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PRESERVATIVES FOR EXTENDING SHELF LIFE OF FISH BY USING NANOPARTICLES BASED ON NANO ICE

Deepti[1]
[1]*PG-Biotechnology Engineering, Maharshi Dayanand University,Rohtak,Haryana*

ABSTRACT:
Nanotechnology is a branch of science that basically deals with synthesi of nano-size particles. A nanoparticle is an ultrafine particle, or a tiny particle that ranges between 1 to 100 nanometers in size and is undetectable by the human eye. Nanoparticles types are commonly divided into two main groups:- organic and inorganic Organic groups include lipsones, hybrid, micelles, dendriners and compact polymeric nanoparticles. Inorganic group includes quantum dots, silica,fullernes and metal nanoparticle. Artificial nanoparticles can be created from any solid or liquid material, including metals, dielectrics, and semiconductors. Nanoparticles have other physical properties that must be measured for a complete description such as size, shape, dispersion state,surface properties and crystallinty.In the current research work, collected some water from fish area and analyse bacteria responsible for spoilage of fish which are pseudomonas,Escherichia coli,Achromobacter,Serratia, Micrococcus,Staphylococcus aureus.Then isolate bacteria for suitable media (MSA,NAM).Organic acid and bacteriocins from bacteria showed good antimicrobial activities against spoilage bacteria.Plant derived antimicrobials could prolong fish shelf life and decrease lipid oxidation.Nanoparticles were synthesized of mainly Zinc,Copper,Magnesium,Silver and their characterization were done using UV visible spectrophotometer,Zeta potential,PSA(Particle size Analyser).Different ice crystal of different nanoparticles of Zn,Ag,Mg,Cu shows to prolong the shelf life of fish.Hence nanoparticles can be a great source for preserving and enhancing the shelf life of fish.
Keywords: PSA,Antimicrobial activity,Organic nanoparicle,MSA,NAM

1.INTRODUCTION

Nanoparticles are small particle that ranges between 1 to 100 nanometres in size , cannot seen by naked eye, nanoparticles have different physical and chemical properties to their larger material counter parts. Nanoparticles types are commonly divided into two main groups:- organic and inorganicOrganic groups include lipsones, hybrid, micelles, dendriners and compact polymeric nanoparticles.

Inorganic group includes quantum dots, silica,fullernes and metal nanoparticles.Artificial nanoparticles can be formed created from any solid or liquid material, including metals, dielectrics, and semiconductors. They are internally hetrogenous and homogeneous.They are also found in foods may consist of inorganic (eg. Silver, titanium dioxide, silicon dioxide, iron oxide and zinc oxide). Nanoparticles composition plays a major role in determining their GIT fate.

Nanoparticles are used in modern era at wide scale for manufacture of scratchproof eyeglasses crack resistant paints, fabric and ceramic coating for solar cells.Nanoparticles made artificially created from any solid or liquid material including metals, non metals or dielectrics and semiconductor. It may be homogenous and hetrogenous internally

1.1 Preservatives in Food:

Food has natural expiration process that is the result of bacteria, fungus and molds taking over the food. By adding the preservatives whether they be natural, artificial, or a combination of both- it prevents these foods from expiring as fast without preservation food can last for four to fivr days. But their shelf life increase to >16 days when a preservatives is added and the pH is lowered accordingly.Production & Packaging the food items in temperature suitable environment is the most commonly used technique to increase the shelf life of qualitative product.If at any step during

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manufacturing the food product faces a temperature abuse, the shelf life can significantly reduce.In order to maintain seafood at its freshest it should be put into the freezer as soon as possible after purchase. Try to keep it frozenas close to minus 20^{o} as possible it will remain in optimum condition for up to six month this way.For water-based products use an oil based produce or anhydrous product oils, salt, butter, or castile soap(without added water), they will last about the time end.

2.MATERIAL & METHOD

Synthesis of nanoparticle by chemical reduction method:

Chemical used:

Distilled water, Starch powder, Zinc nitrate, Sodiumhydroxide, Magnesium sulphate, Barium sulphate, Silver nitrate, sodium boroxide, NaCl, $CuSO_4$.$5H_2O$, Ascorbic acid, Protease peptone, Mannitol, Beaf Extract, Phenol red, Agar, Yeast extract, Peptic digest of animal tissue, Potassium phosphate, lactose, sucrose, eosin-4, methylene blue.

