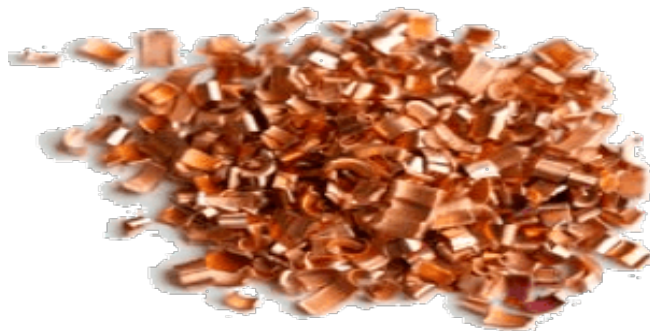




Flow Solutions Trading Co. L.L.C

Introducing Antimicrobial Copper

Based of sceintific research and historical facts, it is known that copper has excellent antimicrobial effect naturally. It distroys bacteria and viruses which cause MERS and SARS. It is effective in preventing virus transmission when used in hospitals and public places.



Application

Elevator and ATM Touch Pads



School Supplies Daily Use Items



Small Scale Industrial Equipments and Touch Screens



Product Available Sizes and Forms

< Roll Type >
Length 10m / Width 40cm



< A4 Type >
Length 29.7cm / Width 21cm



Film Sticker Roll



FilmSticker3EA/A4Size



Film Sticker 10EA / A4Size

Application Examples



Product Background and Development

Evolution of an antimicrobial copper plastic

The needs of consumers for non-toxic antimicrobial products are constantly increasing, but copper that has the best antimicrobial power is about 3~5 times more expensive than common stainless products. It is difficult to process copper into products of diverse shapes due to limited formability, and copper cannot be used widely because of corrosion, oxidation, discoloring and unique odor.

Accordingly, formulated patented technology to develop the first antimicrobial plastic material that resolved economic and formability issues of copper.

By overcoming various shortcomings of copper, our product offers an antimicrobial solution to all areas including medical supplies, kitchen supplies, daily supplies, baby supplies and public transportations. The first plastic material for antimicrobial copper that attains 99.9% of antimicrobial power shown by antimicrobial copper products at affordable prices.

CU+

The International Copper Association (ICA) developed the Cu+ brand in order to inform excellent antimicrobial effects of copper. You can trust antimicrobial effects of any products with the international Cu+ mark. Our Product is a premium brand of antimicrobial copper that obtained the Cu+ mark from the IC

Antimicrobial
Copper



Uniqueness of Our Product



A new durable antimicrobial material

Since the antimicrobial power does not disappear from damaging of surface coating, this material can exhibit optimal antimicrobial effects in everyday life in spite of heat and damaging of products.



Problems such as discoloring of copper and fungi in plastic were resolved.

Our material was developed as plastic compounding type to present a perfect solution to problems of copper such as chemical oxidation, discoloring and corrosion, as well as fungi problems.



A new antimicrobial material that replaces the silver nano material

It is the most definitive new antimicrobial material to replace the silver nano material, which used to be a popular antimicrobial material but was found to be hazardous to human body.



Diverse plastic products can be mass produced.

Since the material is provided as compounding type, it can be mass produced and applied to a variety of polymers including PP, PE, PC, ABS and TPU.

Characteristics of our Products

Technology



- This is a composite material made by ideally mixing copper an inorganic metal and plastic an organic material. This material has uniform physical properties throughout.
- By combining antimicrobial property of copper and processability of plastic, our material embodies the antimicrobial power and anti-fungal property of copper in plastic.

Antimicrobial power



- Our material exhibits the optimal antimicrobial power under daily conditions such as heat and humidity.
- Our material is inexpensive compared to silver nano and ceramic antimicrobial materials and can be supplied in large quantities. It is unrivaled in terms of persistence of the antimicrobial power.

It has excellent antimicrobial effects.

The antimicrobial power does not vary much regardless of particle size. As resistant bacteria are not formed with time, antimicrobial copper has much stronger antimicrobial power compared to silver (nano) and ceramic materials.

Characteristics of our Products



Economic feasibility



Our material was developed in the form of injection material so as to allow mass production of antimicrobial plastic products. It can be applied easily and quickly.

Mass production was accomplished by completely resolving problems of copper such as chemical oxidation, discoloring and high cost.



Diversity



This is the first antimicrobial copper plastic material that maintains the antimicrobial power by mixing antimicrobial copper at a certain ratio when forming injection plastic products.

By developing into compounding type, diverse injection molding products can be made by mixing the material at the site.

The antimicrobial effect lasts long.

The antimicrobial power is not influenced by external environment such as heat and humidity. This is a semi-permanent material that keeps the antimicrobial effect in spite of discoloring and wear.

It is safe.

