

**Quick-Med**  
Technologies, Inc.



# ***Stay Fresh***<sup>®</sup> Antimicrobial Technology

## **Overview**

*November, 2011*

# What is *Stay Fresh*®?

**Stay Fresh**<sup>®</sup>  
Antimicrobial

A breakthrough technology providing highly effective and extraordinarily durable antimicrobial textile protection

- ✓ Superior antimicrobial/antifungal efficacy at low cost
- ✓ Controls odor and staining due to microbes; clothing stays fresher longer
- ✓ Biocompatible – uses the same active that the human body produces to defend itself from bacterial invaders: *hydrogen peroxide*
- ✓ Long lasting – independent lab analysis confirms that that fabric treated with HP and *Stay Fresh* binder lasts through 75 laundering cycles
- ✓ Easy to use—co-applied with softener in finishing stage. No line modifications, no added process costs
- ✓ Environmentally friendly technology—the only antimicrobial technology containing HP approved by US EPA for imparting antimicrobial preservation of textiles (*EPA Registration No. 87358-1*)



TIME

*Innovators Forging the Future*

*This document has been prepared to assist in technology evaluation. Data presented herein were collected using standard laboratory methods and are presented solely to substantiate the efficacy of Stay Fresh technology. Display of data is not intended to be a public health claim.*



## Increasing Need

Consumers have moved to short-cycle, cold-water washes to save energy and wear and tear on clothing and other fabrics, but this leaves bacteria and viruses largely intact<sup>1</sup>

- 140° F water will sanitize laundry. However, only 5 percent of consumers use hot water for laundry.
- Bacteria can easily survive the average 28-minute drying cycle.

## Consumer Receptivity

Research shows that consumers are willing to pay a premium for clothing that stays fresher, longer<sup>2</sup>

- Nearly half (48%) - including more than half of male consumers (51%) - reported that they would be willing to pay more for clothing containing freshness-enhancing treatments
- The study found that the freshness-treated garments that men would be most interested in purchasing are shirts and tops (44%), socks (44%), and pants and slacks (42%)

## Inventory Preservation

Prevent fungal contamination of inventory during storage and transit

<sup>1</sup> Professor Charles Gerba, University of Arizona

<sup>2</sup> Taylor Nelson Sofres, survey of 2,000 U.S. adults between the ages of 18 and 64 (Margin of error of one percent)

# Environmentally Friendly Chemistry

**Stay Fresh**<sup>®</sup>  
Antimicrobial

## Binder + active agent

- Active agent is hydrogen peroxide:  $\text{H}_2\text{O}_2$ 
  - Degrades to water and oxygen (gas): no dangerous decomposition products.  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$  (gas)
  - Used by human cells to destroy bacterial invaders (phagocytosis process), is produced naturally in the mouth, and is naturally present in honey and in milk as a preservative
  - Hydrogen peroxide is known to be effective against a wide variety of pathogenic species, including bacteria, yeasts, fungi, viruses, and spores<sup>1</sup>
- Hydrogen peroxide is sequestered in an inert binder phase that is composed of zinc oxides / hydroxides (agents used in diaper rash creams, sunscreen products and in tooth cements)

<sup>1</sup> Not evaluated or approved by EPA





# Bacterial Species Associated with Odor and Skin Surface

**Sweat associated:**  
*Micrococcaceae*  
*Aerobic diphtheroids*  
*Propionibacterium acne*  
*Corynebacterium xerosis*

**Skin associated:**  
*Staph. aureus*  
*Staph. epidermidis*  
*K. pneumoniae*  
*P. vulgaris*

**Fabric discoloration associated:**  
*Bacillus genera*  
*Micrococcus genera*

**Incontinence associated:**  
*E. coli*  
*Salmonella*  
*Enterococcus faecalis*

**Foot-odor associated:**  
*Staphylococci and aerobic*  
*Coryneform bacteria*

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# Hydrogen Peroxide Provides Broad Spectrum Efficacy\*

	Bacteria	ATCC #	% Kill unlaundered	% Kill after 25x HL
<b>Common pathogens</b>	<i>Staphylococcus aureus</i>	6538	>99.999%	>99.999%
	<i>Staphylococcus epidermidis</i>	12228	>99.999%	>99.999%
	<i>Enterococcus faecium</i>	19434	>99.999%	>99.999%
	<i>Escherichia coli</i>	15597, 8739	>99.999%	>99.999%
	<i>Pseudomonas aeruginosa</i>	15442	>99.999%	>99.9%
	<i>Klebsiella pneumoniae</i>	4352	>99.999%	>99.999%
	<i>Streptococci</i>	10096	>99.999%	>99.99%
<b>Resistant species</b>	MRSA	BAA-44	>99.999%	>99.999%
	VRE	51299	>99.999%	>99.999%
<b>Associated with body odor</b>	<i>Corynebacterium diphtheriae</i>	43145	>99.999%	>99.999%
	<i>Micrococcus luteus</i>	21102	>99.999%	>99.99%
	<i>Proteus vulgaris</i>	13115	>99.999%	>99.999%

