

Innovate or Disintegrate: The Latest in Textile Finishes

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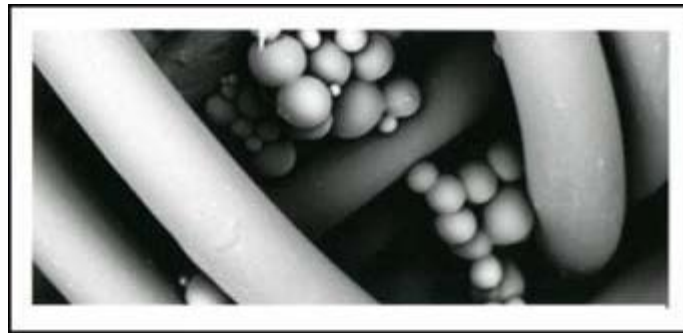
Today's consumer is more finicky than ever. They can now pick and choose from a wide array of inexpensive products. To compound the problem, consumers are spending less on apparel—choosing to spend their disposable income on healthcare, electronics, education, and travel and leisure. To capture today's elusive consumer, it is more important than ever to *innovate*! Recent developments in fabric and garment finishing technologies are spicing-up commodity products.

There are numerous reasons to add value to a product. The most obvious are to revitalize sales, achieve a premium price and differentiate the product from the plethora of others in the market. Less obvious but equally as important—retailers and leading brand labels see unique products as one of the best ways to expand and diversify their line.

The development of unique fabric and garment finishes comes with a host of challenges. Finishes must be durable during the fabric finishing process; stable in the presence of other chemicals; wash-fast; and evenly and consistently applied. Finishes also need to be financially feasible and environmentally friendly.

Micro Encapsulation

Micro encapsulation is one of the latest technologies used to impart an array of unique characteristics to a garment. Particles filled with active ingredients are applied to the fabric or garments for long lasting effects.

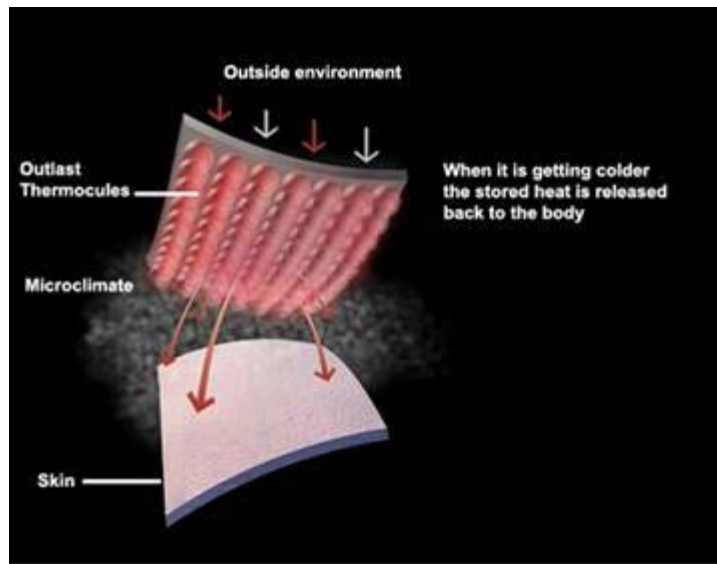


*SEM magnification of Skintex® on polyester
Courtesy of Cognis*

Micro encapsulated particles are anchored onto the fiber. As the wearer moves, the capsules are activated producing a slow release of the active ingredient. Active ingredients run the gamut including moisturizers, aloe, vitamin E, therapeutic smells and insect repellent.

Micro encapsulation technology is also being used to create garments with built-in temperature control systems. Phase change materials or PCM's were originally developed for NASA to protect astronauts against temperature fluctuations ranging from bitter cold to scorching heat. Now, the regular person can enjoy the same protection.

