

*National Academy of Sciences of Ukraine
ISM – V.Bakul Institute for Superhard Materials*

Innovative Technology Localized Ion Plasma Sputtering

Dispersions of Nano Metals in Various
Liquid Carriers

2, Avtozavodskaya Str.,
Kiev, 04074, Ukraine

LIPS innovative technology

for Nano-Metals Colloidal Solutions manufacturing

in water soluble or water insoluble liquids

Localized Ion Plasma Sputtering – LIPS

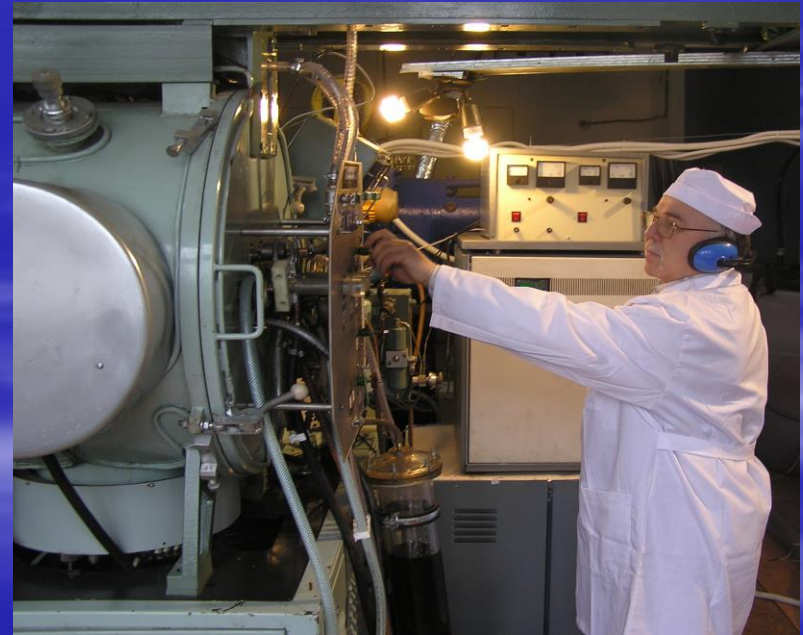
- The proprietary physical process of metals and alloys nano dispersion by plasma jet in vacuum providing one-step productive implantation of sputtered particles to various water soluble and water insoluble liquids (no dry nano powder phase)

Advantages:

- High sputtering rate and nano particles concentration in liquids
- Controlled particle dimensions and sharp dispersions
- High purity metal nano particles in carrier liquids - no traces of additional chemicals
- Wide range of water soluble or water insoluble carrier liquids
- Chemically homogenous and stable to sedimentation colloidal solutions
- Highly concentrated nano additives - ready to be mixed with traditional ingredients of end products
- Low vacuum system, low temperature process, multi sputtering modules units
- Highly productive economical environmentally safe process – no pollution, common ventilation system

Innovative Technology and Pilot Modular Line for Manufacturing Ultra Clean Dispersions of Concentrated Nano Metals in Various Carrier Liquids

- **What we are offering:**
- Semi-industrial Master Batches - Dispersions of Nano Silver, Nano Gold, Nano Platinum and dozens of other Nano Metals in custom liquids with the proof of the best world Labs for the quality, size, distribution, biocompatibility
- Green Technology and Know-how along with Pilot Unit for one-step productive manufacturing of highly concentrated Ultra Clean Dispersions of Nano Metals in Various Liquids: Glycerin, OILS, PLASTICS, POLYSASHARIDES, WATER etc.
- Patented in USA and Ukraine method of metals sputtering in vacuum of controllable nano size Particles (Localized Ion-Plasma Sputtering –LIPS, Patent USA 5,591,313; Patent Ukraine #80513)



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**CUSTOM CONCENTRATED NANO DISPERSIONS
IN VARIOUS CARRIER LIQUIDES**

“SILVER SHIELD -1000”

