

# Antimicrobial Treated Coatings for Use In Graphic Communications and Packaging

Charles Matthews<sup>1</sup> and Dr. Sandrine Garnier<sup>2</sup>

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## Abstract

The recent Covid 19 pandemic has created awareness and concern about “high touch” surfaces and materials. New and more rigorous cleaning and disinfecting protocols and procedure have been implemented in public facilities such as classrooms, restaurants, medical and dental offices, cruise ships, office buildings and cruise ships. That same concern has also impacted the printing industry as menus, magazines, promotional materials, place mats, napkins, and packaging were all subject to the desires of their customers for a new and better alternative that would produce cleaner surfaces.

This paper will present how the use of silver ion technology infused into both aqueous and UV coatings is able to produce cleaner surfaces vs. untreated coatings.

## Introduction

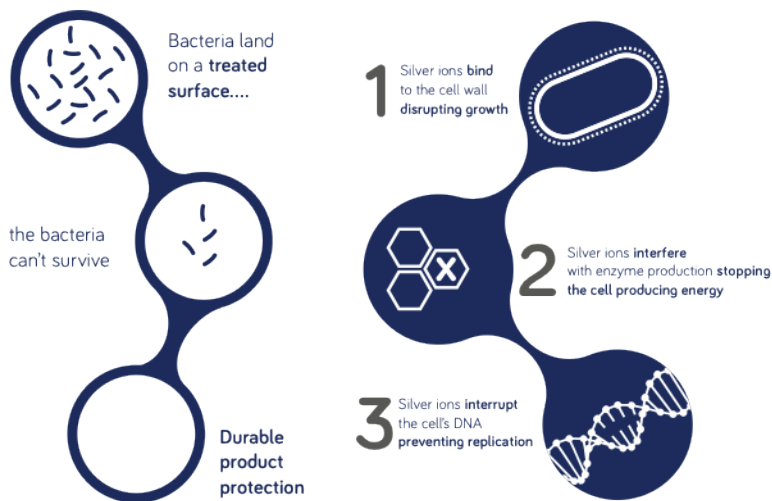
The benefits of silver as a natural antimicrobial has been known since the time of the Pharaohs. Silver has been used for thousands of years to prevent the growth of bacteria without the high toxicity associated with other metals. In ancient Greece, Hippocrates, often called the Father of Medicine, wrote that silver had both healing and anti-disease properties. In the Middle Ages, the wealthy would feed their children using a silver spoon giving them protection against disease. Up until the introduction of antibiotics in 1938, colloidal silver was used as a mainstream antibiotic treatment and silver is still used in wound dressings to this day.

## How Does Silver Work?

Silver has multiple modes of action that inhibit the growth of micro-organisms.

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<sup>1</sup>BiomasterUSA; <sup>2</sup>Addmaster Ltd.



### Current Uses for Silver Ion Technology

Silver ion technology is now incorporated into an enormous variety of products around the globe and is widely available from a number of suppliers. It is used in paints, polyurethanes and other functional coatings, molded plastic components, films, textiles, and apparel. Other leading antimicrobial solutions are...

	Silver	Copper	Copper	Zinc	Organic Biocides (eg QUATS)
Good efficacy	✓	✓	✓	✓	✓
Low Toxicity	✓	✓	✓	X	X
Regulations	✓	X	X	X	X
Cost effective	✓	X	X	✓	✓
All applications	✓	X	X	X	X

### Silver Ion Technology and the Printing Industry

Topcoats that seal the entire surface area of printed materials and provide antimicrobial product protection were an obvious solution to the issue of cleaner surfaces. Silver ions are an excellent solution as they are infused in very low doses, are invisible to the naked eye, will be effective for the life of the coating, and do not affect performance, clarity, or color of either an aqueous or UV coating, or recyclability of the printed material.

The very low dosage rate and the need to have an even dispersion did have one drawback as almost all printers do not have the equipment for this. As a result, ink suppliers were asked to develop antimicrobial treated coatings.

## Ink Manufacturers

Addmaster and BiomasterUSA have partnered with a number of leading ink manufacturers to develop antimicrobial treated coatings. All of the companies reported that they were easily able to incorporate the silver ions into existing commercially available coatings, and that the product development consisted of establishing the correct dosage rate. No capital investment was required as well as no changes to standard operating procedures.

### Does It Work?

Antimicrobial efficacy for non-porous materials such as coatings can be measured using an ISO 22196 test methodology. The test is conducted by exposing a treated and control sample to bacteria and then placing both in a chamber at a specified temperature and relative humidity for 24 hours. After 24 hours the samples are removed and the number of bacteria forming colony units (cfu's) are counted. All of the ink manufacturers were able to achieve results of at least a 99.9% reduction in the treated samples vs. controls, and many were able to achieve a result where the treated sample was below the observable limit of cfu's.

<b>IMSL</b>		<b>INDUSTRIAL MICROBIOLOGICAL SERVICES LTD</b>	
<b>CERTIFICATE OF ANALYSIS</b>		Page 1 of 1	
<b>CUSTOMER</b>		<b>CERTIFICATE NO.</b>	1041512.182/15133
Addmaster Ltd Darfin House Priestly Court Staffordshire Technology Park Stafford ST18 0AR UK.		<b>CUSTOMER REF.</b>	210055
<b>SAMPLE DETAILS</b>		<b>DATE RECEIVED</b>	22/01/2021
WIKOFF COLOR		<b>ORDER NO.</b>	
<b>METHOD:</b> <u>Determination of Antibacterial Activity using Test Based on MOD ISO 22196</u>			
<b>DATE ANALYSED</b>	27/01/2021	<b>DATE REPORTED</b>	29/01/2021
<b>RESULTS (AS CFU CM<sup>2</sup>)</b>			
<b>SAMPLE</b>	<b>SPECIES</b>	<b>CONTACT TIME</b>	<b>REDUCTION (INITIAL)</b>
		<b>0 hrs</b> <b>24 hrs</b>	<b>Log 10</b> <b>%</b>
SHEET FED LITHO VARNISH (CONTROL)	<i>E. coli</i>	1.5E+04    2.7E+02	
ANTIMICROBIAL SHEET FED LITHO VARNISH WITH 0.25% BIOMASTER 999	<i>E. coli</i>	1.5E+04    < 11.11	≥ 3.12    ≥ 99.92%
SHEET FED LITHO VARNISH (CONTROL)	<i>S. aureus</i>	1.6E+04    3.0E+01	
ANTIMICROBIAL SHEET FED LITHO VARNISH WITH 0.25% BIOMASTER 999	<i>S. aureus</i>	1.6E+04    < 11.11	≥ 3.15    ≥ 99.93%

## **Government Regulation**

Government regulation in each country determines the extent of the claims that can be made about antimicrobial treated products.

In the European Union and other countries, treated products can make claims about efficacy vs. specific bacteria and viruses as well as health benefits such as reducing the risk of cross contamination.

In the United States, treated products are regulated by the US Environmental Protection Agency. The EPA will exempt any treated product from further regulation under the “treated article exemption” as long as the claims made are strictly about product protection or preservation. (EPA PR 2000-1). No health or disease prevention claims, whether express or implied, are allowed.

More extensive claims would require a coating to be registered with the EPA as a pesticide and there is currently no EPA recognized modal to accomplish this.

## **Future Outlook**

Given that antimicrobial treated coatings are readily commercially available, are easy for printers to use, and that the awareness generated by the pandemic is unlikely to subside quickly, these coatings offer printers an extra added feature for their customers.