Material World: Spider Silk and T-Rex Leather

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Material World is a weekly roundup of innovations and ideas that are reshaping the materials sector. It covers the latest developments in how fashion is designed, engineered, and scaled—from emerging biomaterials and next-generation leathers to engineered fibers and sustainable alternatives.

Lenzing invests $31 million in Alabama fiber plant

Lenzing Group is investing 27 million euros ($30 million) to expand specialty fiber production at its Mobile, Ala. facility, targeting a growing market for wood-based materials in nonwoven products.



Lenzing's plant in Mobile, Alabama. LENZING

Announced Thursday, the investment will expand the Austrian fiber manufacturer's capacity for lyocell short-cut fibers, which are produced in shorter lengths for specialized nonwoven applications. The company said the upgrades will give the facility greater flexibility to develop customized fibers for customers.

"Nonwovens are a strategic growth area for Lenzing, and our investment in Mobile reflects our strong commitment to expanding our capabilities in this business and strengthening Lenzing's presence in the Americas and globally," said Georg Kasperkovitz, CEO of Lenzing Group.

The Mobile project forms part of a 50-million-euro ($55 million) investment program for Lenzing's nonwovens business, including 23 million euros previously announced for production expansion in Austria.

Lenzing is pursuing growth in specialty nonwovens as part of its "Grow NW. Reset TX." strategy, stressing the development of wood-based alternatives to fossil-derived fibers used in disposable and technical products.

Lululemon develops self-ventilating run vest

Lululemon is using a combination of insulation and mesh ventilation to develop cold-weather running apparel that responds to changes in body heat without requiring runners to remove layers.



Lululemon unveiled its latest innovation, the Ventscape Run Vest, developed and tested with Lululemon ambassadors including Lewis Hamilton. LULULEMON

The athleticwear company introduced its Ventscape PrimaLoft ThermoPlume+ Run Vest at the China International Import Expo. The patent-pending construction pairs synthetic insulation with strategically positioned mesh panels, designed to retain warmth at the beginning of a run while allowing heat and moisture to escape as exertion increases.

Rather than relying on adjustable openings or electronic components, the vest uses airflow generated during movement to ventilate the space between the garment and the body. Lululemon said it used modeling and simulations to determine the placement and proportions of insulation and mesh, followed by thermal mannequin testing to evaluate performance under simulated running conditions.

The company also conducted more than 250 hours of laboratory and outdoor testing covering 2,500 kilometers, with input from athletes including ultrarunner Leah Yingling, middle-distance runner Nikki Hiltz and Formula 1 driver Lewis Hamilton.

“Our ambassadors expressed a common theme of how running in cold weather creates peaks and dips related to thermal discomfort,” said Chantelle Murnaghan, vice president of research and product innovation at Lululemon. “We wanted to create a solution that allows runners to embrace the weather and not view it in a negative way.”

Kraig Biocraft Labs ships spider silk to apparel developers

Kraig Biocraft Laboratories has begun supplying recombinant spider silk to outside developers, including an unnamed performance sportswear brand testing the material for athletic apparel.



Kraig also launched a development program to create additional yarn constructions and material blends for potential textile and technical applications. COURTESY

The Michigan biotechnology company said it shipped its first commercial order of custom-engineered spider silk yarn on Sept. 29 as part of a confidential pilot program. The yarn was processed to the customer’s specifications for development into a performance textile, although Kraig did not identify the buyer.

Unlike companies producing spider silk proteins through microbial fermentation, Kraig uses genetically engineered silkworms to produce fibers containing spider silk proteins. The approach draws on established silkworm-rearing processes while seeking to replicate some of the strength, flexibility and toughness associated with natural spider silk.

The company followed the apparel shipment with an Oct. 26 announcement that it had supplied spider silk samples to a textile technology developer with experience collaborating with major aerospace manufacturers. The recipient, which was not identified, specializes in advanced yarn-spinning equipment and fiber structures.

“Our first custom yarn showed that it is now possible to produce and deliver spider silk to industry,” said Kim Thompson, founder and CEO of Kraig Labs. “This program takes that further. We are launching the development of new yarns, new constructions, and new blends.”

The shipments follow a series of production increases Kraig reported earlier this year, including nearly 2.5 metric tons of cocoons produced during its May-June cycle. That figure represents harvested cocoons rather than finished yarn available for commercial use.

Karl Mayer targets faster production of spacer fabrics

Karl Mayer is preparing to demonstrate two Jacquard warp-knitting machines designed to produce more complex spacer fabrics for athletic footwear and performance apparel.

The German textile machinery manufacturer will showcase its RDJ 7/3 and RDJ 6/2 machines at an in-house exhibition in Changzhou, China, alongside ITMA Asia later this month. Karl Mayer says the machines can achieve productivity gains of up to 70 percent compared with similar equipment on the market.

Both machines use a wireless Jacquard control system that replaces conventional cable connections with conductive tracks integrated into the guide bars. The change simplifies maintenance and creates more room for arranging the yarn-guiding components used to produce different fabric structures.

For footwear manufacturers, those functions allow breathable zones, mesh openings, raised surfaces and intricate patterns to be incorporated directly into knitted materials. The RDJ 6/2 also operates at a finer E32 gauge, producing smoother fabric surfaces that Karl Mayer says could offer an alternative to circular knits in certain apparel applications.

“The shorter production times help our customers respond more quickly to new market demands and produce even smaller run lengths cost-effectively,” said Kay Hilbert, global head of design fabrics and specials at Karl Mayer.