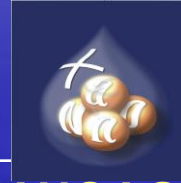


“SS-1000”

is ready to use
CONCENTRATED blend of
metallic nano silver particles
with glycerin in homogenous
STABLE SOLUTION

Size, nano particle shape and
sharp dispersion proved by
the best independent world
Laboratories in USA,
China, Israel, Germany

“NANOAGENT+”



“NANOAGENT+”

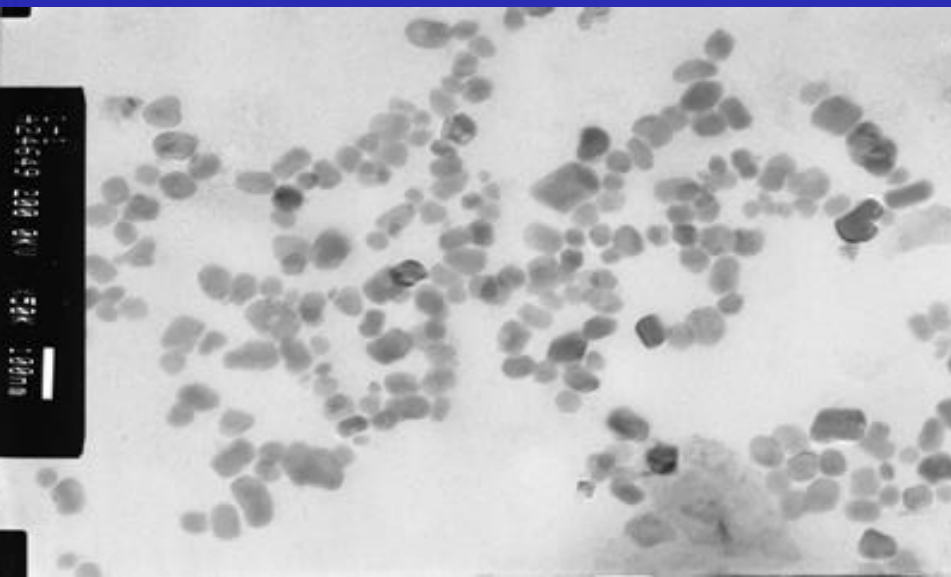
is ready to use
CONCENTRATED blend of
CUSTOM metallic nano
particles (Au, Pt, Pd, Cu,
Fe, Mo, etc) with OILS,
**PLASTICS, OTHER
CUSTOM CARRIER
LIQUIDS** in homogenous
STABLE SOLUTIONS