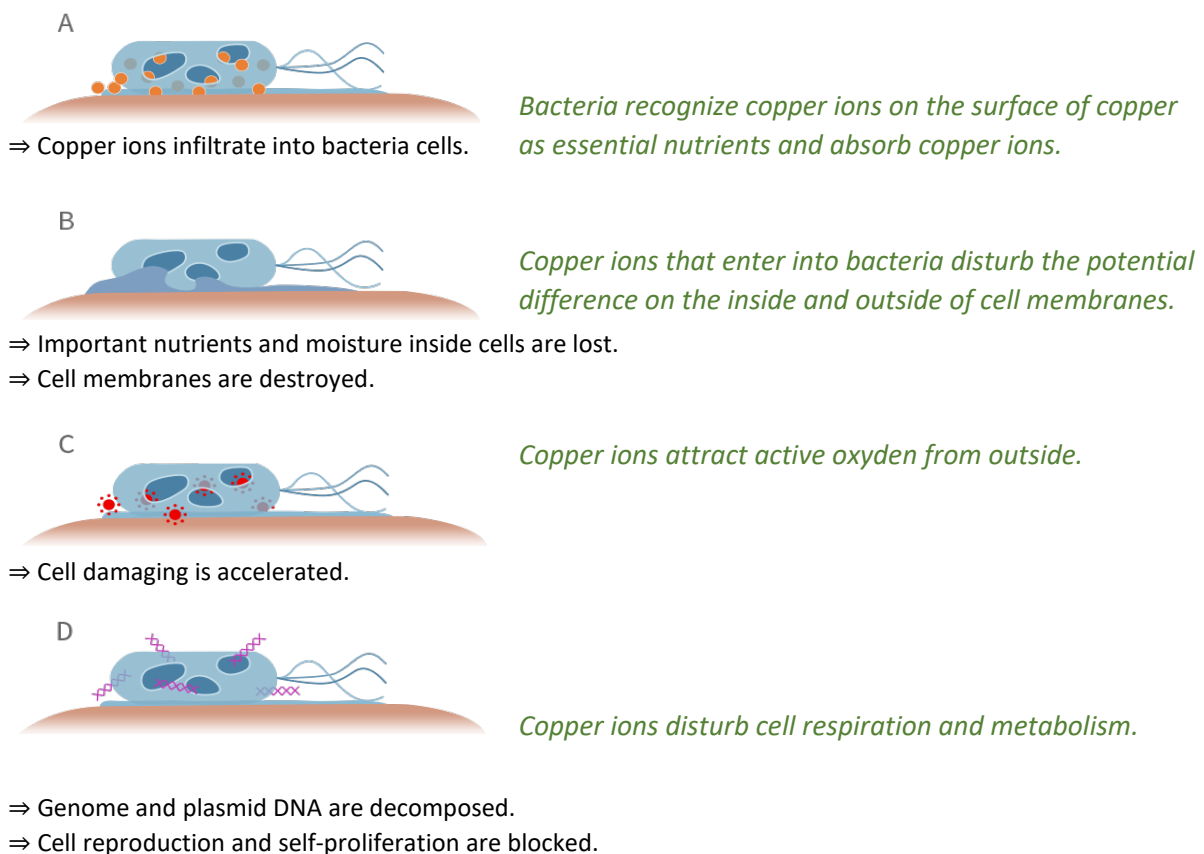
It is a natural antimicrobial material harmless to human body and environment. Our material can be recycled because it does not include any chemical additives, and antimicrobial property remains unchanged after recycling.

Necessity of Antimicrobial Copper

Alone in the United States, about two million people are secondarily infected in medical facilities. About 100,000 people die from secondary infection. Astronomical amount of socioeconomic expense is caused by infections in medical institutions worldwide. According to a clinical test sponsored by the U.S. Department of Defense, the probability of cross infections in patients treated in intensive care units installed with antimicrobial copper products was reduced by 70% or more.

As copper and copper alloy with copper content of 60% or above can eradicate 99.9% of various bacteria inducing healthcare-associated infections within two hours, it has an excellent ability to prevent cross infections and infectious diseases. We can manage clean environment and healthy life by actively using antimicrobial copper in everyday life, in addition to reducing socioeconomic expense from secondary infections.

Antimicrobial Mechanism of Copper



History of Antimicrobial Copper



B.C 2500

Egypt used copper in water pipes to disinfect drinking water.



B.C 2000

India made surgical instruments



B.C 300

Persia stored drinking water in copper bowls.

A.D 900

In Korea, kitchen supplies were made using brass, an alloy of copper and tin, since the Goryeo period .

A.D 1300

Aztec treated sore throat by washing the mouth using water containing copper ions .

Accreditation and Public Confidence



ICA, International Copper Association
<https://www.antimicrobialcopper.org>

The ICA is an international non-profit organization founded in 1960 to pioneer the copper market and develop related technologies.

