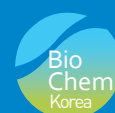


BIO CHEM KOREA



Sterilization Material Specialist Company

BIO CHEM KOREA

Company Introduction

Bio Chem Korea Co., Ltd. is a specialist company striving for the coexistence between human and nature through its advanced technology and innovative and creative solutions in natural antibacterial and sterilization material areas.

Business Philosophy

Develop and perform the technologies that can raise the quality of life by improving the hygiene and health of people

Business Areas

Development, manufacturing and sales of natural sterilization materials and natural insect-proof material, manufacturing and sales of environmentally friendly anti-bacterial household items, development, manufacturing and sales of food freshness preserver, material application consulting and carrier technology development.

Corporate history

- 2010.01 Company incorporated
- 2010.09 "Doctor Sand" received the excellent technology award in the Start-Up Business Competition
- 2011.03 Export of anti-bacterial master batch to Philips China began
- 2011.05 Certified as a venture business
- 2012.10 Head office expanded and relocated (Bucheon)
- 2013.06 Opened a branch in Tianjin, China
- 2014.02 Acquired an approval for waste intermediate recycle method
- 2014.10 Acquired a license for cosmetic manufacturing business
- 2015.07 Acquired a license for cosmetic manufacturing and sales business
- 2015.07 Established a corporate R&D institute

R&D

- 2010.04 Completed the development of Bacto Liquid, a natural antimicrobial using beehive extract
- 2010.08 Completed the development of Bacto Cera, a natural antimicrobial for plastic resin – SMBA
- 2012.06 Completed the development of antibacterial and anti-insect material through nanoliposome of natural extracts – SMBA
- 2013.08 Completed the development of functional paint including anti-bacterial and VOCs reduction functions – SMBA
- 2013.10 Completed the development of subsidiary materials for café with a anti-bacterial function by recycling used coffee grounds
- 2015.04 Developed a plastic with non-contact sterilization function
- 2015.07 Developed a food freshness preserver

Certifications and Approvals

- No. 20150400667 Certified as a Venture Company
- No. 2015113650 Corporate R&D Institute Certified
- KIF No. 11773 Approved as a cosmetic manufacturing business
- KIF No. 6320 Approved as a cosmetic manufacturing and sales business
- BC No. 27 Approved as a hygiene product manufacturing business
- No. 2014-2 Approved as a waste intermediate recycling business

Bacto Liquid

Bacto Liquid is a natural anti-bacterial material, which is flavonoid extracted from beehive (propolis) and stabilized with a special separation extraction method by Bio Chem Korea with its own technology.

Non-toxic to human

- Non-toxic to human due to the material from natural extracts
- LD50 test : 5.000mg/kg
- Skin irritation test : approved
- Oral mucosa test : negative
- Oral toxicity test : negative

Extra strong sterilizing power

- Kills 99.9% of ordinary germs as well as salmonella, virus, etc. within 30 seconds
- FITI certified by Korea Testing and Research Institute



Bacto Cera

Bacto Cera is a natural anti-bacterial material with strong anti-bacterial power as well as high heat-resistance by encapsulating Bacto Liquid, which is the material with strong anti-bacterial properties separated and extracted from honeycomb (propolis), with inorganic materials.

- Can be applied as anti-bacterial plastic material that can be injection molded by being mixed with various resins with Bacto Cera that is processed into the form of powder by inorganic encapsulation of natural anti-bacterial materials
- Excellent anti-bacterial effect on Gram-negative and positive bacteria such as E. coli, Salmonella, Listeria, Staphylococcus aureus, Bacillus subtilis, and in particular, excellent anti-bacterial effect for food poisoning bacteria

Thermal stability

- Organic material weak to heat is incorporated into an inorganic carrier in order to maintain its effectiveness without destroying its ingredients in a hot temperature [Highest resistance temperature: 250°C]

Effectiveness durability

- Microporous encapsulation achieves sustained release effect of sterilization
- Effectiveness maintained between 1 to 5 years depending on the applied materials



Bacto Cera Halo Test

Applications

○ Bacto Liquid



Detergent Dishwashing detergent Hand wash Deodorizer

Ordinary household products that require anti-bacterial function, such as soap, detergent, dishwashing detergent, etc.