Instrument used :

Microscope, centrifugation, magnetic stirrer, hot plate, hot air oven, UV- visible spectrophotometer, particle size analyser, laminar air flow, autoclave

ZINC (Zn)

0.1% of starch were dissolved in 25ml of distilled water.Pour the solution in beaker. Place the beaker into ice bath for 5-10 min.Stir the solution with magnetic stirrer.Add silver nitrate solution dropwise with continuous stirring until the silver nitrate is finished.Then add 0.26g of NaOH after this the colour of solution become light yellow and then grey after complete NaOH is dissolved with continous stirring.Held the solution overnight.Then centrifuge with D.W twice & ethanol once.Then heat the pellet for 30 min at 80^{o}c.

Copper(Cu)

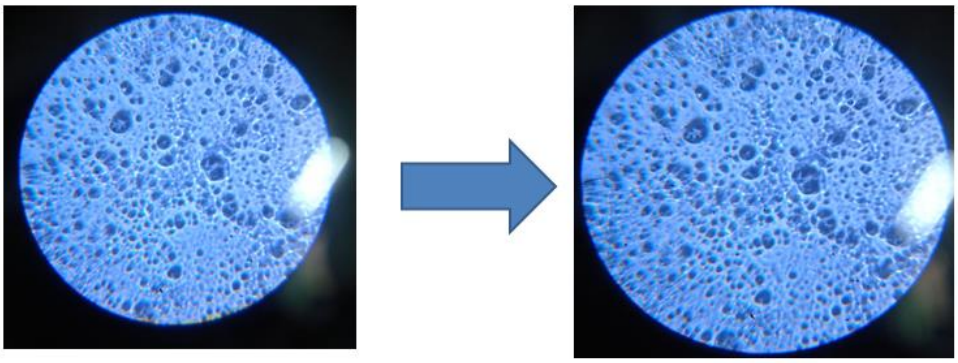
Prepare 30ml of copper sulphate pentahydrate & starch solution in a beakerAdd magnetic beads in beaker.Then stir for 30 min.After stirring add ascorbic acid in starch & CuSO4 Solution than stir for 15 min .After that check the pH of the solution then add NaOH solution till neutral the ph of the solution. After check the pH heat the solution for 45 min at 60^{o} c .After that leave the soln overnight to settle.Next day discard supernant.

3.Results &discussion

Charecterisation Of Nanoparticles:

Nanoparticles have different analytical requirements than conventional chemicals for which composition and concentration are sufficient metrices.Nanoparticles have other physical properties that must be measured for a complete description such as size , shape, dispersion state , surface properties and crystallinty.

FIGURE 1:



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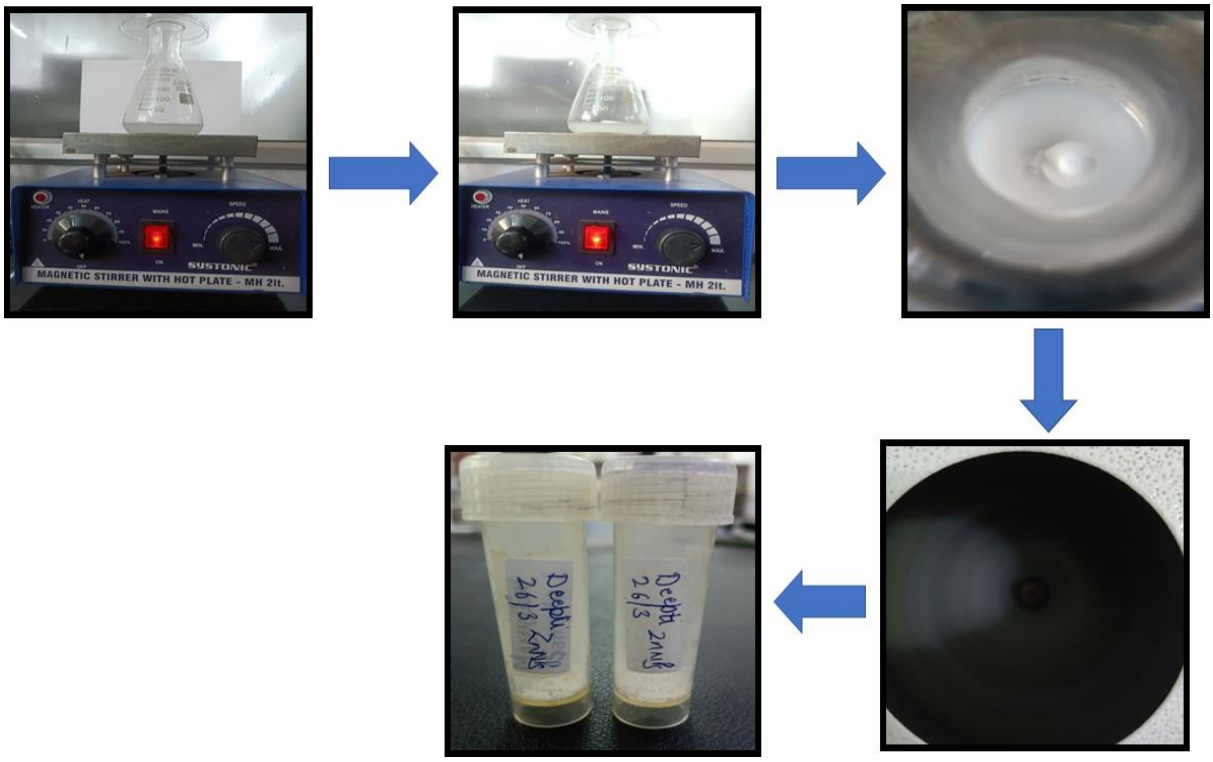
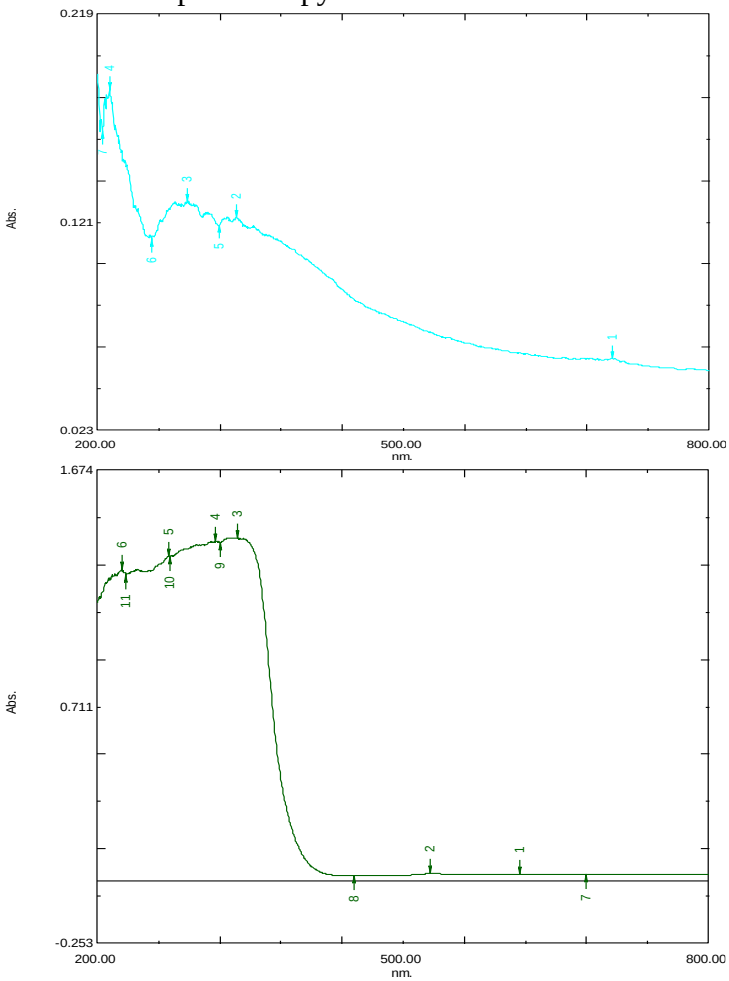


UV Visible Spectrophotometry of Zinc & Copper: At a particular wavelength, absorbance was measured in spectroscopy.



