

KENIFINE™

KOBELCO
KOBELCO STEEL,LTD.

◆ What is KENIFINE ?

- KENIFINE™ is an original anti-bacterial coating technology developed by Kobe Steel.
- Its anti-bacterial effect is 10 times stronger and its anti-fungal effect is 50 times stronger than conventional anti-bacterial technologies.
- It has already been applied to food and drink processing facilities, medical and welfare facilities, air-conditioning and electrical applications, kitchen and grooming goods, fishery and agricultural equipment, coins for game machines, etc.
- Everyone can use KENIFINE and share its commercial applications.



- <Note>
- Safety is verified by acute toxicity tests, skin patch tests, etc.
 - Alumite (anodizing) treatment is available for aluminum parts.
 - Powder is also developed. It is applied to paints, spray, prints, etc.
 - We are open to licensing the technology to manufacturers that handle surface-treated products.

◆ Proposal from KENIFINE !

1. Why not solve your bacterial trouble by KENIFINE?
2. Why not start your new business by KENIFINE?

<Business Plans>

Any combination is OK !

Plan1

Create new products !



Plan2

Distribution/Sales !



Plan3

Anti-bacterial engineering business !



★ Plan4

Integrated KENIFINE business !



If you have plating facilities,
it can be easily incorporated.

All plan will be supported by Kobe Steel !

★mark requires licensing

Contact : Materials Research Laboratory Kobe Steel, Ltd

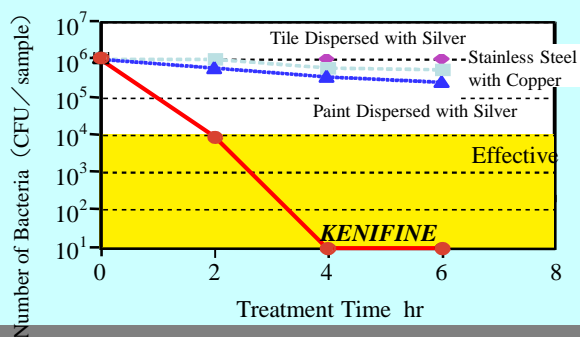
Information in this document such as values, photographs, evaluation is listed for the purpose of explaining the general features and performance of KENIFINE-applied products only, and it does not guarantee anything as a result. In addition, the information is subject to change without notice.

Experimental Data of KENIFINE

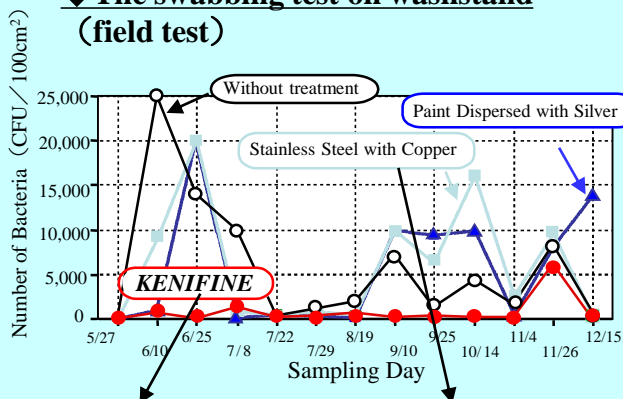
High Anti-bacterial Properties

- KENIFINE is **10 times faster** at controlling microorganisms than conventional anti-microbial products.
- KENIFINE is effective over a long period of ten years.

◆ The antibacterial test covered with the film (laboratory test)



◆ The swabbing test on washstand (field test)

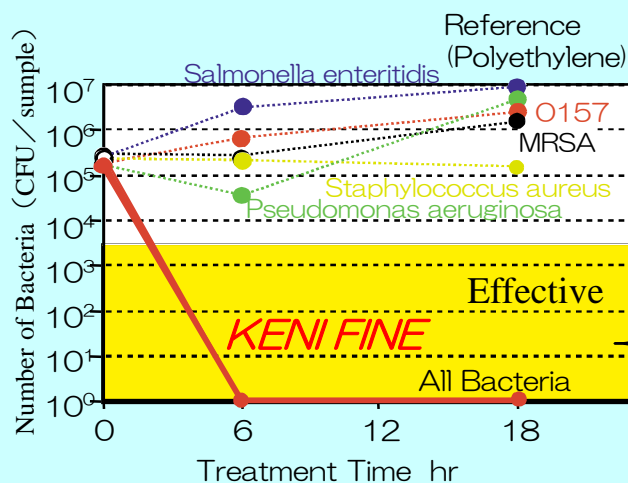


KENIFINE



Stainless Steel with Copper

High Anti-bacterial Properties (2)



Results of antibacterial laboratory tests of KENIFINE

Japan Food Research Laboratories Test
No.598070156-001,598070156-002

• Gram negative

- Escherichia coli* (IFO13500)
- Escherichia coli* O157:H7
- Enterobacter cloacae*
- Vibrio parahaemolyticus*
- Citrobacter freundii*
- Klebsiella pneumoniae*
- Campylobacter jejuni*
- Serratia marcescens*
- Shigella sonnei*
- Salmonella* sp. Gr 9
- Salmonella typhimurium*
- Pseudomonas aeruginosa*
- Neisseria gonorrhoeae*
- Legionella pneumophilla* (ATCC33152)
- Agrobacterium radiobacter*

• Gram positive

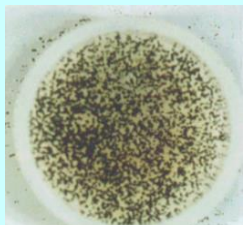
- Staphylococcus aureus*
- Streptococcus pyogenes*
- Streptococcus agalactiae*
- Enterococcus faecalis*
- Enterococcus fecium*
- Bacillus subtilis* (ATCC6633)
- Streptomyces azureus* (ATCC14921)

High Anti-fungal and Anti-algal(waterweed) Properties

• **KENIFINE** can be used in applications that until now could not be achieved from conventional coatings.