○ Bacto Cera (Powder Type)



Dipper well Tub lid Cup Lid Sandwich case

Products that require anti-bacterial function, such as plastic, silicon injection molded products, etc.

Insect proof materials

This is a natural insect proof material in a double capsule shape, which is encapsulated again with a micro capsule after separating and extracting insect repellent from natural materials such as neem, sophora root, clove, cinnamon, etc. and nanoliposoming them.

Advantages

- **Zero vermin** : Repelling effect remains for a long time without tolerance of insects by applying natural insect repellent
- **Zero germs** : 99.9% anti-bacterial effect lasts by inorganically carrying natural anti-bacterial materials
- **Zero fungus** : Excellent fungus prevention
- **Zero heavy metal** : Does not contain heavy metals such as lead and arsenic
- **Zero toxic gas** : Does not generate carcinogenic toxic gas material such as formaldehyde, etc

Certifications

- **Mite repelling test** : Mite repelling rate 99.8% (FITI Test Laboratory)
- **Anti-bacterial activity test** : 99.9% (Korea Conformity Laboratories)
- **Skin irritation test** : no irritation (Dermapro)
- **Fungus-resistance test** : anti-mold rate grade 0 (Korea Conformity Laboratories)
- **Heavy metal test** : 6 major heavy metals not detected (Korea Conformity Laboratories)
- **Toxic gas test** : Total VOCs are not detected (Korea Conformity Laboratories)



2 Patents registered

- A double capsule with anti-bacterial and anti-insect functions and its manufacturing method
- Liquid paint that contains double capsules with anti-bacterial and anti-insect functions

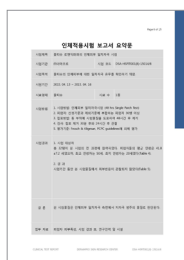
Natural Antiseptic Solution (NBS-150)

NBS-150, which is a natural antiseptic solution, is an antiseptic solution for wet tissue. This is a material that enables antiseptic without using any artificial antiseptic treatment, extracted from the total of 8 natural ingredients and developed considering various functionalities, such as anti-bacterial, moisturizing, skin irritation, etc.

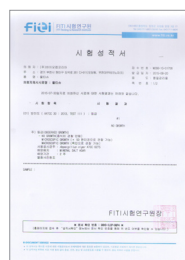


Natural antiseptic solution ingredients and effects	
Ingredients	Effects
Purified water	
Volcanic water extract	Soothing skin, waste removal, elasticity, moisturizing
Cypress (phytoncide) extract	Anti-bacterial, antiseptic, deodorization, moisturizing, anti-inflammation
Sciadopitys verticillata extract	Moisturizing, anti-bacterial and antiseptic,
Abalone fermentation extract	Whitening, moisturizing, anti-aging, strengthening skin elasticity
Grapefruit extract	Anti-bacterial, antiseptic and deodorization
Propolis (honeycomb) extract	Anti-bacterial, antiseptic and anti-inflammation
Caviar extract	Moisturizing
Coffee extract	Anti-bacterial and antiseptic

Certifications



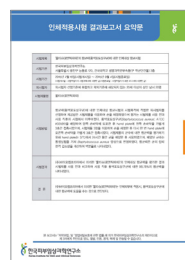
Skin irritation test



Anti-bacterial test



Anti-mold test



Anti-bacterial clinical test



Cosmetic Inspection Test

Freshness preserver (JY-815)

Factors having effects on freshness

After harvesting fresh crops, metabolism becomes a major factor that causes quality changes after harvesting generally, so the required factors to maintain freshness of fruits and vegetables are various factors, such as temperature, moisture, oxygen concentration, carbon dioxide concentration, ethylene gas, vibration and shock, pathogenic microorganisms, light, etc.