The concept is based on the endothermic/exothermic transitions. When ice melts heat is absorbed from the environment (endothermic transition). When liquids solidify, heat is given off (exothermic transition). Phase change materials are capable of storing and releasing large amounts of energy. Micro encapsulated PCM's can be applied to the fabric or garment. The PCM stores the body's excess heat as it's created and releases it as it's needed.



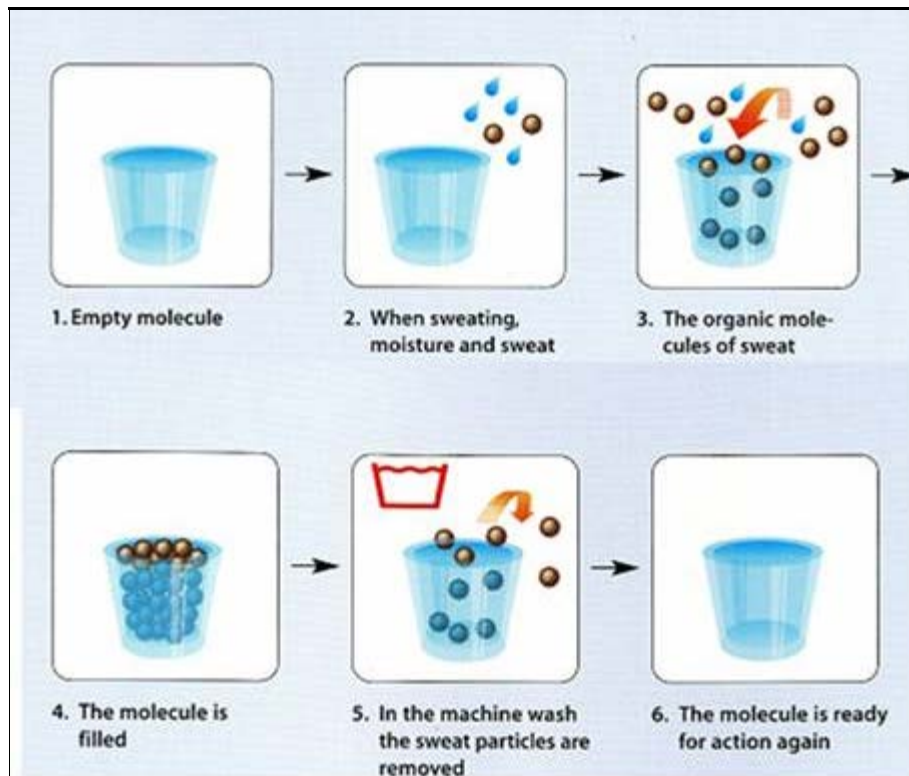
Courtesy of OUTLAST Technologies, Inc.

Odor Control

Odor control is a hot topic in the apparel and hosiery arenas. Odor can be controlled by applying an antimicrobial finish, removing the odor molecules as they are formed or covering up the odor with a fragrance.

Odors are formed as a result of bacterial growth. An antimicrobial finish can be applied to the fabric to prevent bacterial growth—ultimately eliminating the odor.

Cyclodextrins can be incorporated into a fabric finish to remove odor. Cyclodextrins have a unique molecular structure, composed of a hydrophobic cavity, with a hydrophilic exterior. The odor molecules being hydrophobic become trapped in the cavities of the cyclodextrins and are removed during laundering.



Courtesy of Cognis

Micro encapsulation technology can be used to cover up odors with fragrances. Microcapsules containing fragrances can be applied to the fabric to provide a slow release over time.

Stain Resistance

Stain resistant finishes are no longer considered a niche market. Consumers not only want their work wear to perform, but their casual and evening wear as well. Studies have shown that consumers are willing to pay extra for stain resistant apparel.

New technological advances have made the heavy stain resistant coatings of the 1960's a thing of the past. Traditionally, fluorochemicals have been used to impart stain resistant characteristics to the textile. Fluorochemicals are the only chemicals capable of repelling water, oil and other liquids that cause stains. Fabrics finished with fluorochemicals have nonstick properties. Unfortunately, fluorochemicals can have adverse effects on the environment and on human and animal health. This has led to the investigation of new stain resistant finishes.