\*Test Method: AATCC Method 100; 25 hot water laundering cycles

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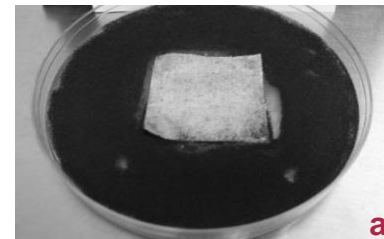
# Material Preservation

*Stay Fresh* provides strong antifungal protection, helping prevent loss of inventory or goods in transit

- Figures a & b: *Aspergillus niger* (a black mold). Testing per AATCC method 30 (iii). Shown at 8 days.
- Figures c & d: *Penicillium citrinum* (bluish-green fungi). Testing per AATCC method 30. Shown at 22 days.
- Figures e & f: *Cladosporium sph.* (dark green to black on front, black on back). Shown at 14 days.

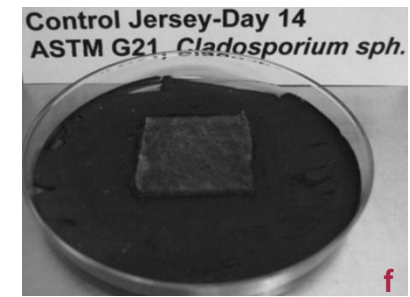
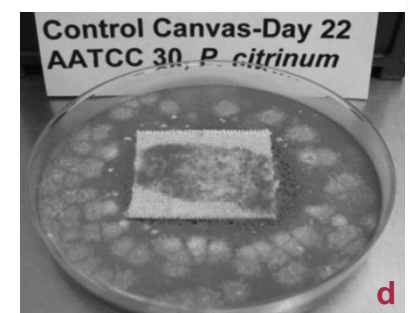
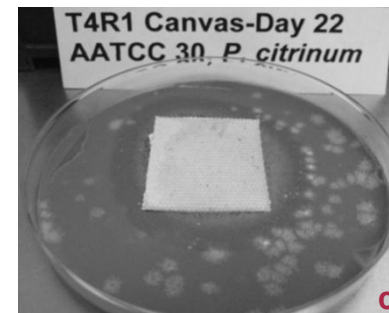
## Stay Fresh treated fabric

Treated canvas day 8,  
AATCC method 30, *A. niger*



## Identically tested controls

Control canvas day 8,  
AATCC method 30, *A. niger*



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# Competing Technologies *Key Limitations*

## Silver / Copper

(e.g., Agion<sup>®</sup>, AlphaSan<sup>®</sup>,  
Silpure<sup>®</sup>, SmartSilver<sup>®</sup>,  
Cupron<sup>®</sup>)

- Expensive
- Can induce discoloration
- Leaching agent (environmental concerns)
- Depletes over time

## Triclosan

(e.g., Microban<sup>®</sup>,  
Ultra Fresh<sup>®</sup>)

- Leaching agent (environmental concerns)
- Degradation product concerns (can produce dioxins)
- Suspected endocrine disruptor
- Growing public concern
- Potential future regulatory limitations

## Cationic Treatments

(e.g., Aegis<sup>®</sup>, Purista<sup>®</sup>,  
Biosafe<sup>®</sup>, BioShield<sup>®</sup>)

- Cations combine with anionic dyes and detergents
- Antimicrobial agent can be blinded by detergent
- Light color textiles can discolor in laundering





# Competitive Comparison

*Stay Fresh* offers a superior performance, price and safety profile

Characteristic	<i>Stay Fresh</i>	Silver	Triclosan	PHMB	Silane Quat
<b>Effectiveness</b>	High	High	Medium	Medium	Low
<b>Durability to laundering</b>	High	Medium/Low	Medium	Low	Low
<b>Discoloration issues</b>	No	Probable	No	Probable	Probable
<b>Environmental fate</b>	Active turns to water + oxygen	Depletes into effluent	Can degrade to dioxins	Depletes into effluent	Bound silane
<b>Economics</b>	Low cost	Expensive	Medium cost	Medium cost	Medium cost

# Stay Fresh<sup>®</sup> Summary

**Stay Fresh<sup>®</sup>**  
Antimicrobial

- ✓ Unique technology
- ✓ Rapid acting, long lasting, antimicrobial
- ✓ Highly effective against even problematic bacteria
- ✓ Not easily blocked by organics (*e.g., perspiration, blood, urine*)
- ✓ Environmentally sound
  - *Environmentally friendly chemistry*
  - *Long lasting treatment, enhanced freshness even when washed at lower temperatures*
  - *Enhances textile life—brighter colors, whiter whites, no bacterial staining*
- ✓ Simple to apply
- ✓ Highly cost effective relative to other antimicrobials

