

# Comparing Antimicrobial Efficacy of Copper and Silver for Interior Touch Surface Applications

## Background

Silver and copper have been used for their antimicrobial properties for centuries. Now, manufacturers are incorporating these metals into healthcare, food industry and even some consumer products, and making antimicrobial claims. In particular, there are several companies that create silver-ion coatings that can be applied to various surfaces, from work tops to door handles, which are then marketed as antimicrobial; some such products claim to be effective against MRSA, a potentially deadly hospital-acquired infection. A study<sup>1</sup> published in *Letters in Applied Microbiology* answers the question of whether these applications work under real-life conditions, as summarised below.

Materials containing silver have been shown to be effective under conditions of high temperature (35°C) and high humidity (90% or higher relative humidity) but, until this study, they had not been tested at lower temperature and humidity levels typical of indoor environments, such as those found in hospitals. The researchers used copper alloys as a point of comparison because laboratory testing<sup>2</sup> has already shown that they are effective in reducing over 99.9% of bacteria within two hours at room temperature (22°C) and normal humidity (50%).

## Recent Science

The study tested survival rates of MRSA on two types of silver-ion coated surfaces, five copper alloy surfaces and a stainless steel surface. The silver ion-containing materials showed only minimal bacterial reduction at 20°C and 22% humidity. The stainless steel, which served as the experimental control, showed no measurable antimicrobial efficacy at any temperature or humidity level, as was expected.

Previous laboratory studies have demonstrated copper's broad spectrum antimicrobial efficacy at room temperature and humidity against bacteria (MRSA, *Clostridium difficile*), fungi (*Aspergillus niger*) and viruses (including Influenza A (H1N1)). Following a review of such detailed scientific data, copper has been officially recognised in the United States by the Environmental Protection Agency, and copper, brass and bronze alloys are now registered to make public health claims.

<sup>1</sup> *Effects of temperature and humidity on the efficacy of methicillin-resistant Staphylococcus aureus challenged antimicrobial materials containing silver and copper.* Michels HT, Noyce JO and Keevil CW, *Letters in Applied Microbiology*, 49 (2009) 191–195. [www.copperinfo.co.uk/antimicrobial/downloads/effects-temperature-humidity-comparing-silver-and-copper.pdf](http://www.copperinfo.co.uk/antimicrobial/downloads/effects-temperature-humidity-comparing-silver-and-copper.pdf).

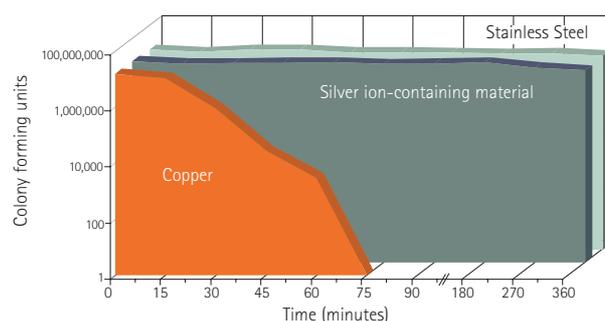
<sup>2</sup> *Potential use of copper surfaces to reduce survival of epidemic methicillin-resistant Staphylococcus aureus in the healthcare environment.* Noyce JO, Michels H and Keevil CW (2006a), *J Hosp Infect* 63, 289–297.

<sup>3</sup> *The role of copper in the reduction of contamination of the hospital environment.* Casey AL, Adams D, Karpanen TJ, Lambert PA, Cookson BD, Nightingale P, Miruszenko L, Shillam R, Christian P, Elliott TSJ. *Hosp Infect* 74, Issue 1, January 2010, Pages 72–77.

Copper's exceptional antimicrobial performance in the laboratory, under typical indoor conditions, led to a clinical trial at Selly Oak Hospital in Birmingham, the first results<sup>3</sup> of which show a 90 – 100% reduction in bioburden on copper alloy surfaces (door handle, push plate, toilet seat) compared with non-copper surfaces.

These results were confirmed in trials conducted in the US, funded by the Department of Defense. These showed a significant reduction in bioburden and an absence of both MRSA and VRE on the installed copper surfaces (including nurse call buttons, chair arms, IV drip poles and bed rails).

MRSA Viability on Copper, Silver Ion-containing Material and Stainless Steel at 20°C



MRSA viability at 22°C and 50% RH on C11000 copper, a silver ion-containing material, and S30400 stainless steel. A 7-log reduction was obtained in 75 min for C11000 copper, but no meaningful reduction was seen at 360 min on the silver ion-containing materials (one shown) or the experimental control, stainless steel.

## Comparison Table

	Antimicrobial Copper	Silver Ion-containing Coatings
US EPA registered antimicrobial	✓	✗
Effective under typical indoor conditions	✓	✗
Durable, lifetime efficacy	✓	✗
Recyclable	✓	✗
Contains an essential element	✓	✗

Copper Development Association  
5 Grovelands Business Centre  
Boundary Way  
Hemel Hempstead, HP2 7TE  
UK

[www.copperinfo.co.uk](http://www.copperinfo.co.uk)  
[helpline@copperdev.co.uk](mailto:helpline@copperdev.co.uk)  
[www.antimicrobialcopper.com](http://www.antimicrobialcopper.com)

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