**DEVELOPMENT AND LICENCING OF PRODUCTIVE LIPS
TECHNOLOGY AND UNITS FOR NANO PRODUCTS MANUFACTURING**

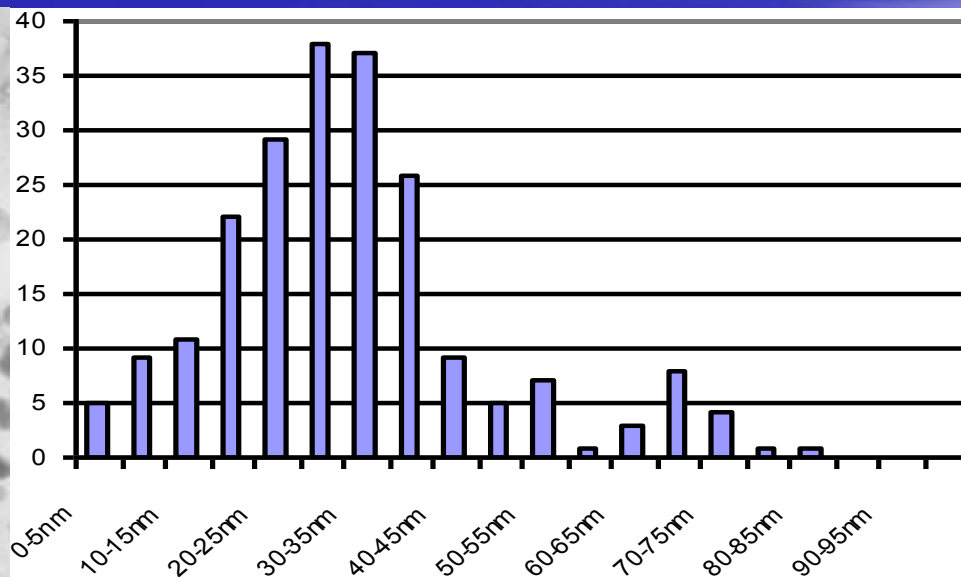


Nano Silver Colloidal Solution in Glycerin SS-1000

Electronic microscope picture of Silver nano particles

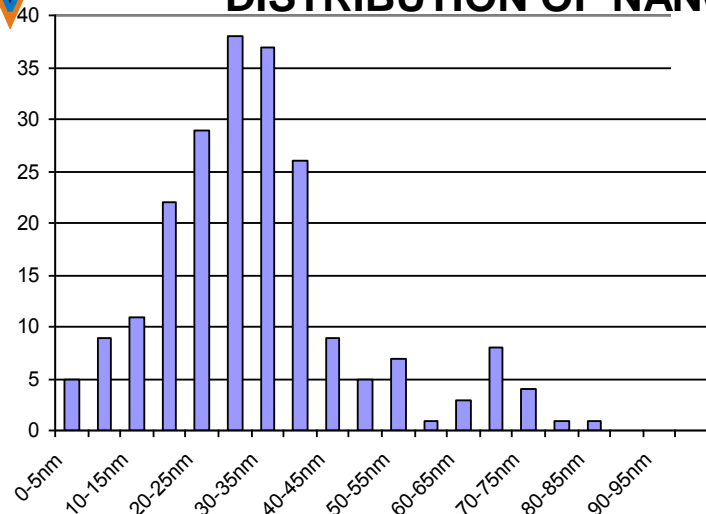


Dispersion of Silver nano particles

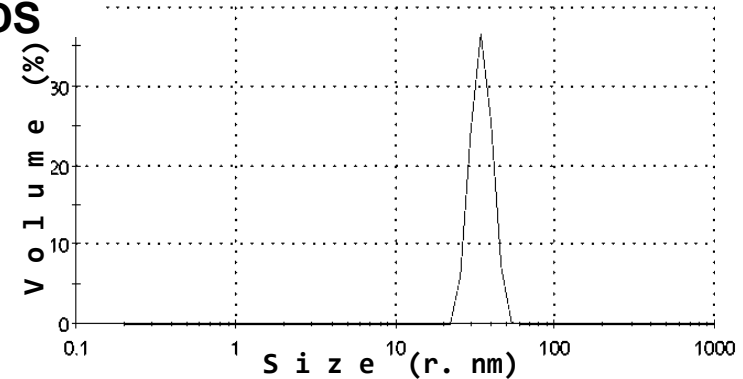




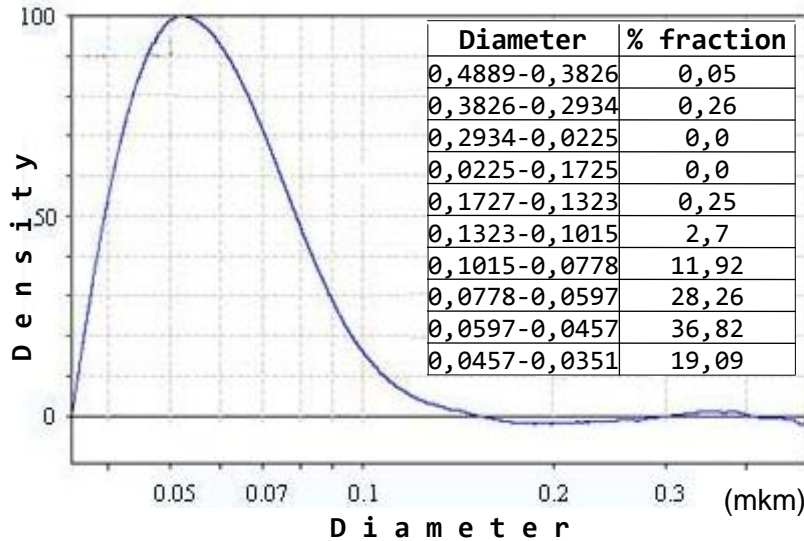
DISTRIBUTION OF NANOPARTICLES SILVER SS-1000 ACCORDING TO VARIOUS METHODS



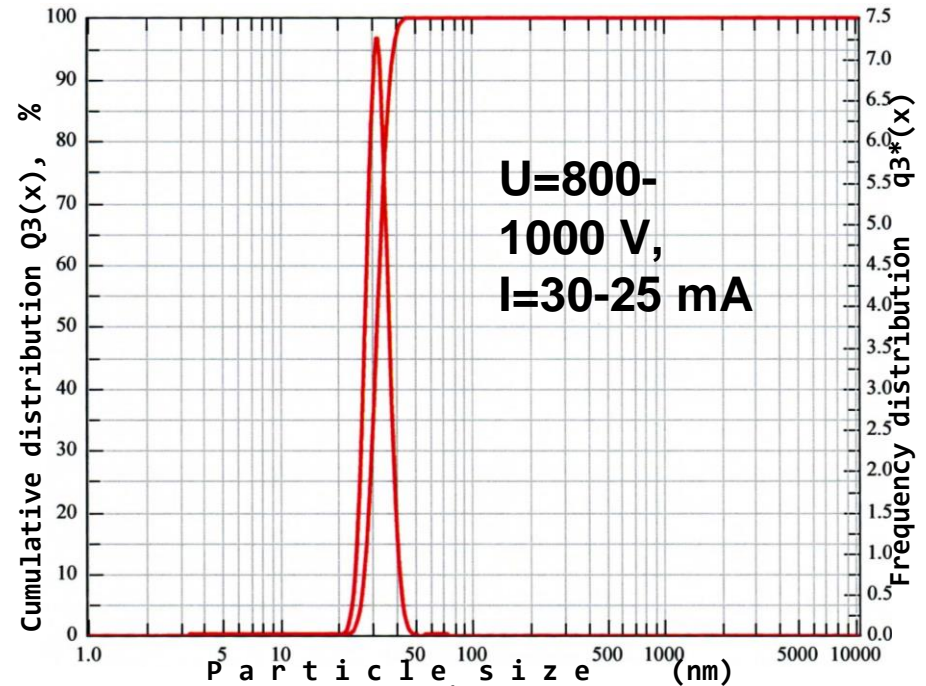
Research by high resolution SEM



Laser dynamic light scattering method (Science Colloidal Lab, USA: device DLS)



High-speed centrifugation method (Shanghai University, China: device CPS DC 2400)



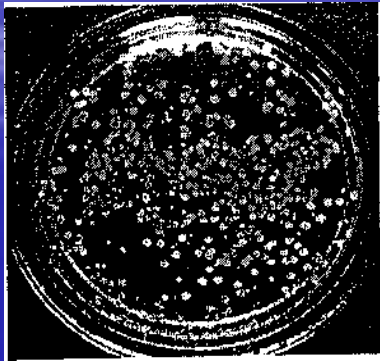
Photon cross correlation spectroscopy method (Germany: device NanoPHOX NX-i009)

Nano – Silver Basic

- The largest commercial product in the world among all Nano-Materials – 50% of all nano materials on the world market
- Very much related to daily life – implemented to more than 800 healthcare goods
- Excellent material in view of health and environment – non toxic, non allergic, negligent soil or water contamination in comparison with common household chemicals
- Easy to use in many application fields