Effect of ethylene

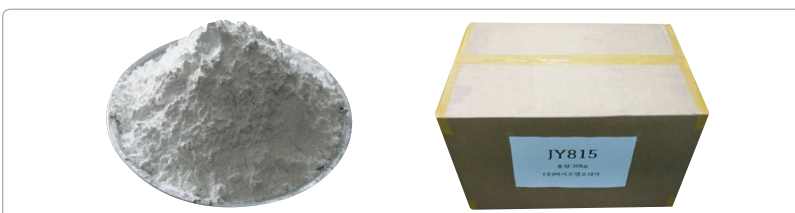
Ethylene can not only have various effects on the growth or development of plants but also is produced by almost all plants so it is recognized as a plant hormone. The most representative of all effects of such ethylene on plants is that it promotes the aging of tissues. Therefore, when storing fruits and vegetables that require freshness, ethylene must be either absorbed or removed

Effects of JY-815

Rapidly absorbs and degrades ethylene generated from fruits and vegetables (ethylene removal capacity (9.5ppm/g/h))
Inhibit proliferation of microorganisms and fungus with anti-bacterial function
Anti-fogging effect through controlling moisture



Freshness preserver block type



Freshness preserver powder type

Control group



Test group



Temperature condition: room temperature
27 ~ 30°C

Cucumber

- On the 10th day of the cucumber test, the control group is completely decayed so mildew is formed and water is collected



Banana & tomato

- On the 8th day of the banana test, the control groups shows the skin completely gone dark and water is formed.
- The tomato is dried at about 40% and decomposition occurs



Peach

- On the 5th day of the heavenly peach, fungus is formed and decomposition occurs in the control group



Tangerine

- On the 15th day of the tangerine test, mildew is formed.

Anti-bacterial master batch

- Manufactured as anti-bacterial plastic material that can be injection molded by being mixed with and various resins with Bacto Cera that is injected and processed into the form of powder by inorganic encapsulation of natural anti-bacterial materials
- Excellent anti-bacterial effect on Gram-negative and positive bacteria such as E. coli, Salmonella, Listeria, Staphylococcus aureus, Bacillus subtilis, and in particular, excellent anti-bacterial effect for food poisoning bacteria
- As it is supplied by being manufactured with the same materials as applied products such as PE, PP and ABS so that it can be applied to products by not changing physical characteristics on various materials

PE

- Food packaging materials, clean wrap, vacuum hygiene pack, laminating film, etc.
- Injection molding of drinking water tank, anti-bacterial cutting board, water bottle, living appliances
- Shows excellent anti-bacterial power and has high mechanical and thermal property so is suitable for products that require high adhesion strength or high processing heat resistance stability



Category	Unit	Test method (ASTM)	Representative value
Density	g/cm ²	D1905	0.921
Melting index	g/10min	D1238	12
Softening point	°C	D1525	85
Tensile yield strength	kg/cm ²	D0638	110
Tensile rupture strength	kg/cm ²	D0638	130
Rupture flexible rate	%	D0638	550
Cold brittleness temperature	°C	D0746	< -70

PP

- Ice makers, tableware, water purifier body, hose, pipe, etc.
- school supplies such as ball pens, pencil cases, etc. Food packaging, etc.
- Shows excellent anti-bacterial power and can be used in variety of purposes such as food containers, general containers for living, etc.



Category	Unit	Test method (ASTM)	Representative value
Density	g/cm ²	D1905	0.962
Melting index	g/10min	D1238	12
Softening point	°C	D1525	152
Tensile yield strength	kg/cm ²	D0638	340
Tensile rupture strength	kg/cm ²	D0638	100
Rupture flexible rate	%	D0638	> 550

ABS

- ABS products requiring anti-bacterial function, such as home appliances, household items, baby products, office supplies, automobile parts, etc.
- Shows excellent anti-bacterial power and excellent in anti-bacterial durability, impact resistance and machinability