◆ Anti-fungal lab tests

A.niger, 28°C,
48 hours later



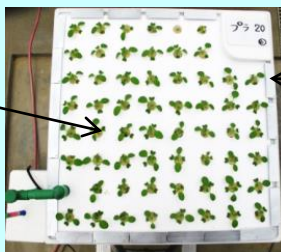
Stainless Steel with Copper



KENIFINE

◆ Anti-algal test by hydroponics plant bed

Japanese
mustard
spinach



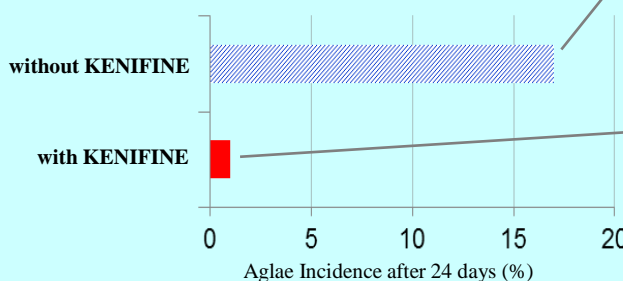
T-shaped stainless
steel jig with and
without KENIFINE



without KENIFINE
→ Algae are seen.



with KENIFINE
→ Algae are not seen.



(by Research Institute of Environment, Agriculture and Fisheries, Osaka Prefecture)

Other microorganism groups that confirmed effects

• Fungus

- Aspergillus niger* (IFO6341)
- Penicillium chrysogenum* (IFO4626)
- Rhizopus oryzae* (IFO31005)
- Cladosporium cladosporioides* (IFO6348)
- Chaetomium globosum* (IFO6347)

• Green algal

- Chlorella* 226
- Scenedesmus pyrenoidosa* (NIES-96)

• Bacteriophage

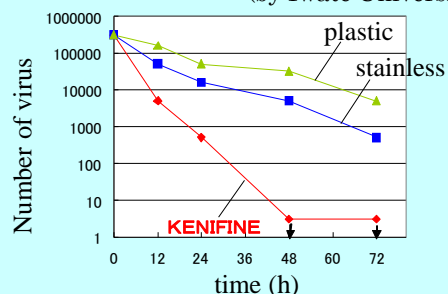
- T4
- λ
- MS2

• Virus

- Influenza A type (A/PR/3/34(H1N1))
- Cow coronavirus (No.66/H)

◆ Effect on mouse coronavirus (MHV)

(by Iwate University)



Acute Toxicity & Skin Irritation

◆ Low Acute Toxicity (=Mortality 0%)

	Mortality of rats taken powdered KENIFINE weighting 2000mg/kg		
	After 1 day	After 7 days	After 14 days
Male	0%	0%	0%
Female	0%	0%	0%

Japan Food Research Laboratories, Test No.598070191-001

• **KENIFINE's** safety has been verified by acute toxicity tests and skin patch tests conducted by external bodies.

◆ Low Metal Allergy (=Ratio of irritated 0%)

	Ratio of irritated person after contacted with KENIFINE film for 48 hours
men	0% /13
women	0% /7

Life Science Laboratory, Test No.01-XII-0501

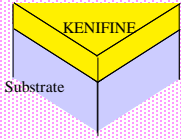
Application Examples of KENIFINE

Developed Technologies

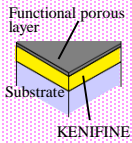
Application Examples

1. Plating processing

① Standard type (as-KENIFINE plating)



②~④ Multi-function type



Corrosion resistance and/or appearances are improved.

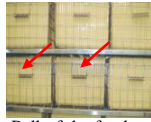
② Chromium specification

③ Special silver specification

④ Special gold specification



Food shelf handle



Pull of the food storage shelf



Air conditioner parts (anti-fungal filter)



Hatching trays for trout



Coins for game machine



Modular bath catch basin



Waste pockets



Triangular corner



Slime-pooof antibacterial plate



Grooming goods



Chopstick rest



Hair catcher



Garden shears for horticulture



Wagon for hospitals



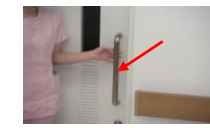
Mt.Fuji bottle opener



Mt.Fuji bookmark



Health equipment



Door handle in hospital



Door handle in airport



Machine accessory parts



Bathroom drain



Plants Jewel



Golf markers



Spoons



Knife rests



Loupe



Ring holder



Single-flower vase

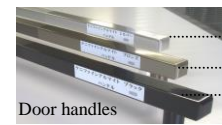


Spoons



Letter opener

2. Alumite (anodizing) treatment



..... silver color
..... bronze color
..... black color



Lever handle



..... Card case
..... Lipstick case
..... Mechanical pencil

① Painting, Spraying



Spray cans



Door handle (baking finish)



Concrete wall



Interior wall and door



Plant wall and floor (Indoor-hydroponics factory)

3. Powder

② Printing



T-shirt



Neck straps



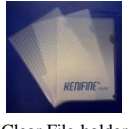
Underwear



Picture books



Sticker for smart-phone



Clear File holder

③ Others (Kneading...)



Tatami mats for Judo



Tatami mats for nursing home



Mats for pets



Slippers



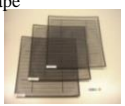
Insole



Multi-purpose tape



Master batch



Air-conditioner filters