SS-1000 Product Features

The authentic innovative product produced by special LIPS technology



a

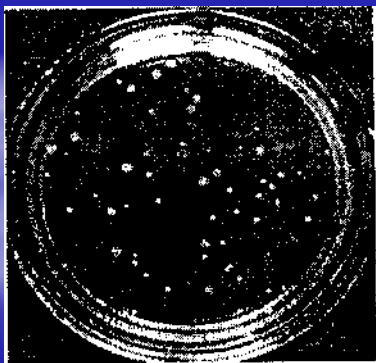
The main antibacterial agent – **Silver** concentrated **nano particles in homogenous solution in Glycerin** :

It rapidly kills parasites, viruses, fungus and other pathogens including:

Staphylococcus , Salmonella arizona;
E. Coli, virus H1N1 , fungi and more then 700 other pathogens. For example:

E. Coli (a) in a presence of SS-1000 water solution in concentration:

- 1,5 mg/L stop a grown of 80% of bacteria in less then 3 minutes (a);
- 6 mg/L kills of 99% of bacteria less then in a 3 minutes (b).



b

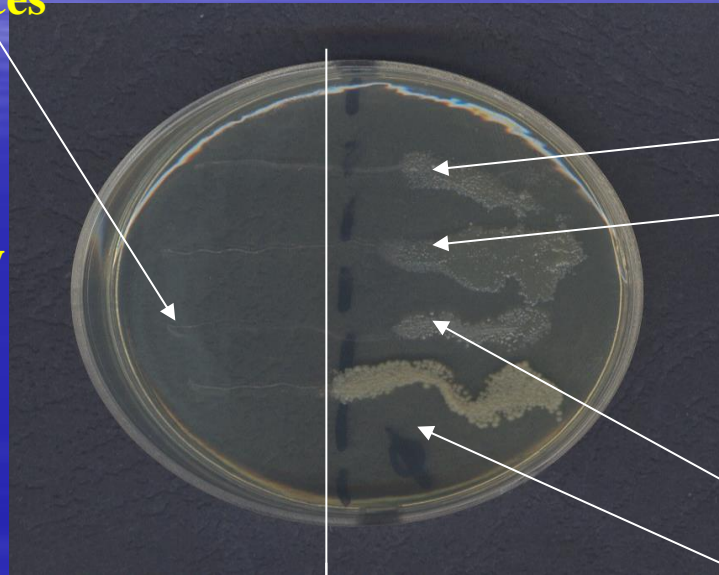
FIELDSES OF APPLICATION OF NANO SILVER DISPERSIONS

Disinfectant killing over 1000 Bacteria, Viruses, Fungi

Contact Surfaces

Contaminated by bacteria and treated by Nano Silver disinfectant keep sterility

up to 5 days



Staphylococcus
Escherichia coli

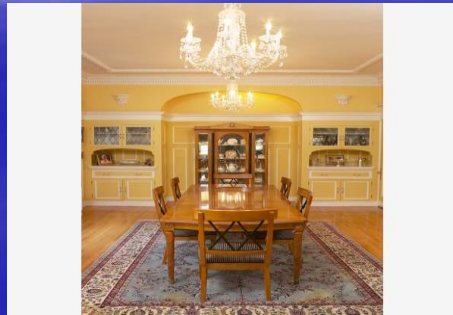
Bacteria grow on non treated surface during 5 days period