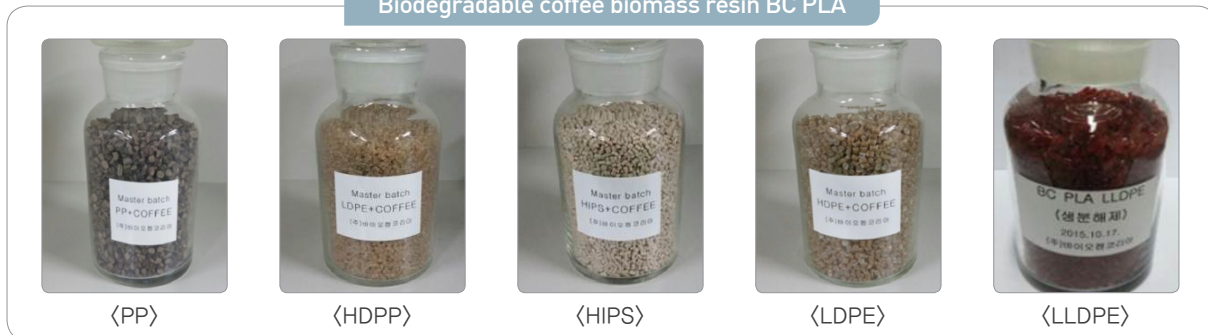


Category	Unit	Test method (ASTM)	Representative value
Density	g/cm ²	D1905	1.04
Melting index	g/10min	D1238	12
Softening point	°C	D1525	97
Tensile yield strength	kg/cm ²	D0638	380

Biodegradable Biomass Plastic (BC PLA)

Biodegradable biomass resin composite BC PLA processed from used coffee grounds, which is a by-product.

Biodegradable coffee biomass resin BC PLA



Extrusion and injection molding products

Film extrusion

Injection

Sheet extrusion

Physical characteristic table			
	Unit	Test method	Result value
Melting index	g/10min	ASTM D1238	16
Density	g/cm ³	ASTM D792	0.9
Yielding point stress	kgf/cm ²	ASTM D638	160
Breaking point flexible rate	%	ASTM D638	100<
Bending elasticity	kgf/cm ²	ASTM D790	17,000
Impact strength (23°C)	kgf-cm/cm	ASTM D256	2.5
Thermal strain temperature	°C	ASTM D648	120

There is almost no change to physical characteristics even when extruded and injected by mixing with plastic resins

BC PLA anti-bacterial test
99.9% BC PLA

BC PLA biodegradability test 53.1%
BC PLA

Patent registration

Manufacturing method of biodegradable resin composite using coffee by-product and manufacturing method of biodegradable resin composite with non-contact anti-bacterial function of biodegradable resin composite manufactured from it and biodegradable resin composite with anti-bacterial function manufactured from it and water tissue packaging cap with non-contact anti-bacterial function using it.



BP Certification BP

Bio base resin certification
Biomass use, carbon emission reduction, Toxicity reduction in ecosystem



Parts and Toll Processing



Mite patch

A mite repellent product for mattresses using natural anti-insect materials, sustained release mite repellent patch with a special coating on the patch with extracts from natural anti-insect materials.



Vitamin filter

Equipped in water softeners to eliminate residual chlorines in tap water, gelate vitamins and strengthens durability



Vitamin air-conditioner filter for automobiles

Products with nanoliposome vitamins specially coated on media. Anti-bacterial functions, eliminates PM-10 and releases vitamins



Anti-bacterial tub lid

Injection molded product, which is given a anti-bacterial function on silicon rubber. Prevents bacterial contamination from hands.



Biomass plastic resin

Biodegradable biomass plastic manufactured using coffee by-product.

Injection molding is possible without reduction of physical characteristics



Functional soft capsules

Functional materials are manufactured as capsules through macromolecule reaction.

Can be applied to food, cosmetics, drinks, etc.



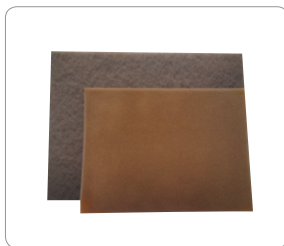
Aroma kit

Product equipped in the air hole of bed mattresses and releases delicate scent of natural aroma



Anti-bacterial sedi-filter

(for bidets, water purifiers and softeners)
Sediment block is created with anti-bacterial materials to control the proliferation of germs in the filter, as well as to eliminate foreign particles and rust



Anti-bacterial filter for air purifiers

Propolis extracts are specially processes and coated on filter media.

