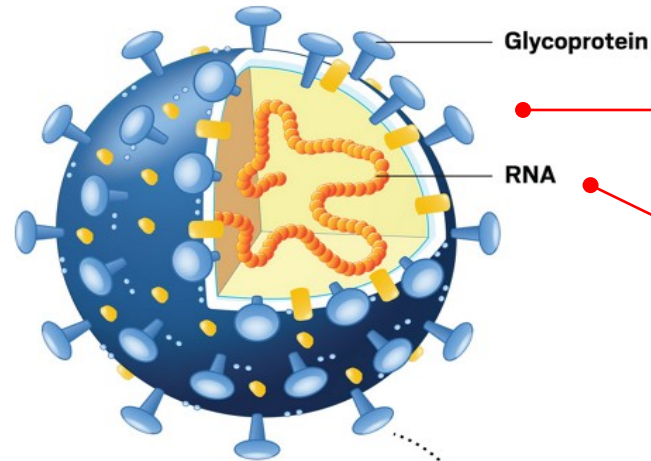


Anti-virus Film

Mechanism of Virus Infection

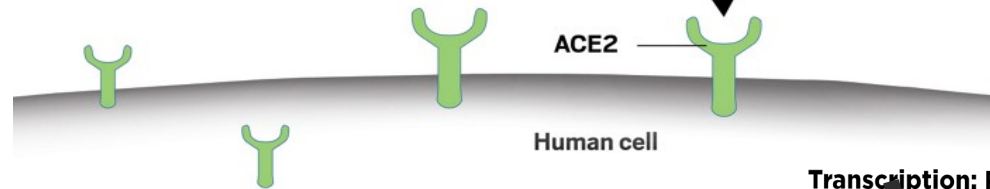


In penetrating *through* the cell membrane, the main key is
"Glycoprotein Spike"

The kernel for virus proliferation : RNA
→ RNA Polymerase operates as catalyst for RNA replication

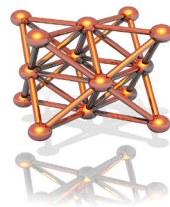
Virus vs Bacteria ?

Viruses are an inanimate object, bacteria are a living organism.
According to many studies, Cu has **both antiviral and antibacterial functions.**

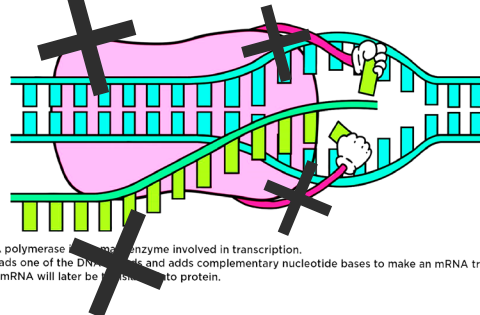


The Antimicrobial Principle of Cu

The antimicrobial Cu controls
Replication of Virus RNA



Transcription: Role of the RNA Polymerase

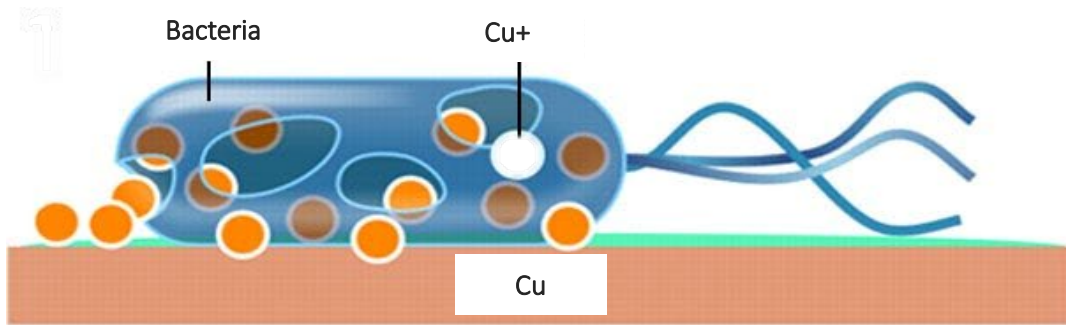


RNA polymerase is a multi-subunit enzyme involved in transcription.
It reads one of the DNA strands and adds complementary nucleotide bases to make an mRNA transcript.
The mRNA will later be translated into protein.

