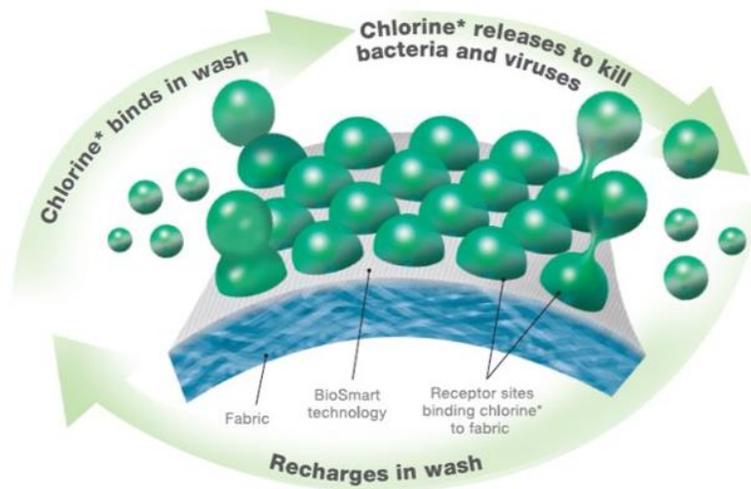


Milliken®
BioSmart® 

Antimicrobial Technology by Milliken & Company



Why Was BioSmart® Created?

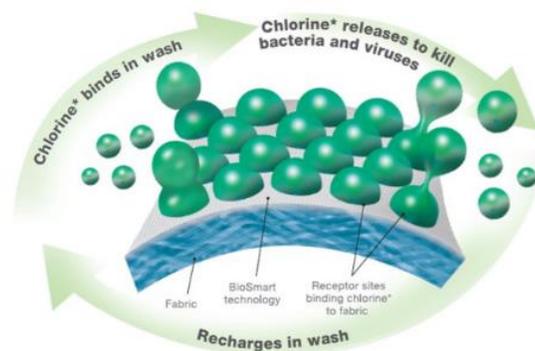
- Hospital acquired infections from MRSA and other drug resistant microbes continue to increase, resulting in significant cost and risk to the healthcare community.
- Studies has shown that textiles serve as sites for bacterial contamination.
- There are limited antimicrobial textile solutions that are both durable and effective against a broad range of bacteria and viruses.
- Technology enhanced textiles can be a significant contributor to a HAI prevention program.
- Food illness outbreaks continue to occur, negatively impacting brands and consumers.

What is BioSmart®?

- A textile technology that binds chlorine to the fabric surface.
- Works in home and industrial laundries.
- Recharges after each wash with EPA-registered chlorine bleach.
- BioSmart® has been successfully tested against multiple bacterial and viral strains.
- BioSmart® has passed ISO skin irritation and skin sensitivity testing.
- Patented technology.

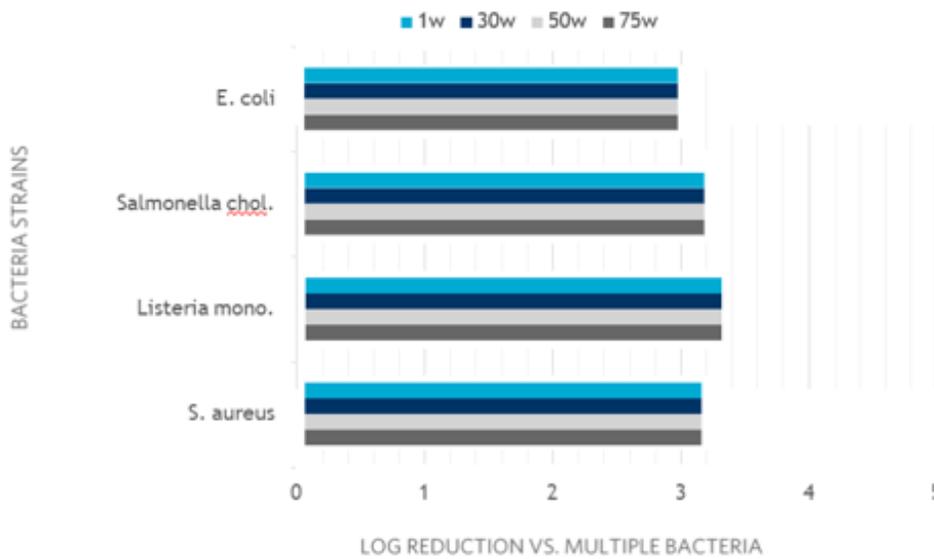
How Does BioSmart® Work?

- BioSmart® is a textile finish that is bound to the fabric surface.
- When the fabric is washed with EPA-registered chlorine bleach, the chlorine binds to the BioSmart® finish.
- When the fabric comes into contact with microbes, the chlorine is released to kill viruses and bacteria.
- The chlorine is then re-charged in the next wash cycle.



How Durable is BioSmart®?

- BioSmart® has been shown to be effective against a variety of bacteria even after 75 home or industrial laundry cycles.
- Tested using AATCC 100 test method.