Using nanotechnology, unique and permanent stain resistant finishes are being developed. Nanotechnology is defined as the precise manipulation of individual atoms and molecules to create layered structures. Nanosize particles can exhibit unexpected properties— different from those of the bulk material. The basic premise is that properties can dramatically change when a substance's size is reduced to the nanometer range. For example, ceramics which are normally brittle can be deformable when their size is reduced. In bulk form, gold is inert, however, once broken down into small clusters of atoms it becomes highly reactive.

Scientists have looked to nature for inspiration. Studying the surface of lotus leaves, which have an incredible ability to repel water, scientists have developed a finish that has superior stain resistant qualities.

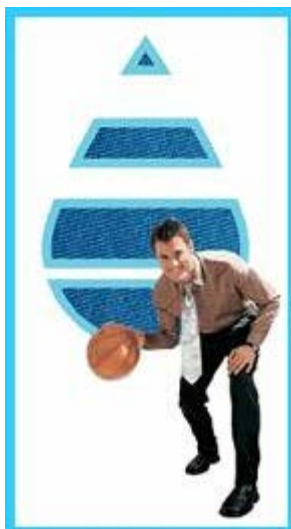
The surface of the lotus leaf appears smooth but is actually rough and naturally dirt and water repellent. The rough surface reduces the ability of water to spread out. Tiny crevices in the leaf's surface trap air, preventing the water droplets from adhering to the surface. As droplets roll off the surface they pick up particles of dirt lying in their path. Using this same concept, scientists have developed a finish that forms a similar structure on the fibers surface. Fabrics can be cleaned by simply rinsing with water.

Nano-Tex, founded in 1998 has been one of the leaders in nano-treatments designed specifically for textiles. The first commercially available products debuted in December of 2000.

NanoTex treatments are applied to a fabric in a bath. As the fabric goes through the bath, nanoparticles come in contact with the fibers of the fabric. When the fabric is cured or heated, the nanoparticles spread out evenly and bond to the fibers. Treatments do not jeopardize the aesthetic characteristics or mechanical properties of the fabric. Treatments can be applied to a number of fibers including cotton, polyester, silk and wool.

NanoTex has developed a treatment called Resists Spills. After the treatment is applied the fabric becomes both liquid repellent and stain resistant. Without ever penetrating the fabric, liquids such as coffee, wine, water and salad oil bead up and roll off the fabric.

NanoTex has developed other treatments that impart unique performance characteristics to the fabric. Coolest Comfort imparts superior wicking properties to a previously hydrophobic synthetic. After treatment the fabric pulls away perspiration from the body allowing the wearer to stay dry and comfortable.



Coolest Comfort
Courtesy of NanoTex

Coolest Comfort is now being applied to resin treated cotton. Resins are used to make cotton wrinkle free, unfortunately the resin treatment also blocks cotton's natural ability to absorb moisture. Coolest Comfort can be formulated to restore the natural wicking properties of resin treated cotton.

Resists Static is the first permanent anti-static treatment for synthetic fibers. Not only does it repel static but also repels statically attractive substances such as dog hair, lint and dust. Resists Static can be applied to a variety of fabric constructions including fleece and suit linings.



Resist Static
Courtesy of NanoTex

Consumers today want their clothes to do double and triple duty. Just like their handy cell phone is their life-line to their friends, family and colleagues— it will also take a picture, play their favorite tunes and get them up in the morning. Consumers want their clothes to be durable, comfortable *and* stain resistant. Today's textile chemists are developing finishes that are intriguing to even the most discerning consumer.

References

Hauser, Peter. "Advances and Trends in Textile Wet Processing Chemicals." JTATM, **Volume 5, Issue 1, Winter 2006**

May 2006