Bacteria from human hands form very good environment for the proliferation of virus.

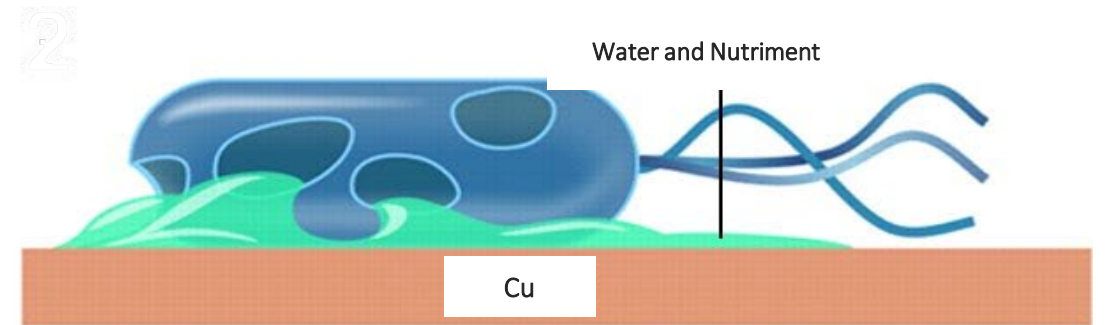
The antimicrobial Cu blocks the growth of bacteria and suppresses the environment in which the virus can replicate.

The Antimicrobial Principle of Cu



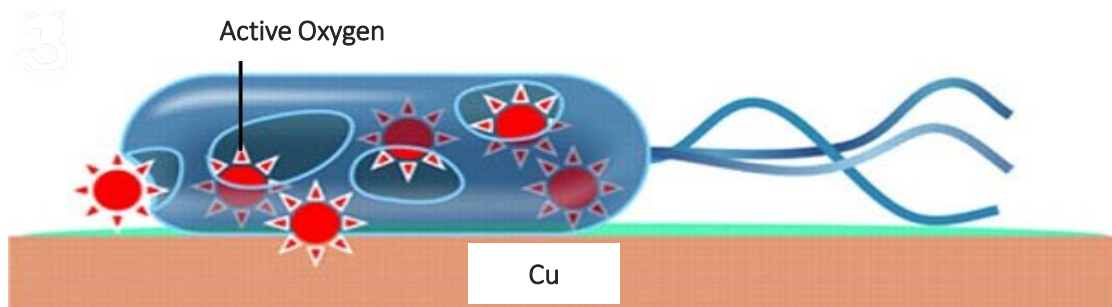
Bacteria recognize that Cu^+ on the surface of Cu is essential nutriment, and take them into the cell

→ Cu^+ penetrates the cell of bacteria



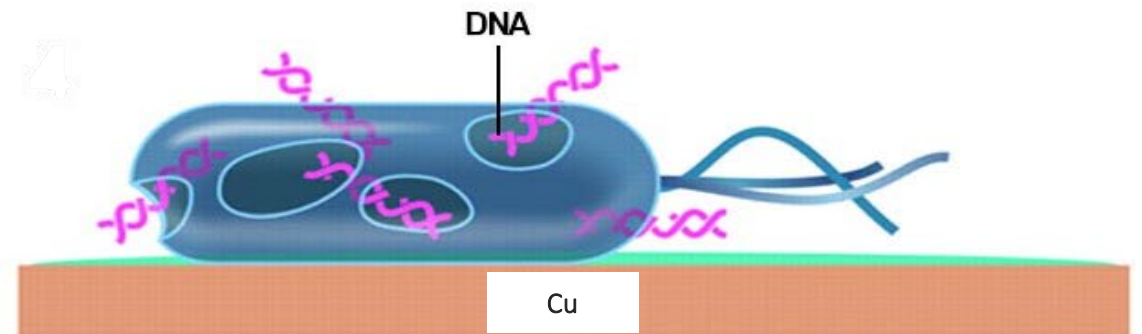
Taken Cu^+ holes membrane, in order to cause the loss of cell's nutriment and water.