Anti-bacterial power: 99.9%
Anti-mold: level 0



Anti-bacterial dipper well

A product that can be used hygienically when cooking by suppressing the proliferation of germs



Biodegradable anti-bacterial sheets

Forming sheets for disposable food packaging materials

For vacuum forming such as tofu containers, cup lids, sandwich cases, etc.



Moisturizing beauty capsules

A product encapsulating extracts with whitening and moisturizing functions; used by equipping in showers and water softeners.

Toll processing

- Extracting functional materials
- Manufacturing micro capsules (micro capsules, nano capsules)
- Manufacturing soft capsules
- Tablet manufacturing such as foaming tablets,
- Ball manufacturing (3φ~15φ),
- OEM manufacturing and filling of cleaning agents, detergents, hand cleaners, etc.

introduction of products



Anti-bacterial and anti-insect paint additive

(Ecoting Zero)

This is a cutting edge material processed by microcapsulating natural vermin repellent material and anti-bacterial materials and a new material with excellent insect repelling and anti-bacterial effects as well as anti-mold effect.



Anti-bacterial paint additive

(Ecoting Pro)

This is a cutting edge material from processed nanoliposome natural anti-bacterial materials and a new material with anti-bacterial effects as well as anti-mold effect.



Water saver for toilet bowls

(Garisuae)

This is a water saver that can save 30% of water for each use and enables perfect cleaning, easy installation and semi-permanent use without reduction in water pressure.



Self-sterilization cap

With its non-contact sterilization feature, it automatically sterilizes water tissues by just closing the cap and is environment friendly using biodegradable raw materials. You can use it for a long time using self-adhesive that can be attached and detached for more than 1,000 times.



Anti-bacterial cleaning agent

(Sense Fresh)

Made from natural materials, it's safe and an anti-bacterial cleaning agent with anti-bacterial effect as well as deodorizing effect.

Volume : 40ml, 250ml, 450ml, 1L, 10L



Anti-bacterial hand cleaner

It is made from natural surfactants and natural ingredient anti-bacterial extracts so it's non-irritant and boasts excellent anti-bacterial power.

Volume : 250ml, 500ml, 1L refills



Multi-purpose cleaning agent

It is a product using natural materials such as grapefruit seed extract, catechin, etc., so is not irritating and has excellent cleaning power.



Dishtowel disinfectant

You can get sterilizing effect with just soaking dishtowels with it as if you steam-clean dishtowels without steam-clean them and with the 100% natural ingredients of food additives, it is non-toxic to human body and safe without any skin irritation with natural moisturizing ingredients.



Anti-bacterial dish washing liquid "Yeon"

This is a product with 98.8% natural biodegradability and strong cleaning power, as well as odor elimination. This is a type 1 kitchen detergent that can sanitize not only kitchen tableware but also baby feeding bottles and fruits.



Cypress extract

100% natural phytoncide ingredient eliminates sick house syndrome and has excellent odor removal and anti-bacterial effects.

Volume : 250ml, 40ml



Cinnamon distilled extracts

100% natural cinnamon ingredient removes dust mites and has excellent mosquito repelling effect.

Volume : 250ml, 40ml



Bio fog machine and eco deodorizer

This is a new-concept anti-bacterial deodorizing machine and deodorizer that are used by spraying fog of natural extracts such as phytoncide, herbs, etc.

Self-sterilization cap

What is self-sterilization?

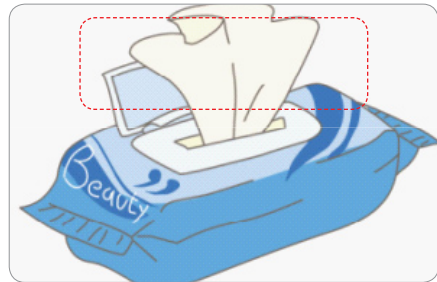
This is a technology that performs sterilization with a non-contact method without touching the areas where sterilization is required.