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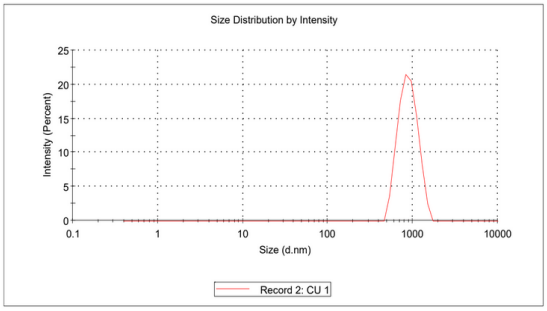
PSA (Particle Size Analyser):

Particle size analyser analyse the size and charge of nanoparticles**.**

Copper (Cu)

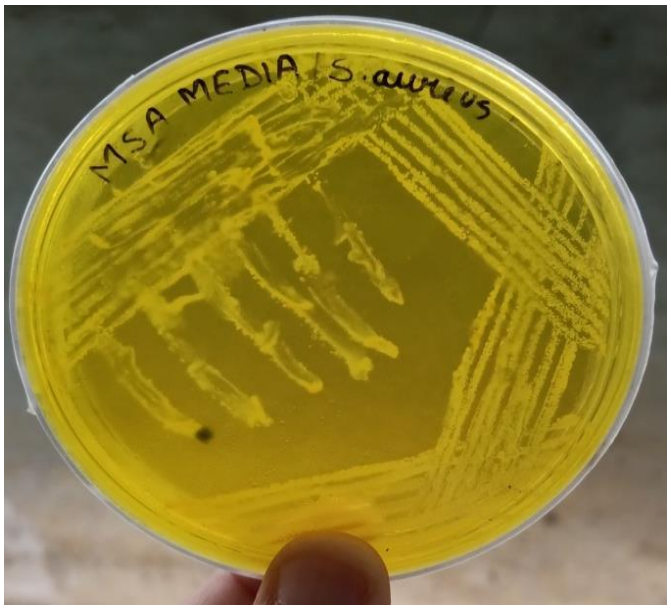


Bacteria Isolation:

In this collected some water from fish area and analyse bacteria responsible for spoilage of fish which are pseudomonas, Escherichia coli, Achromobacter, Serratia, Micrococcus,Staphylococcus aureus.We isolate bacteria for suitable media.

MSA Composition:

CHEMICALS	COMPOSITION (For 25ml)
Sodium Chloride	1.87 g/ml
Protease peptone	0.25 g/ml
Mannitol	0.25 g/ml
Phenol red	0.00062 g/ml
Agar	0.375 g/ml



Spreading and Comparison:

We divided petri plate into two half one is fish water and another one is fish water +nanoparticles this way follow spreading.