→ Destruction of cell



Cu^+ takes active oxygen through the holes of cell.

→ Accelerating the destruction of cell

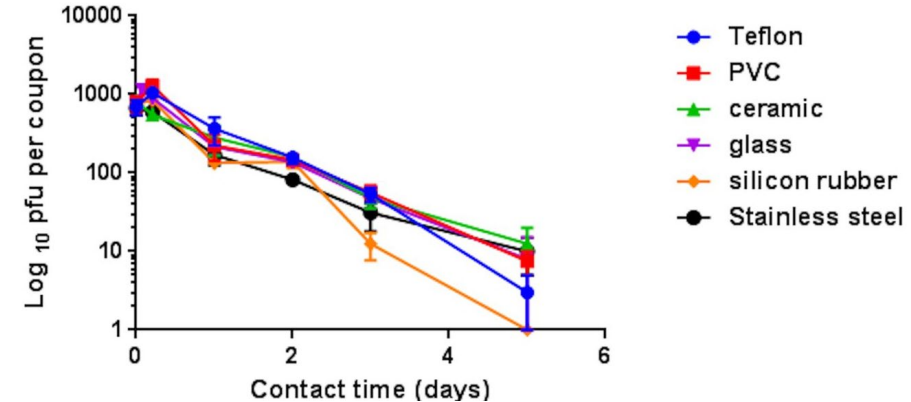


Eventually, bacteria completely disappeared by severe interruption on respiration and metabolic activity and damage on DNA.

→ Prevent copy or increase of cell

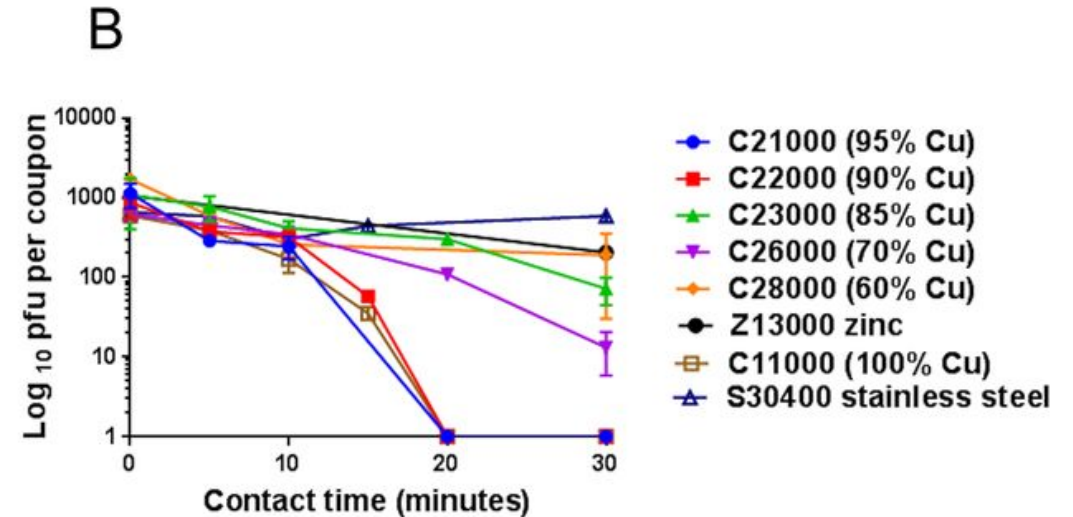
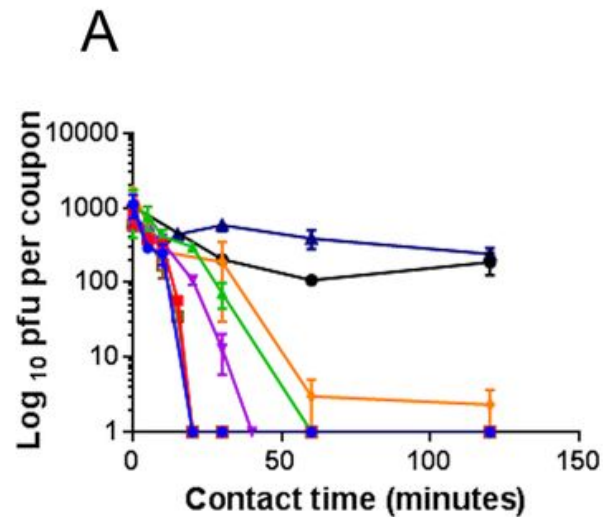
Cu Anti-Virus Research Data