Major copper producers, copper and copper alloy manufacturers, and power cable companies around the world are participating as members of the ICA. These members account for 80% of global refined copper production.

The ICA has its head office in New York, U.S. and regional headquarters in Brussels, Santiago and Singapore. It is operating research programs on the relationship between copper and environment/health in more than 50 nations.

The ICA developed the Cu+® brand to inform excellence of antimicrobial copper to consumers. The international Cu+ certification mark is attached to copper or copper alloy (with copper content of 60% or above) products that show certain antimicrobial effect within two hours.

Copper products with the Cu+ brand mark can be used safely because their antimicrobial effects have been certified.



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EPA, Environmental Protection Agency
<https://www.epa.gov>

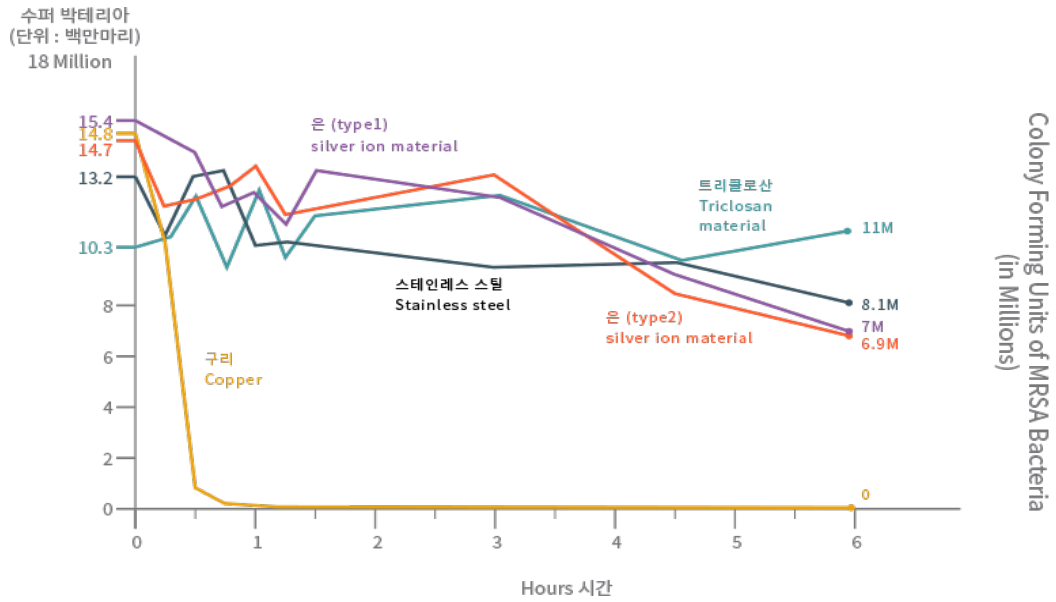
The EPA is an administrative agency of the United States for environmental protection founded in 1970 in order to establish and implement measures against environmental pollution.

The EPA is obliged to prevent pollutions in six areas including water, air, noise, waste, hazardous substance and radioactive substance. It is granted with various authorities in accordance with the Clean Air Act and Toxic Substances Control Act.

The EPA only acknowledges and registers copper and copper alloy (with copper content of 60% or above) as 'touch surface materials.' (Gold and silver are not acknowledged.)

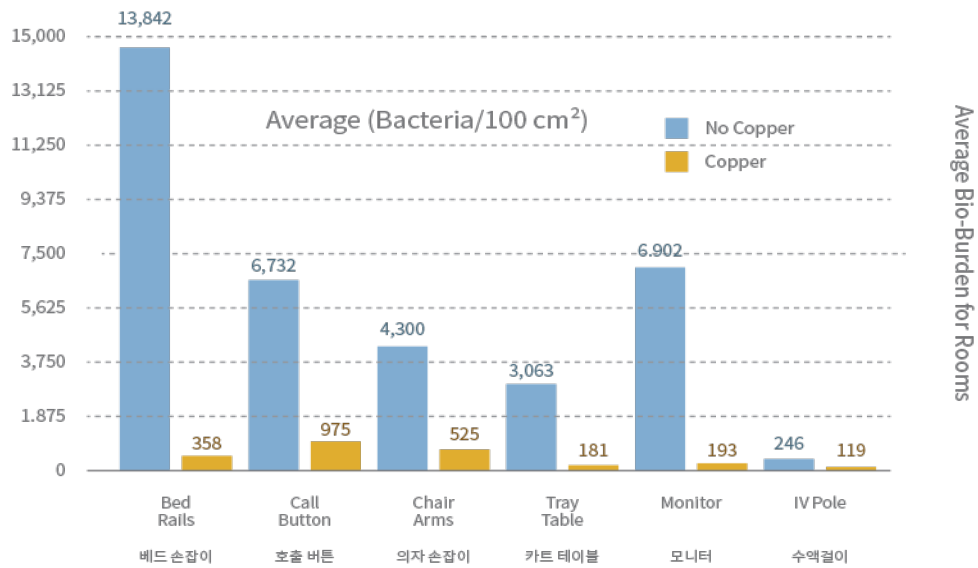
Comparison and Test Results

Comparison of Antimicrobial Performance of Representative Inorganic Materials



99.9% antimicrobial power only shown by copper within two hours (eradicates over 90% within 30 minutes)