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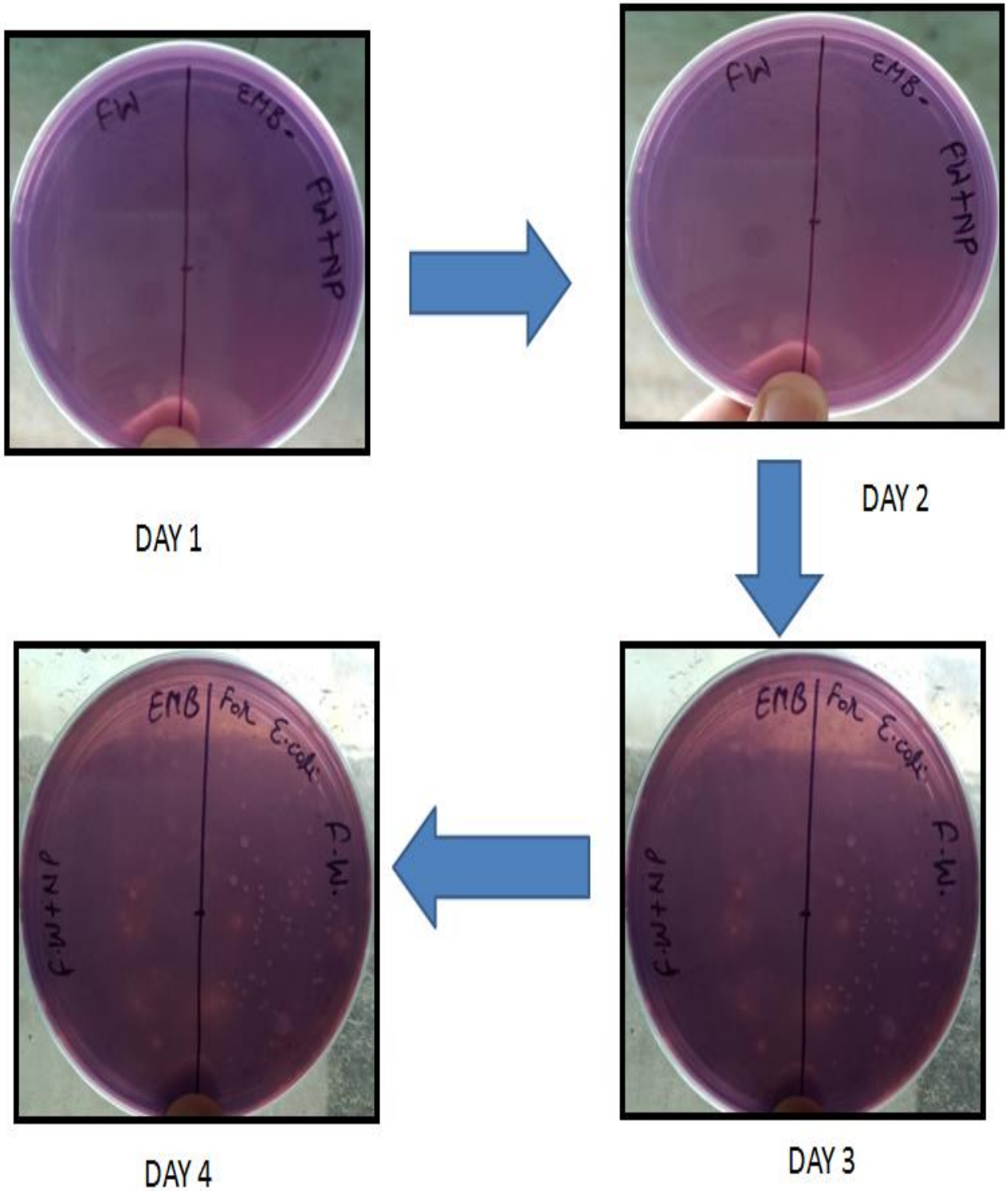

Expanded in different directions, to observe things from micro to nano, to even smaller scale sizes by different microscope, behaviour of fish was observed. In case of nano ice,fish shelf life was expanded.

Fish With Different Time Intervals

In this, we take fish from nearby and kept in two different ways:

One side we kept fish with nanoice and analyzes with different time interval On other side we kept fish with nanoparticles and ice, that nanoparticles extend shelf life of fish as compared to other.

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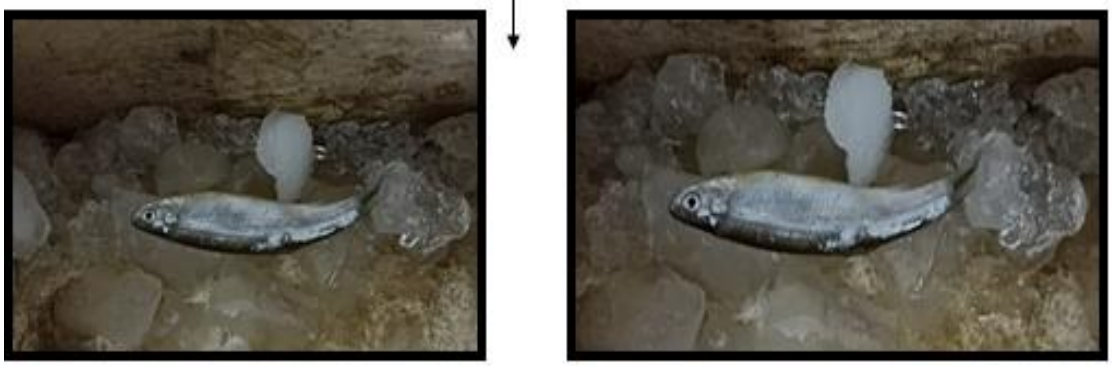
Fish kept in nano-ice

After 2 Hrs



After 4 Hrs

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