Human corona virus proliferates on surfaces such as plastic, ceramic tiles, glass, and stainless steel for at least 5 days.



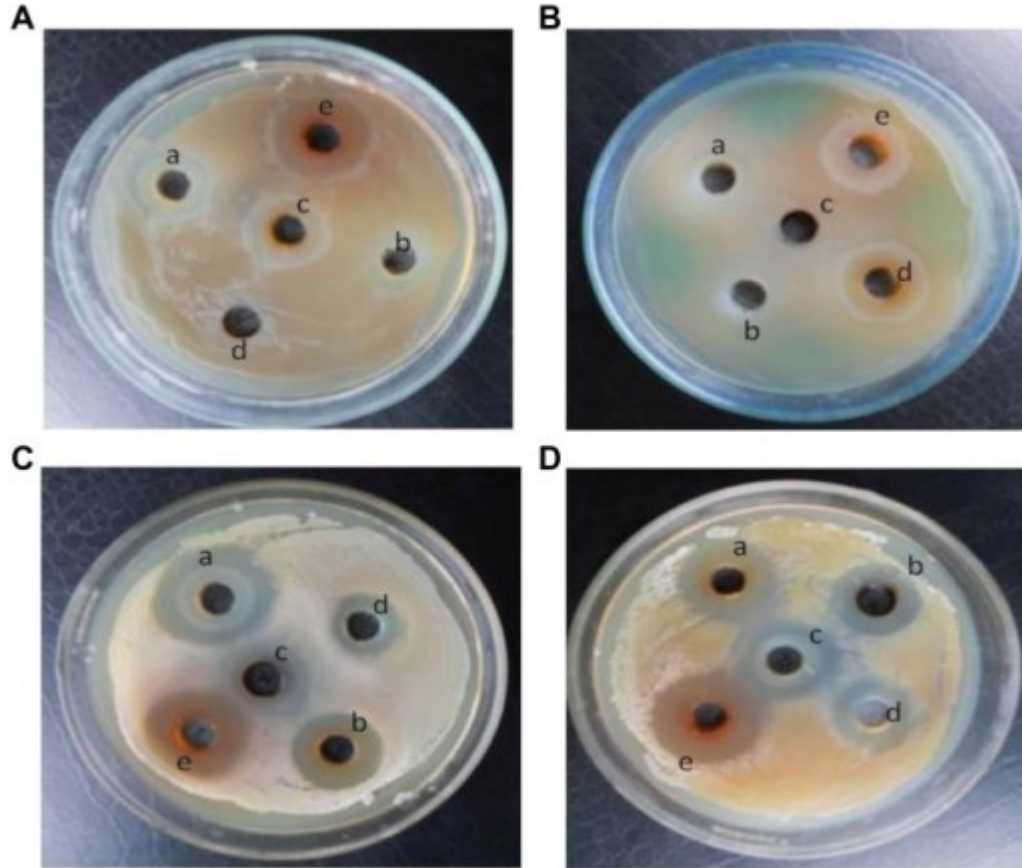
▲ Human Coronavirus 229E Remains Infectious on Common Touch Surface Materials
(Sarah L. Warnes, Zoë R. Little, C. William Keevil)

Inactivation on Cu surfaces in 30 minutes **Cu destroys both the body structure and the genome of the virus !!**



▲ Human Coronavirus 229E Remains Infectious on Common Touch Surface Materials
(Sarah L. Warnes, Zoë R. Little, C. William Keevil)

