COVID-19 pandemic sparks more interest in Henrico County-based Cupron Inc.'s antimicrobial technology

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Henrico County-based Cupron Inc. first gained some notoriety back in 2010 because of — socks.

The company, which at the time had a small office in the Virginia Bio + Tech Park in downtown Richmond, developed patented manufacturing methods to infuse copper into textiles such as socks, shirts, medical gowns and sheets, as well as hard surfaces such as countertops.

Copper has long been known for its natural antimicrobial properties. Bacteria, fungi and even viruses have a much harder time surviving on copper surfaces or clothing that has copper integrated into its fibers.

Cupron garnered attention after the company sent dozens of pairs of its copper-infused socks to Chile, where 33 miners were trapped 2,000 feet underground after a cave-in at the San Jose copper-gold mine. As the world-famous rescue operation unfolded, Cupron's socks were among the products and supplies that were sent down a small resupply shaft to the miners while they waited for 69 days to be rescued.

"That was a real-world demonstration that if you surround a human with self-sanitizing surfaces, it makes a difference," said Chris Andrews, Cupron's CEO. He said all but one of the miners wore the socks. "The doctors were convinced the miners would have infections all over their bodies. The ones who wore the socks were the ones that did not get infections on their feet."

Fast-forward 12 years, and Cupron is now selling copper-infused medical textiles such as gowns and sheets to 35 hospitals to help prevent the growth of microbes in their facilities and to help prevent patient infections.

In the years following the mine accident, Cupron partnered with hospital systems to conduct five clinical trials that showed copper-infused textiles and surfaces, when used in conjunction with normal sanitization procedures, can help reduce the number of hospital-acquired infections.

"The hypothesis was that if you could surround a patient with surfaces that are constantly self- sanitizing, then you can reduce the overall bio-burden in a hospital room," said Jason Ellis, the company's executive vice president and division president for its medical textiles businesses. "The hypothesis was that would translate into fewer infections. That is what we had to go out and do in multiple hospitals with multiple studies, and that is what we did."

Ellis said Cupron is the only company in the world that has a public health claim approved by the U.S. Environmental Protection Agency that their fibers are anti-fungal.

The past two years have sparked a flurry of interest in the company, its executives said. The COVID-19 pandemic has prompted new interest in ways to prevent the spread of microbes in various environments from hospitals to airplanes, they said.

“It has educated our marketplace as to what our technology does, and it has created a sustained demand for solutions to that,” Andrews said. “COVID validated indirectly everything we have been working on for eight years now.”

Cupron is privately owned and does not report its revenue or profit, but Andrews said sales have been “moving up” for two years now, and the company is pushing into new potential markets.

In 2016, Cupron moved from the Virginia Bio + Tech Park into a new headquarters office, warehouse and distribution site on November Avenue in eastern Henrico County. At that site, Cupron stores its medical textile products such as sheets and robes, which it sources from overseas manufacturers and then ships to hospital customers from Louisiana to Connecticut.

Cupron executives say the company’s research has shown that its copper-infused materials are effective against the virus that causes COVID-19, although the company cannot officially make that claim yet. It could happen by the end of this year.

In 2020, the EPA created a new regulatory category for self-sanitizing surfaces, and Cupron is about midway through a roughly 18-month process to get the EPA’s approval for the company to make anti-viral

claims for copper-infused foam pillow and mattress products. The company also wants to get EPA approval in 2023 to claim that its technology can be used to prevent the spread of COVID-19 in certain plastic and other synthetic surfaces.

“We have demonstrated that [copper-infused materials] actually kill much tougher pathogens,” than COVID-19, Andrews said. “We have demonstrated it can kill much tougher bacteria or fungi. Viruses generally are not hard to kill, but they are just highly transmissible so they get around much faster.”

In addition to medical textiles, Cupron has been focusing on licensing its technology to makers of non-medical products, and one of the company’s goals is to get materials that use Cupron’s technology into material and surfaces used in places where people congregate and microbes can easily spread.

“Think about every surface inside of an airplane — the drop-down table, the seat backs, the arms of the seats, and the synthetic leather on the seat,” Andrews said. “All of that can be functionalized with our technology to that same high level of performance. We also now have different films and coatings for a wide variety of packaging. Think about food packaging or non-food packaging, or anywhere that people want to be comfortable that there are not pathogens developing in the supply chain.”

Three clothing manufacturers are using Cupron’s technology to make copper-infused athletic wear, including socks and shirts, Cupron executives said. The company also has customers in the adult diaper industry.

On the medical side, Cupron’s technology is being used by Stericycle, an Illinois-based maker of medical waste disposal containers. The

company is now making plastic waste containers that are infused with copper to help prevent the growth of microbes.

One of the health care systems that tested Cupron's technology was Sentara, a Norfolk-based nonprofit hospital operator. Sentara retrofitted its hospitals with copper-infused medical textiles, bedside tabletops and snap-on, handrail covers on patient beds, which are among the highest-touch areas in a patient setting.

"Sentara invested in copper textiles and surfaces throughout our hospitals in 2014 based on our own published clinical trial," said Mary Morin, vice president of clinical effectiveness for Sentara Healthcare. "That trial showed significant reductions in hospital-acquired infections in patient and staff areas using copper-infused products. Recent data research documents a continued incremental reduction in HAIs across our system, indicating that copper products, coupled with robust infection control protocols, can contribute to a safer patient experience."

Cupron sources recycled copper that it supplies to customers to make finished products. The company has partnered with Techmer PM, a Tennessee-based supplier of modified polymers, to make intermediate products for customers that then produce the finished goods.

"We design raw materials in order for manufacturers to be able to convert them into their products," said David Turner, vice president of design and business development for Techmer PM. "We take these raw products like copper and we convert them into a manufacturable substance, which would be polymer, plus copper, plus other additives, that make a product that can go to textile manufacturers or things like medical waste containers."

Turner says there are customers in the packaging industry who are looking into it. “We have people in the upholstery and floor covering industry who are looking at it. Over the last two years, we have seen a great deal of interest in it.”

In addition to selling medical textiles and licensing its technology for other products, Cupron also has a laboratory in Henrico where it does tests for clinical trials. The lab also can test whether other products on the market that claim to contain copper really do.

Often, they do not, said Vikram Kanmukhla, a chemical engineer and Cupron’s vice president for innovation and quality.

“Unfortunately, there are companies out there that have more copper in their names than in their products,” he said.

That is one reason why Cupron has done research and taken steps to get regulatory approval for its products — to differentiate itself from others that may merely claim to be antimicrobial, Kanmukhla said.

The COVID-19 pandemic has opened up opportunities for Cupron, but also presented challenges. Among those challenges are supply chain disruptions and difficulty getting access to health care facilities.

“I have never seen anything like it,” said Michael Britt, Cupron’s senior vice president for global operations, of the supply chain disruptions caused by COVID-19. He said the company has had to “scramble” a few times to get supplies of its textiles shipped from overseas.

“It is taking a lot longer for stuff to move, and it is more expensive for everything — air and ocean,” Britt said.

At the same time, the pandemic made it harder for the company to get access to health care facilities and customers. So Cupron pivoted its strategy by partnering with laundry companies that supply health care facilities.

In March, Cupron signed a deal to supply microbe-resistant linens to Up To Date Laundry Inc., a Baltimore-based company that is one of the largest health care laundries on the East Coast, processing close to 60 million pounds of linens each year.

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