Before closing the cap after using water tissues, the area where half-pulled is inserted back inside and the cap is closed and at this time, the water tissue not used is contaminated by a hand.

Therefore, we have the problem of germs proliferating inside the water tissue and the fundamental of the self-sterilization cap is to sterilize the contaminated area by just **closing the cap after using water tissue**.



Contaminated by hands when pushed back with hands



Result of non-contact anti-bacterial test

[Various test certification of self-sterilization cap]

Water tissue in a regular cap

Germs multiplied by 3,000 times

Water tissue in a sterilization cap

All germs are destroyed

[Non-contact sterilization test]

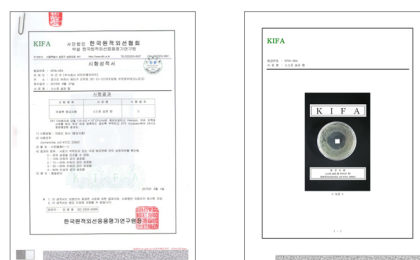
[Regular cap]

[Sterilization cap]

Toxic substance test: not detected



Non-contact sterilization test : 99.9% anti-bacterial power



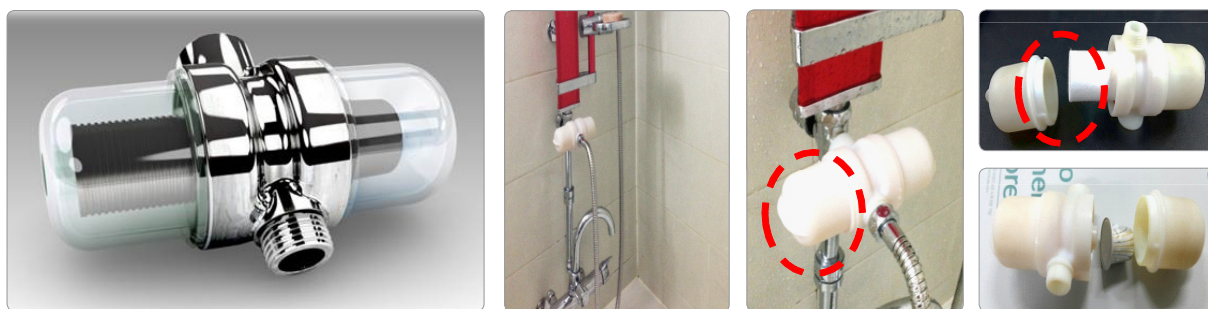
Aromaro Healing Shower and Capsule

Aromaro is a healing shower system that enables you to enjoy aromatherapy easily at home with encapsulated pure natural aroma oil

- It's convenient because you can select an individual capsule depending on your daily mood.
- The capsules are consisted of functionalities such as relaxation, concentration, memory, refreshing, hair care, etc., so you can choose during a shower.
- Anybody can use it easily as the capsules are attached and detached in one touch.
- Natural aroma coats as if covering your entire body to protect skin and scalp and you can even enjoy therapeutic effect from natural scent.
- Just by taking a shower fill up your bathroom with aromatic scents.



How to install



- Compact and beautiful design fits any bathroom
- It can be easily installed in any shower
- Easy capsule attachment and detachment with the one-touch cap
- Attaching and detaching on existing showers does not require any additional construction.

Triple complex filter system that cleanly removes harmful substances in water. A three-stage filtering system removes harmful substances such as foreign particles, rust, heavy metals, etc., as well as invisible residual chlorine

1단계 10μm 세디먼트 필터
2단계 10μm 세디먼트 필터
3단계 10μm 세디먼트 필터

Relax
Memory
Concentration
Refresh
Hair care

Maximizing therapeutic effect by carefully selecting only proven raw materials

No skin irritation and diffuses delicate aroma by using 100% natural essence oil



Sterilization Material Specialist Company

BIO CHEM KOREA

Office : Zip code 14523, Room 1212, Building D (Dodang-dong, Bucheon Daewoo Techno Park), 261
Doyak-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do
TEL : 070-8270-4046 FAX : 032-670-7911 www.biochemkorea.com