Test Result for Antimicrobial Copper



- **Viruses :**
 - A) Colon bacillus
 - B) Bacillus pyocyaneus (Induce pneumonia, meningitis)
 - C) Hay bacillus (Induce eye inflammation)
 - D) Staphylococcus aureus(Food poisoning)
- **Test condition**
 - Neglected after culturing virus in the same condition
 - * “a~e” Different treated copper

▲ Size-dependent antimicrobial properties of CuO nanoparticles against Gram-positive and -negative microbial strains.
(Azam A, Ahmed AS, Oves M, Khan MS, Memic A)

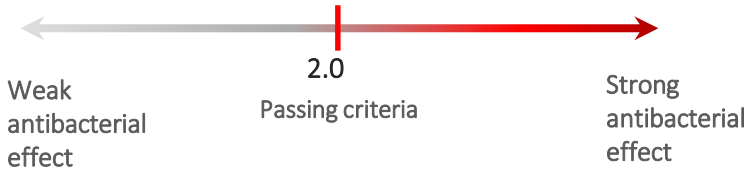
After cultivating strains in the test batch, check the results of the experiment in which the strains do not propagate around the area where the Cu powder has fallen.

Test Report for Antimicrobial Film

※ Additive description

Standard of antimicrobial effective : 2.0

▶ 100 times germ suppression compared with non-antimicrobial sample



<Test condition>

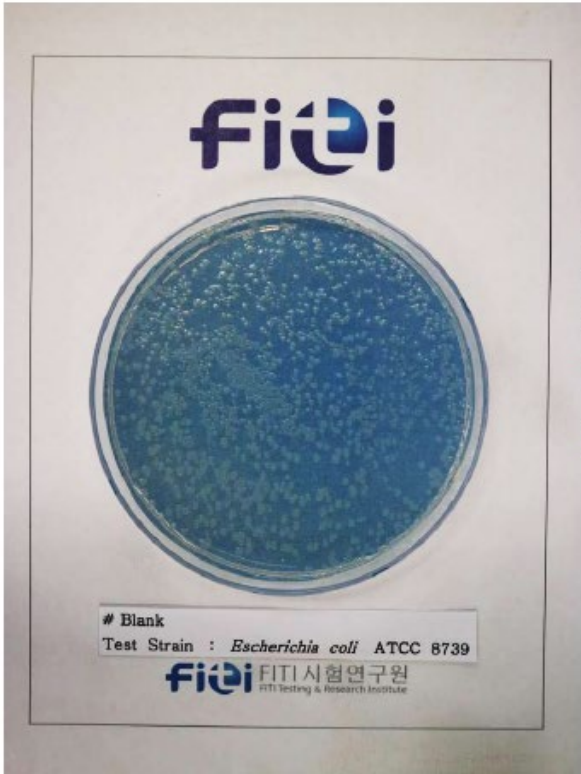
Cultivation 24 hrs. in 90% humidity at 35°C

Virus 1: Staphylococcus aureus

Virus 2: Colon bacillus



Antimicrobial



Non -Antimicrobial

Test reports & Certification



SEOUL
NATIONAL
UNIVERSITY

BIOLOGICAL SCIENCES
Laboratory of Virology

TEST REPORT

TEST TITLE

Test report for "Inhibit effectiveness on BCoV of R&F

Chemical antimicrobial film"

TEST METHOD

Virus Suppression Test for the Surface of Synthetic Resin and Non-Porous Surface

TEST FACILITY

Department of Virology, Veterinary College,
Seoul National University

Industrial-Academic Cooperation
Group of Seoul National University
(Official Seal)

Anti virus test



(28115) 21, Yangcheon-3gil, Ochang-eup, Cheongwon-gu, Chungbuk, Korea
Tel : 043-711-8865 Fax : 043-711-8805

REPORT NO.: M287-20-01190
PAGE : 2 OF 6

01. ANTIMICROBIAL ACTIVITY AND EFFICACY (JIS Z 2801 : 2010, FILM-CONTACT METHOD) : CFU/g, VALUE OF ANTIMICROBIAL ACTIVITY : log

