The Scent of Victory: Controlling Odor in the Locker Room

By Maria C. Thiry

The smelly gym bag, stinky socks, the stench of the gym locker—all these things are nearly as iconic and memorable when discussing athletic endeavors as the Olympic Torch. Are consumers content to accept this stench as a part of working out? Or would they prefer the sweet scent of victory?

“When we exercise, our glands excrete sweat to help cool us down. That’s when the normal bacterial flora present on our bodies can turn smelly,” says Kathy Hall, vice-president of marketing for Microban, explaining why unpleasant odors and exercise are inexorably linked. “Sweat provides a ready nutrient source and the bacteria present on garments can quickly multiply, producing unpleasant odors. Antimicrobial technologies help inhibit the growth of microorganisms, reducing bacterial and fungal odors on sports apparel and footwear.”

“Antimicrobials are in the business of odor management,” says David Parkes, president of Concept III Textiles, of the role of antimicrobial treatments for sportswear and outdoorwear fabrics. Parkes says that consumers “expect [sportswear] products to have odor management built-in, just as they expect the products to wick.”

Karel Williams, global strategic marketing manager for Dow Microbial Control, a business unit of The Dow Chemical Co., notes that as well as enhancing “the wearer’s feeling of freshness,” antimicrobially-treated fabrics “extend the useful life of the sports garment by protecting it from the effects of unwanted bacteria, such as degradation, discoloration, and odor.” Less odor means less need for home laundering, and fewer laundering cycles reduces the wear and tear on garments. Urs Zihlmann, product manager for the textile division of Sanitized AG, believes that with antimicrobial treatment the “life cycle of a textile can be extended and the consumer can pay an active contribution to environmental protection.”

Odor management can also become an intangible performance booster for athletes. “Athletes perform better when they are not distracted and when they have confidence in their equipment,” says Robert Monticello, chief technology officer for Aegis Environments. “Antimicrobials help eliminate another point of distraction and concern. Antimicrobial protection can also give athletes more confidence in the equipment they are using and that it is ready to go without degradation or heavy contamination.” By eliminating the odor of the stinky gym bag, antimicrobially-treated fabrics can contribute to the scent of victory.
Hitting the Odor Target

Targeting Bacterial Odor

Athletic and outdoor apparel are important targets for antimicrobial technologies—specifically antibacterial treatments—and not simply because these garments are more likely to be subjected to sweat and the warm, moist conditions that promote bacterial growth. The other factor that makes these garments big targets is the fabric fiber. “Many of the new polyester blends loved by consumers for their lightweight feel and wicking abilities are also more likely to hold on to bacteria even during washing,” notes Hall.

It’s the dirty secret that everyone knows: “Polyester absorbs odor,” admits Todd Copeland, strategic environmental materials developer for Patagonia. “And those odors come back even after it’s been washed.” According to Barrie Clemo, vice-president of sales for Thomson Research Associates, “A lot of the high-performance sportswear is 100% polyester, much of it microfibers, which are very vulnerable to bacteria-caused odors.”

Clemo says it’s been posited that since polyester doesn’t absorb water but does absorb oil, bacteria start to break down the body oils absorbed by the polyester. “That’s what causes the unpleasant odors,” he says. “The theory is that if we can control the bacteria, we can control the odor.”

Copeland says the issue is one of durability of the apparel. “Athletes want to be able to keep wearing their clothing even after the first time they perspire in it,” he says. Often-expensive athletic and outdoor apparel should be able have more than one use.

A related issue that’s also important in terms of odor control is multi-functionality, says Copeland.

“When Sciessent’s Agion Active surveyed over 70,000 consumers from their Stink at Nothing campaign, they learned that there was a strong demand for odor elimination technology. Consumers want odor elimination technology because it strengthens social confidence and they are not completely satisfied with what was previously on the market. They actually valued it just as [highly] as fit and comfort.”

~ Cyndy Hunter, Sciessent LLC
Feature

Footrace

Dirk Höfer, researcher at the Hohenstein Institute, has been looking into the durability of fungal organisms on textile fibers. He says that nearly 60% of runners have athletes’ foot (caused by fungi), and it is therefore important to study the mechanisms of the fungal infection’s transmission.