Note:

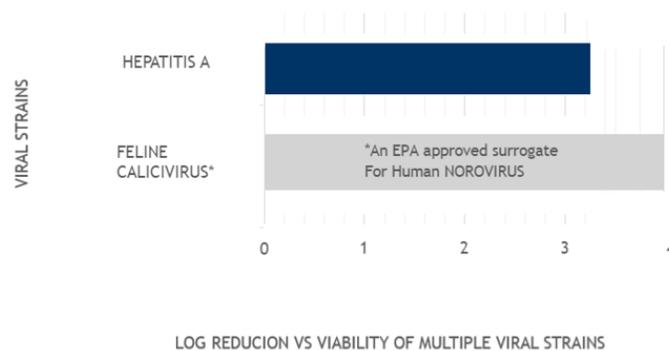
Log 1 corresponds to a 90% reduction

Log 2 is a 99% reduction

Log 3 is a 99.9% reduction

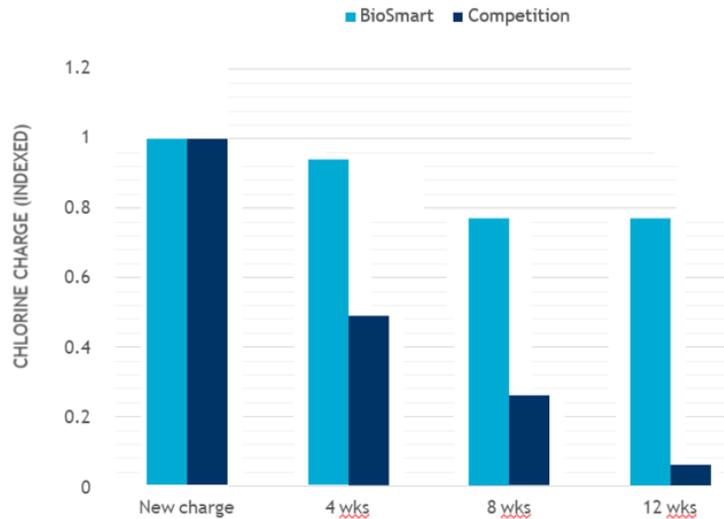
Does BioSmart® Work on Viruses?

- Outside testing has shown that BioSmart® works against viral strains as well.



What is the Shelf-Life of Charged BioSmart® Fabrics?

- After charging with chlorine, BioSmart® Fabrics have been shown to remain effective for over 12 weeks of storage.



BioSmart® Fabric Performance Claims

- BioSmart® Fabrics, when laundered with EPA-registered chlorine bleach according to care instructions, binds the chlorine to its surface.
- Chlorine bleach* kills 99.9%** of many common bacterial and viruses, including:
 - Salmonella choleraesuis
 - Escherichia coli
 - Staphylococcus aureus
 - Hepatitis Q
 - Klebsiella pneumoniae
- Durable through a minimum of 75 industrial or home washes.

*When used in accordance with its EPA-registered label instructions

** Laboratory conditions using AATCC 100 test method

How is BioSmart® Charged with Chlorine?

BioSmart® Fabrics Care Instructions

BioSmart® is a patented Milliken technology that binds chlorine in the wash cycle. BioSmart® garments must be washed in a bleach cycle to charge the fabric with chlorine initially, and to re-charge during each wash.

The initial charge procedure and the re-charge procedure for BioSmart® are the same. In each case, EPA-registered chlorine bleach should be used.

Home Washing:

- All EPA-registered bleach products have instructions for laundry on the label. Most of them indicate that the proper concentration is ½ cup per standard home washing machine load. Some of the products may be higher in concentration and recommend a lower level, so please check the label of the bleach that you are using.
- Use a regular laundry cycle and be sure to include the rinse step. Failure to rinse the fabric can result in local concentrations of chlorine that may cause irritation to sensitive individuals. After the rinse, you may not be able to smell a bleach odor, but the chlorine is bound to the fabric.
- The fabric can be dried in any manner (tumble drier, line dry, etc.) without affecting the performance.
- BioSmart® fabrics are designed to be re-charged at each laundry cycle. The fabric can be recharged up to 75 times.

Industrial Laundering:

- In order to properly charge the fabric, 50-200 ppm concentration of EPA-registered chlorine bleach is required in the wash cycle. This is generally the concentration used for normal chlorine bleach loads, but please follow the recommendations of your wash chemistry supplier.
- Follow the regular wash and rinse steps for typical chlorine bleach loads. BioSmart® fabrics will retain the chlorine on the fabric even when using “antichlor” rinses.
- BioSmart® fabrics are designed to be re-charged at each laundry cycle. The technology is durable for at least 75 cycles.
- The fabric can be dried in any manner (tumble drier, tunnel, etc.) without affecting the performance.

Frequently Asked Questions:

Will BioSmart Fabrics work with peroxide bleach?

No, BioSmart requires Chlorine bleach. The chemistry is not able to bind peroxide. Washing with peroxide will not harm BioSmart fabrics, but there will no residual antimicrobial effect.

What if a chlorine bleach is used that is not EPA-registered?

EPA-registered bleach has been tested to be effective at the directed use levels. Use of non-registered bleach may not provide adequate charging of the fabric with chlorine.

Are BioSmart fabrics rated to AAMI PB70 level 1, 2, 3, or 4?

No, AAMI PB70 rated fabrics are designed to used as medical barrier fabrics. BioSmart fabrics are absorbent and require some amount of moisture to activate and release the chlorine. Therefore, these fabrics are not appropriate for use as medical barriers.

If BioSmart is used in a face mask, is it hazardous to breathe?

No, the BioSmart chemistry is not hazardous and is bound to the fabric. After charging, the amount of chlorine that could be released is well below harmful levels if charged according to instructions. If a strong chlorine odor persists on the fabric, extra rinsing can be accomplished to reduce the odor. In industrial laundries, the use of antichlor is recommended, but not required.

Can BioSmart fabrics be put in the dryer?

BioSmart fabrics can be dried according to any commercial method without harming durability of the chemistry.

Will BioSmart fabrics cause skin irritation?

No, BioSmart fabrics have been tested to ISO 10993-10 and found no skin irritation. In addition, BioSmart was tested for cytotoxicity according to ISO 10993- 5 and no evidence of cell toxicity was observed.