Pseudomonas aeruginosa

Candida albicans

Treated with Nano Silver

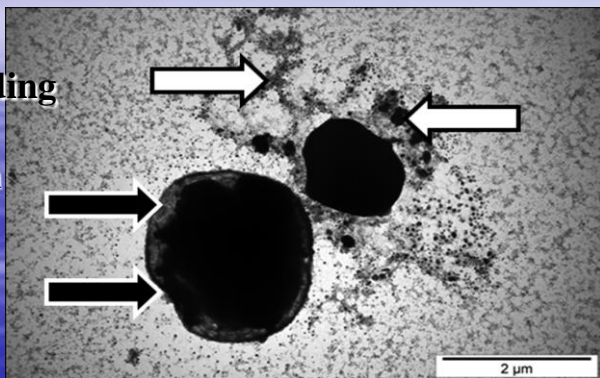
Non Treated with nano Silver



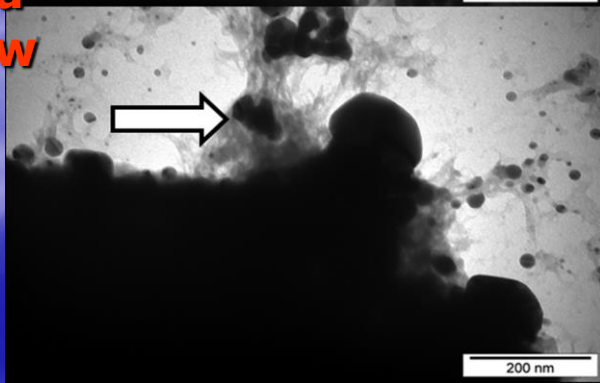
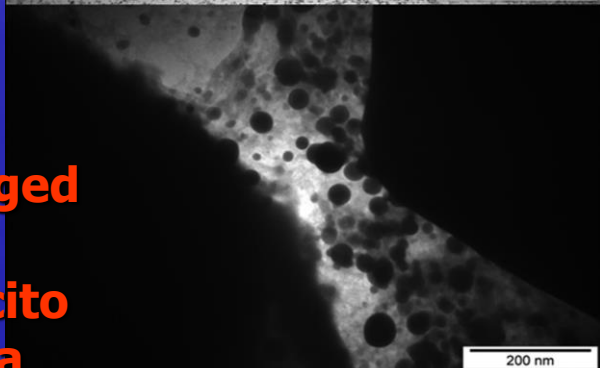


Research of Fungicid Concentration for Product «Nanoagent +» - custom mix of nano Ag и nano Cu

Ag Nano particles
Surrounding micro organism



Damaged cells
With cito plasma outflow



Candida albicans

Concentration of «Nanoagent Pro»	25 mkg/ml 3-rd day - No grow of Fungi cells	25 mkg/ml 4-th day - No grow of Fungi cells	25 mkg/ml 5-th day - No grow of Fungi cells	12,5 mkg/ml 3-rd day + grow of Fungi cells
Name of Fungi				
<i>Candida utilis</i> Lia-01-	-	-	-	+
<i>Candida albicans</i> YKMV2681 (ATCC101)	-	-	-	+
<i>Zygosaccharomyces rouxii</i> NCYC 381	-	-	-	+
<i>Saccharomyces cerevisiae</i> ATCC 9763-	-	-	-	+
<i>Candida pseudotropicalis</i> -	-	-	-	+
<i>Aspergillus niger</i> (field stamm)	-	-	+	+

How to use additives with Nano Silver “SS-1000”

- Anti bacterial, anti algae solution
- Treatment of water in pools and spa with nano additive consisting ultra clean Silver nano particles **will clean water from 99% of bacteria algae and biological films during 20 days**

Simple treatment,
no chemicals, no needs to
chlorinate water, regulated ph,
not toxic to human and pets,
no allergic reactions
fast healing mine scratches,
dermatitis, solar irritations



How to use additives with Nano Silver “SS-1000”

- Anti bacterial, anti allergic solution
- Treatment (spraying) of home air conditioners filters with “SS-1000” will **clean fresh air eliminating 99% of bacteria and fungi during 20 days**

**Simple application,
No needs of chemicals,
not toxic to human and pets,
no allergic reactions**



Applications of Nanosilver for Food Storage & Packaging

Containers and Films made from plastic with Nano Silver additions can extend shelf life of the food

In 3-5 times

<p>2010 Market Volume \$410 mil:</p>	<p>2012 Market Volume \$5800 mil:</p>
<p>Nano Silver Appl food procc. - \$100 mil; food package-\$210 mil; food Ingrid - \$100 mil</p>	<p>Nano Silver Appl food procc. -\$1303 mil; food package \$2930mil; -food Ingrid - \$1475 mil.</p>