From Höfer’s studies using tracer materials, he’s found that fungi are extremely persistent on fabrics. “Laundering at 30°C does not get rid of fungi,” he says. “Laundering at a minimum of 60°C is needed to kill fungi on fabric,” he says. “The transmission of fungal organisms from one textile to another is very likely, risking the spread of fungal infections, such as athletes’ foot, in laundry baskets.”

This summer, the Hohenstein Institute will perform field tests for foot odor control technologies, funded by a research grant from the EU and German governments. The tests will be evaluated by trained odor panelists.

Hohenstein also has a Movable Sweating Foot Model. The model simulates sweating on the foot, while measuring the effect of movement and heat. “We will measure the thermo-physiological properties as well as moisture,” says Höfer. “Not only antimicrobial properties of the sock, but also heat and moisture within the shoe are matters of interest.”

“Consumers want to be able to perform moderate exercise and not have to run home to change before running errands while wearing the same clothing,” he notes.

Targeting Fungal Odor

Most of the antimicrobial technologies used in textiles are engineered to control bacteria, but “if you’re looking for an antimicrobial technology for footwear, you want to make sure you’re using a technology that also provides antifungal properties,” says Hall. James Delattre, vice-president of global sales and marketing for NanoHorizons, says that antifungal treatments “improve performance by preventing mildew and odor build up in the footwear during extended and intense use.”

Winning the Race:
Performance & Testing

Get Ready...

Even when the problem is obviously present and the technology to combat that problem exists, “antimicrobial performance can be a difficult thing to sell,” says Parkes. Tony Hardin, owner of VarsityPro Apparel Solutions, says that in institutional situations, such as team uniforms, the schools and athletic directors in charge of purchasing are very practical. “If you can add something to eliminate odors, it will sell,” he says. On the other hand, selling to individual consumers is a more difficult job, he says. “I won’t even mention it,” Hardin says. “It’s a delicate topic to tell a customer, ‘you won’t smell if you use this.’ I don’t know how to market it without insulting my customers,” he says.

Get Set...

Antimicrobial technologies that control odor and fabric degradation add value to sportswear fabrics, but also add costs. How can brands, retailers, or even consumers be sure that the technology performs as promised? “Performance claims can be hard to prove,” notes Cyndy Hunter, vice-president of marketing for Scinessent’s Agion Active. “Individual wear of a garment can vary greatly depending on how the consumer uses it.”
Gregory Haggquist, founder of Cocona Inc., says that he thinks it’s “impossible to guarantee a clear and repeatable expectation around odor to the consumer. The main reasons for this are the wide variation in individual development and perception of odor along with individual body chemistry that creates very bad odor in some but not in others.” Copeland agrees that some antimicrobial odor-control technologies seem to work better than others, depending on, among other things, the wearer’s personal body chemistry.

Copeland says that the odor-control function of an antimicrobial treatment can be affected by the “complex chemistry of odor, sweat, and the decreasing amounts of antimicrobial finish on the fabric over time.”

Go!
In addition to this complexity, Dirk Höfer, a researcher at the Hohenstein Institute, says that some antimicrobials have “strong activity under lab conditions, but have performance issues in the field.” He says that many brands are switching from solely performing in vitro testing to “proving the efficacy of the antimicrobial in the field.” Copeland says that Patagonia does both standard lab testing and field testing. “We found that it’s best to have good field tests with as varied a group of people as you can get: different genders, ages, races, and physical types, to get better confidence in your results.”

It was with these challenges in mind, Hunter says, that Sciessent’s Agion Active developed its Stink at Nothing campaign. Sciessent “challenged consumers from all walks of life” to don a T-shirt treated with Sciessent’s odor-control technology and “give it a work out—in whatever sweat-inducing ways they could think of.”

### Up to the Challenge

While the need for odor-controlling technology is demonstrably present, there remains the challenge of choosing the correct technology for the application.