The RDJ 7/3 has already entered industrial use. Indonesian performance-footwear textile manufacturer Long John Group commissioned the machine at its facility in August.

RMIT tests mycelium leather for wildfire gear

Researchers at Australia’s RMIT University have developed a prototype wildfire jacket using **mycelium leather** grown from fungal networks cultivated on **agricultural waste**.



The mycelium wildfire jacket. RMIT UNIVERSITY

The jacket, announced in September and currently exhibited at the National Gallery of Victoria, is part of an effort to determine whether fungi-derived materials could eventually be used in **protective clothing**.

Researchers are examining the material’s fire resistance, thermal insulation, durability and capacity to self-extinguish after exposure to flames. RMIT said the **mycelium leather** has achieved Oeko-Tex Standard 100 Product Class II certification, which addresses the presence of certain harmful substances in textiles intended for direct skin contact.

Researchers spanning microbiology, materials science and design developed the prototype. Although **mycelium leather** is the central experimental material, the National Gallery of Victoria’s description also lists Tencel, polyester, nylon, PVC and metal components in the finished jacket.

The project is still a research and design demonstration rather than a commercially available protective garment. The jacket is on display through Feb. 7, 2027.

Christie Brinkley Wears Lab-Grown ‘T-Rex Leather’

Christie Brinkley wore a bracelet made with laboratory-grown “T-Rex leather” to the 2026 Humane World for Animals To the Rescue! gala in New York, bringing a controversial biomaterial back into the spotlight.



Christie Brinkley's bracelet. COURTESY

The Nov. 6 appearance followed the bracelet's October debut at the CFDA/Vogue Fashion Fund **Material Innovation** Challenge. Designed by George Inaki of Japanese fine jewelry label Milamore, the cuff features a kintsugi-inspired broken-heart clasp made with 18-karat gold, sterling silver and natural diamonds.

The material was developed by British biotechnology company Lab-Grown Leather Ltd. using engineered collagen modeled on protein fragments identified in Tyrannosaurus rex fossils. Working with The Organoid Company and creative agency VML, the company used computational techniques to reconstruct a collagen sequence, then cultivated engineered cells to produce leather-like material.

The collaboration first attracted attention in April, when the companies unveiled a handbag made with the material at Amsterdam's Art Zoo museum.

Paleontologists have scrutinized its prehistoric origins, arguing that the surviving collagen fragments come from dinosaur bones rather than skin. They also question whether the reconstructed protein can accurately reproduce the composition and structure of actual T. rex leather.

The bracelet was developed in partnership with Imposter 4 Animals, which is working to introduce the material to North American luxury markets. The company positions T-Rex Leather as an animal-free alternative to conventional hides, although the announcement did not provide independent performance or biodegradation data for the bracelet.

Ororo expands heated apparel with detachable hood

Heated apparel manufacturer **Ororo** has introduced four additions to its SureWarm collection, including its first jacket with a detachable heated hood.



The collection is available now, with prices starting at $249. COURTESY

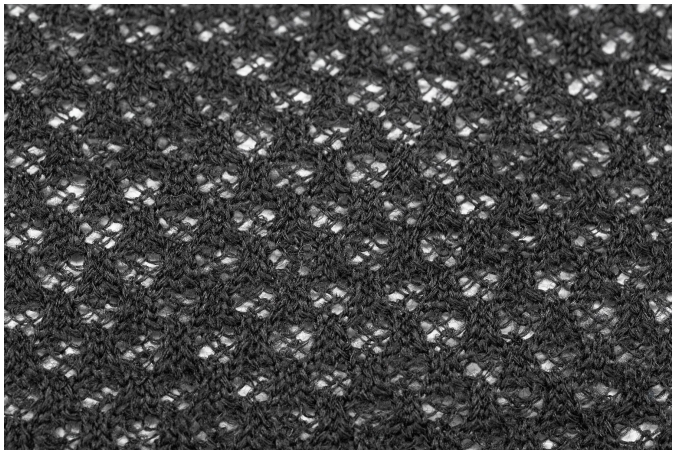
Announced Nov. 12, the expanded lineup includes a fleece hoodie, a workwear-inspired jacket and two outerwear styles equipped with six or seven heating zones. The garments use rechargeable batteries to power heating elements positioned around areas including the pockets, shoulders, upper arms and back.

The Overland SureWarm jacket features seven heating zones, including elements in the removable hood intended to warm the head and ears. Its construction combines a water-resistant nylon shell with Fellex G insulation.

Ororo is also expanding its **dual-control technology**, letting wearers activate heating in different sections of a garment independently. The Missoula Core jacket includes a dual-source power configuration intended for extended use.

Nuyarn's open-net wool fabric wins performance award

Nuyarn Technologies has received a 2026 Performance Days Award for an open-net wool fabric construction designed to improve breathability and moisture management in performance apparel.



Nuyarn's Spyder Wool. COURTESY

The development combines an open fabric structure with **Nuyarn's proprietary yarn technology**, which processes wool fibers without the tight twisting used in conventional spinning. Nuyarn said the open-net structure allows moisture vapor to escape before sweat collects against the skin. The company sees uses for the fabric in lightweight summer running gear and alpine base layers.

"This award reflects our ongoing drive to push the boundaries of performance textiles," said **Andy Wynne**, CEO of Nuyarn. "It demonstrates what's possible when continuous innovation, fabric development, and strong partnerships come together."

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