composites packaging are of great potential to environment. Smart packaging allows the consumers to choose right products which have good shelf life and also by indicating the nature and other characteristics of the food. This technology also paves way to food safety and security. Nutritional supplements with the combination of nanotechnology deliver the drugs efficiently. Also many commercial nutraceuticals are available. These supplements interact most powerfully with cells and easily acceptable. Even though nanotechnology came to effect in foods by producers' it is yet to be recognized by the consumers, due to the ethical issues and unawareness. The potential use of Nano-technology and its benefits in industry and consumers health has to be spread. Prospective research in nanotechnology in food industry and its incorporation have the capability to reinvent food world. Likewise certain regulations have to be made by the food administration department of the countries government to establish proper and safe commercialization of nano food. The interaction of nano-particles and cells leads to debate about some pessimistic approach to nano-foods .But the wide potential of nanotechnology in overall food industry and its benefits in providing rich nutritional value, quality packaging, smart sensing are to be borne in mind and relevant research for more safer techniques for incorporation of nanotechnology in food industry has to be implemented.

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#### **VII. DISCLOSURE OF POTENTIAL CONFLICTS OF INTEREST:**

There is no conflict of interest between the authors and any organization.

#### **VIII. COMPLIANCE WITH ETHICAL STANDARDS:**

The whole project was done at National centre of Physics, Islamabad. There is no issue ethically as experimentation involved synthesis of nano particles from green synthesis while its application was checked on fruits and vegetables. It is in compliance with ethical standards.

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