Gildardo Nova, global marketing manager for specialized synthetics and wool at Huntsman Textile Effects, notes that the three main antimicrobial technologies used on textiles for sportswear fabrics are: silver-based technology, triclosan, and quaternary silanes. Urs Zihlmann, product manager for the textile division of Sanitized AG, says that silver-based antimicrobial technologies are especially popular in sportswear applications because ‘silver-based products have an especially extraordinary performance on synthetic substrates; therefore, they match the requirements for sportswear very well.”

However, there are several niche technologies, ideal for a particular application, or when the mainstream technologies are undesirable for some reason. Some niche technologies that Nova mentions include chitosan—“a biological antimicrobial extracted from crab shells,” and PHMB (poly-hexamethylen-biguanidin-hydrochloride). Zihlmann adds Zinc pyrithione-based products to the list, and notes that they can be applied during the exhaust process (in the dye-bath).

Another niche antimicrobial is copper-based technology. Dirk Höfer, a researcher at the Hohenstein Institute, says that copper is used “as alternative to silver. Silver is antibacterial. Copper is more antiviral. Copper is effective against H, N, membrane and non-membrane containing viruses, as well as bacteria-specific viruses—so-called bacteriophages.”

A new technology “follows a strategy to move away from biocidal compounds,” says Nova. Described as “probiotic,” this technology is a finish based on micro-organisms. “These ‘good’ micro-organisms will grow on the finished garments and prevent the growth of the ‘bad’ micro-organisms that create bad odors,” says Nova.
Hiking, Biking, and Mosquito-Swatting

The Great Outdoors might as well be the Great Bugdoors, because athletes engaged in running, biking, baseball, hiking, kayaking, and other outdoor activities spend a lot of time swatting mosquitoes, or dealing with other bugs. Insect-protection agents applied to fabrics are becoming increasingly popular, says Urs Zihlmann, product manager of the textile division of Sanitized AG. Besides the annoyance factor, many biting insects such as ticks and mosquitoes can be disease vectors. Thus, protecting against insects “may help guard the consumer against the diseases [insects can transfer] such as malaria or yellow fever,” notes Zihlmann.

Hunter says that the campaign yielded “tremendous results, with over 3,000 testers from all over the world—from moms in stroller strides classes to Marines at boot camp.”

Sometimes the results of field testing don’t support the lab findings. According to Dana Parnello, product research and testing manager for REI, in one study, while the antimicrobial performance of fabric treatments tested well in the lab, “in field testing, our users didn't notice enough of a difference to justify the added cost.” Scott F. Smith, product research and testing analyst at REI, says that the field testers had a “hard time telling the difference between articles that were and weren't treated.” Parnello says that they performed blind and double-blind tests in the field. “We sent a variety of testers into a breadth of conditions with virtually identical garments; half of them were treated with antimicrobial, the other half not treated. About as many testers noticed the performance as didn't notice the difference. Regardless of which of the many factors that may have led to the result, in that case, it just wasn't compelling enough to add the treatment and expense to the product,” he says.

Climbing for the Next Summit

“Antimicrobials alone clearly do not fully combat the problem of odor on [sports] apparel,” notes Hunter. She says that this is because antimicrobials don't address “vapor-based odor,” and that Sciessent’s Agion Active is promoting a new “dual technology… designed to eliminate both bacterial and vapor based odors for a total solution.”

Another approach to achieving better odor control on sportswear fabrics is by controlling the fabric pH. According to Yukihiro Shigemura, general manager of fiber products research and development for
Teijin Fibers Ltd., his company has developed a new polyester fabric that maintains a “mildly acidic pH level, similar to healthy skin.” As well as helping to control odor, the fabric is gentle to skin and retains polyester characteristics important to sportswear, such as water absorption and quick drying properties.

No matter which odor-controlling technology is used, the need to control odors in sports and outdoor apparel is obvious, and controlling odors is important to consumers. Both lab and field tests may be necessary to make sure that the technology used is effective for the application. Without a doubt, however, antimicrobials will have a role in the race against odor.

“Current industry standard test methods are designed to measure the efficacy of an antimicrobial technology at inhibiting the growth of microorganisms, but we’re now also working on new test methods that can correlate efficacy results to the real world functional benefit of odor reduction.”

~Gina Sloan, director of Microbiology, Microban International