	BLANK	#1
BACTERIA-1		
AT BEGINNING	1.4×10^4	1.4×10^4
AFTER 24 h	2.8×10^5	< 0.63
VALUE OF ANTI-MICROBIAL ACTIVITY	-	5.6
BACTERIA-2		
AT BEGINNING	1.7×10^4	1.7×10^4
AFTER 24 h	2.6×10^5	< 0.63
VALUE OF ANTI-MICROBIAL ACTIVITY	-	5.6
BACTERIA-3		
AT BEGINNING	1.4×10^4	1.4×10^4
AFTER 24 h	3.0×10^5	< 0.63
VALUE OF ANTI-MICROBIAL ACTIVITY	-	5.6
BACTERIA-4		
AT BEGINNING	1.7×10^4	1.7×10^4
AFTER 24 h	6.9×10^5	< 0.63
VALUE OF ANTI-MICROBIAL ACTIVITY	-	5.0

NOTE) STANDARD FILM : STOMACHER® 400 POLY-BAG
TEST CONDITION : THE SOLUTION ARE FIXED AT (35 ± 1) °C, 90 % R.H. FOR 24 h,
AND DETERMINE BACTERIA CELL GROWTH INHIBITION RATE BY
POUR AGAR PLATE METHOD.
ANTIMICROBIAL EFFICACY : THE VALUE OF ANTIMICROBIAL ACTIVITY
SHALL NOT BE LESS THAN 2.0 log
TEST BACTERIA : BACTERIA-1 - *Klebsiella pneumoniae* ATCC 4352
BACTERIA-2 - *Pseudomonas aeruginosa* ATCC 27853
BACTERIA-3 - *Salmonella typhimurium* KCTC 1925
BACTERIA-4 - *Staphylococcus aureus* ATCC 33591 (MRSA)
SEE ATTACHED PHOTOS.

** End of The Report **

** SAMPLE POTHO **



Anti bacteria test



CERTIFICATE OF COMPLIANCE

Applicant:

Address: A7-011, 550 Misa-daero Hanam-si, Gyeonggi-do,
Republic of Korea, 12925

Product: Anti-microbial film – tan

Main Material: Polyethylene (PE)

Test Standard(s): FDA 21 CFR Part 177.1520

Test Laboratory: Consumer Testing Laboratories

Lab Report No.: ARHL078927

Date of the Certificate: May, 28, 2020

Test Agent: CHEMRON FDA KOREA

THIS IS CERTIFIED THAT:

The composition of the product **Anti-microbial film – tan** complies
with the requirements of FDA Regulation 21 CFR 177.1520
"Polyethylene (PE)." This material is acceptable for repeated use
and can be used in contact with food.

CONSUMER TESTING LABORATORIES, INC.

CONSUMER TESTING LABORATORIES, INC.

Dannon Rose

Chris Dahl

CATEGORY MANAGER, HARDLINES TESTING

DIRECTOR, HARDLINES TESTING

The certificate applies to the tested sample above mentioned only and shall not imply an assessment
of the whole production. It is only valid in connection with the products same as the tested sample
above mentioned only.

Chief Executive Officer : Peter Park




Safety test

Applications




The Specification on Antivirus films

1. Non-Adhesive type

TYPE	SPEC.	UNIT Q'TY	PACKING	WEIGHT (Kgs) / INBOX	
ROLL	150mic. 400mm X 5m	1 roll	1 roll / box	0.6	
	150MIC. 400mm X 10m	1 roll	1 roll / box	1.2	
SHEET	150mic. 210 X 297mm (A4)	5 sheets	20 packs / box	1.22	
	150mic. 210 X 297mm (A4)	10 shees	20 packs / box	2.44	

2. Adhesive type

TYPE	SPEC.	UNIT Q'TY	PACKING	WEIGHT (Kgs) / INBOX	
ROLL	150mic. 400mm X 5m	1 roll	1 roll / box	0.9	
	150MIC. 400mm X 10m	1 roll	1 roll / box	1.8	
SHEET	150mic. 210 X 297mm	5 sheets	20 packs / box	2	
	150mic. 210 X 297mm	10 shees	20 packs / box	4	