*Nano and Biocidal Silver: Friends of the Earth Australia (<http://nano.foe.org.au>)
 Friends of the Earth United States
 (<http://www.foe.org/healthypeople/nanotechnologycampaign>)

Applications of Nanosilver in Food Processing & FOOD Ingredient



- Russian Researches have proved that addition of **Silver coated ceolite** into wheat flower in concentration – 0,0015% **have decreased** the presence of "Bacillus mesentericus" and "Bacillus subtilis" - **main bread diseases - by 44%.**
- It has extend the shelf life of fresh bread **to 72 hours** without special packaging.

Using **"Silver Shield-1000"** - liquid water soluble easily mixable product you can save about 40% of bread and **extend the shelf life of the fresh bread about 3 times**

"Silver Shield-1000" is a price competitive food supplement:
8-10 times cheaper then world analogs

How to use additives with “Nanoagent+”

- Anti bacterial, anti fungi solution “Nanoagent +”

Treatment of rugs and carpets with water solution of nano product “Nanoagent +”

containing nano particles of extra pure Silver and Copper **will clean contact surfaces from 99% of bacteria and fungi during 20 days**

- **No needs to chemical rugs cleaning**



No chemicals, not toxic to human and pets, no allergic reactions

How to use additives with “Nanoagent+”

- Anti aging additives to Cosmetic Creams

Consisting Nano particles of pure Gold (Au – 24 carats) with controllable size and concentration have wide applications in modification of cosmetic products due to deep penetrating ability and strengthening of collagen layers, the safest cosmetic alternative to botulinum injections that provides guaranteed noticeable results



**No chemicals,
no allergic reactions,
PARFUME FREE, PARABENS
FREE, FIRMING
INGREDIENTS FREE,
TIGHTENING INGREDIENTS
FREE, SILICONE FREE,
ALCOHOL FREE, fast
strengthening of
collagen layers during
15-20 days**

World demand for nano Silver

- MIn 2010 Demand for new
- ounces Silver industrial uses (nano Silver)
- 45 Autocatalists
- 40 Food Packaging
- 35 Super capacitors
- 30 Super conductors
- Water Purification
- 25 Hygiene
- Medical Uses
- 20 Wood Preservatives
- 15
- 10
- 5
- 0

According to data from
Silver Institute

Prep.GFMS Ltd, March 2011

	2010	2012	2020
	\$410	\$5800	\$20000
	MIn	MIn	MIn
Food processing	\$100	\$1303	
Food packaging	\$210	\$2930	
Food Ingredient	\$100	\$1475	



Nano Silver Colloidal Solution in Glycerin

SS-1000

Characteristics and Advantages

- Multiple function Anti-Bacteria, Sterilization, Anti-fungus, De-odorize, Excellent functional durability
- Wide range of Anti-Microbial spectrum
- Do not allow tolerance and resistance to wide range of Bacteria
- Controllable size (down to 10 nm) and sharp dispersion
- Certified concentration (100 ppm up to 1000 ppm)
- Sedimentation stability in glycerin and its water solutions
- Environmental friendly and no harm to human and pets
- Easy to apply to various products by simple mix with traditional ingredients without basic productive technology changing
- Can be applied to transparent product like PE film, lacquers, paints
- Economical manufacturing process and availability of mass production under competitive price

- Treatment of traditional masks with our nano Silver product SS-1000 can upgrade it's protective qualities against virus H1N1 and to rise protective time in 3-5 times



3-4 sprays to inner and outer surface of mask enough to upgrade the antibacterial properties and protective time for individual mask

Productive LIPS UNIT



- Capable to produce 10 L /h of nano Silver product “SS-1000”
- Concentrated (100 mg/L) Colloidal solution of metallic nano Silver in Glycerin

Contact information

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Thank you for attention