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Spinning a high-tech web of innovation

By **Elisabetta Povoledo** International Herald Tribune

Thursday, September 30, 2004

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O.K., so not everyone can swing from a web or catch thieves like flies as Peter Parker does as Spider-Man, but recent technological breakthroughs have brought spider and man one step closer.

Spiderweave, which claims to be the world's first machine-produced, spider-woven fabric is 30 times stronger than Kevlar, yet as soft and supple as silk. The new fabric isn't on the market yet, nor is it likely to be any time soon.

"It's so expensive that it's unfeasible to apply to everyday life," said Filippo Pagliai, the founder of Grado Zero Espace, which developed the fabric with the University of California using a web culled from the carnivorous *Nephila clavipes* spider. He saw spiderweave's future in military applications.

Since it was founded six years ago, the transfer technology program of this small company based in Tuscany has made a name for itself by specializing in prototypes.

Another recent discovery applied liquid ceramics — the same kind used to protect the external tiles of the space shuttle when it re-enters the atmosphere, Pagliai said — to fabrics and leather to produce a light and flexible coating that acts as a thermal

insulator.

"Transferring technology used in the aerospace sector to everyday life, that is our aim," said Pagliai of the project, which was developed with the European Space Agency. And in the case of liquid cement, the costs are not high at all, "so it has immediate potential."

The two innovative materials are just a sampling of the direction textile research has been taking in the last decade. Experts have been looking to technologies transferred from other fields, like aerospace, construction and medical, to create new fabrics with a broad range of potential applications.

Nanotechnology has already manipulated molecular particles to bring the world clothing that does not stain or gently massages the wearer.

Manufacturers have also come up with fabrics that neutralize sweat and have aroma-therapeutic qualities, like Bayscent, developed a couple of years ago by Bayer Chemicals in Italy. And fabrics are now regularly developed from food byproducts, like corn, soybeans and seaweed.

"There's a lot of research going on into natural, uncontaminated, environmentally friendly materials, you see it on all fronts," said Manuela

Cifarelli, director of the Milan branch of database Material Connexion, a clearinghouse of sorts for innovative products and materials.

Today's consumer, she added, was much more aware and more demanding, which pushed manufacturers to new levels of quality.

Italy has been at the forefront of this trend, depending on the flexibility and technological know-how of the small and medium-sized companies working in the local textile sector able to transfer technologies from one sector to the next and develop new products at an almost dizzying rate.

"Italy manages to exploit its creativity and the ingenuity that has made the made in Italy brand famous," said Aldo Tempesti, director of Texclubtec, a Milan-based association that promotes and develops high-tech and innovative textiles.

The national fashion sector, increasingly under attack from developing countries and their more competitive labor costs, is looking to the research in new textiles as a way to keep the sector on top. "Because of the competition, it's become a necessity for Italy to be able to differentiate and offer new products," said Tempesti. It is, he noted, Italy's best card, "its strength."

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Tempesti was speaking by telephone from China where he was helping set up a fashion show featuring innovative technical textiles at the Shanghai Science and Technology Museum. Organized by the Italian Institute for Foreign Trade, the fashion show was scheduled to coincide with China's first Formula One Grand Prix (on Sept. 26) and Shanghai Fashion Week.

"We did the Shanghai show to highlight that considerable research is behind Italian creativity," said Mario Adinolfi, a spokesman for the institute, in a phone interview from Rome.

Through the high-tech presentation, the Foreign Trade Institute also bargained on sparking new commercial and industrial cooperation between the two industrial rivals.

Pozzi Electa, one of the 21 Italian companies exhibiting in Shanghai, featured one of its latest finds: Crabyon. It is the brand-name for an ecologically friendly fiber culled from shells discarded by crab-processing factories.

Technicians at the company, which has two spinning mills near Bergamo, took powdered chitosan, which is derived from chitin, the natural polysaccharide found in crabs and shellfish, and blended it with viscose to

come up with a fiber that was pliable and easy to dye.

Crabyon was developed a decade ago in Japan, primarily for medical use, but it has already been applied to sportswear, stockings and lingerie, where its antibacterial properties ("antismell function," Pozzi Electa's promotional materials read) have obvious advantages. "They had the notion, we said we would weave it," said Francesco Della Porta, who runs the 115-year-old family company with his two cousins.

In his Milanese office, Della Porta spoke passionately about Crabyon's properties, praising its still-to-be proven medical benefits. It is said to increase immunity to disease, accelerate wound healing and soothe burns. Currently, tests are being carried out with the University of Milan to confirm these qualities.

The company likes to boast of having pioneered research into technical innovation. "We were the first to weave metals, like steel," said Bernadette Pozzi, the cousin in charge of research and development. "Now everyone talks about these materials, but eight years ago we were alone."

In their quest for novelty they have tried to concoct new materials from just about anything, from bananas to

quartz. "Even the most absurd stuff," Pozzi said, admitting, however, that "it doesn't always work out."

The latest trick is called Firefly, a glow-in-the-dark fabric developed by Pozzi Electa and officially presented last week in Paris at the Première Vision Salon, the fabric trade fair.

Firefly, Della Porta claims, is softer, and more wearable than any phosphorescent precedent.

"In this game, it's all about novelty," he said. "That's where the competition is."

Elisabetta Povoledo is a regular contributor to the International Herald Tribune.

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