Test Results Found in U.S. Hospitals



Over 90% of pathogens and bacteria were removed from the surface of copper products. Super bacteria such as MRSA and VRE were not detected.

Antimicrobial Copper vs. Other Antimicrobial Materials

Antimicrobial Silver	Organic Material	Antimicrobial Copper
Silver can release ions when moisture content is 90% or above, and the antimicrobial power is noticeably reduced if it cannot release ions.	Organic antimicrobial materials use chemical actions and are unrelated to humidity and moisture	Copper shows best antimicrobial power regardless of humidity
Antimicrobial silver shows increased antimicrobial power in nano size, which reduces sharply with increasing particle size	There is no correlation between particle size and antimicrobial power	The antimicrobial properties does not vary much according to particle size
Zeolite loses the antimicrobial power after certain time	Persistence of antimicrobial property is reduced by elution	The antimicrobial power of copper is semi-permanent
It is hazardous to human body	There are characteristic problems such as oral and skin irritation on human body	Copper is the one and only touch surface material approved by U.S EPA with excellent human body safety
Resistant bacterial are generated	Resistant bacterial are generated	Resistant bacterial are NOT generated
Market Size reduced due to hazard of nano particles	Market size is moderate	Copper is expected to dominate the market for antimicrobial materials

Antimicrobial Tests of Antimicrobial Copper on Super Bacteria (Pathogens)

<p>1994 – The University of Southampton demonstrated antimicrobial property of copper and copper alloy against Legionella pneumophila.</p>	<p>Acinetobacter baumannii Adenovirus Aspergillus niger Candida albicans Campylobacter jejuni Clostridium difficile Enterobacter aerogenes Escherichia coli O157:H7 Helicobacter Pylori</p>
<p>2000 – Antimicrobial property of copper and copper alloy against Escherichia coli was demonstrated.</p>	<p>Influenza A (H1N1) Legionella pneumophila Listeria monocytogenes</p>
<p>2006 – Antimicrobial property of copper and copper alloy against Methicillin-resistant Staphylococcus aureus (MRSA) was demonstrated.</p>	<p>Klebsiella pneumoniae MRSA Mycobacterium tuberculosis</p>
<p>2007 – Antimicrobial property of copper and copper alloy against C. difficile was demonstrated.</p>	<p>Poliovirus Pseudomonas aeruginosa Salmonella enteritidis Staphylococcus aureus</p>
<p>2007 – Antimicrobial property of copper and copper alloy against influenza A (H1N1) was demonstrated.</p>	<p>Tubercle bacillus Vancomycin-resistant enterococcus (VRE)</p>
<p>2008 – About 300 alloys were registered by the U.S. EPA.</p>	
<p>2009 – Antimicrobial property of copper and copper alloy against VRE was demonstrated.</p>	
<p>2011 – Asan Medical Center in South Korea conducted a laboratory research on MRSA and VRE.</p>	
<p>2012 – Eradication of MRSH was demonstrated.</p>	
<p>2013 – Eradication of norovirus was demonstrated.</p>	
<p>2014 – Suppression of avian influenza (AI) was demonstrated.</p>	
<p>2015 – Inactivation of MERS virus was demonstrated.</p>	



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Disadvantages of Antimicrobial Copper

The antimicrobial effect of copper cannot be enjoyed widely due to the difficulty of market expansion.

Antimicrobial copper is about 3~5 times more expensive than stainless steel.
⇒ It is difficult to use copper widely.

There are limitations in formability of copper metal.
⇒ It is difficult to be formed into different products.

Due to physical properties of copper, chemical changes such as corrosion and oxidation occur. There are visual and emotional issues like discoloring and odor.
⇒ As it is difficult to arouse the needs of consumers, it is only used in limited areas like medical facilities.

(In Europe, there is no hostility toward discolor copper products because they are recognized as antiques.)

For further inquiries on price and commercial terms , please contact us.



Flow Solutions Trading Co. L.L.C

Suite No. 303 Shaikh Tower Adh Dahrn Street Building
No. 2638 Al Khobar Ash Shamaliyah 6240 Postal Code:
34429 Kingdom of Saudi Arabia
Email: info@fstarabia.com