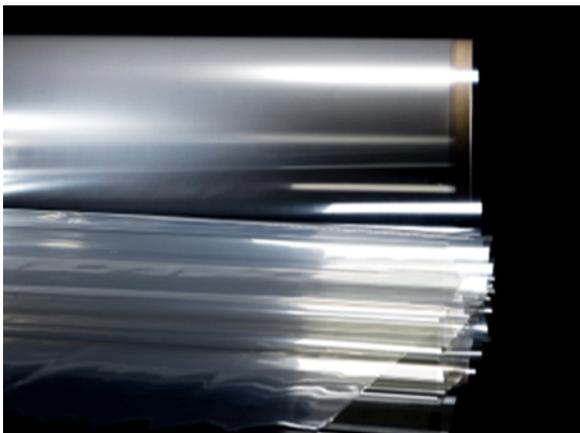
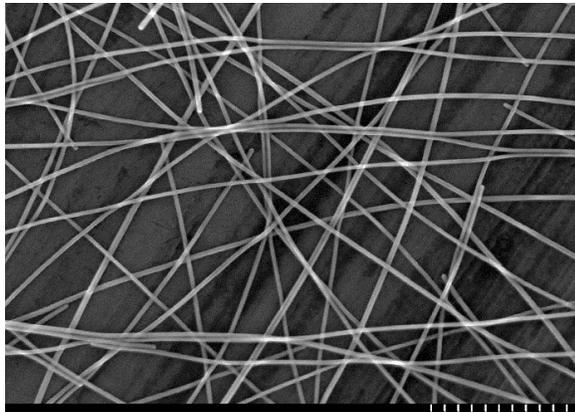


Silver News

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Highlights of TechConnect World Innovation Conference in Anaheim, California

By Trevor Keel, PhD., Technical Consultant to The Silver Institute



CAMBRIOS

An electron micrograph of Cambrios silver nanowires, and the formulated thin film product.

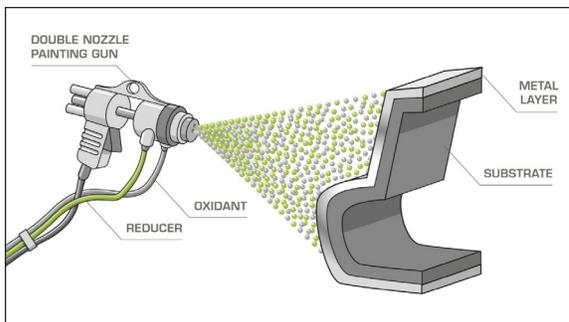
The Silver Institute in May sponsored a technical symposium that provided a forum for small companies, academics and government officials to meet and discuss their efforts to move new, silver-based technologies towards the marketplace.

- The first keynote speaker was Fiona Marshall, CEO of UK-based healthcare firm [AgPlus Diagnostics](#), who introduced her company's innovative diagnostic technology, which relies on silver nanoparticles. She outlined her vision of developing a highly-sensitive electroanalytical diagnostic platform for use across multiple sectors including human, veterinary and environmental diagnostics, sports medicine and military applications.
- The second keynote was delivered by Michael Spaid, CEO of California-based [Cambrios Advanced Material Corporation](#). Cambrios specializes in the development of transparent conductive materials for use in a range of applications including touchscreens, smart windows and flexible electronics. He introduced Cambrios' silver nanowire technology, which is available as an ink or film, and some of the products in which the technology is already found, including touch sensors from manufacturers such as Panasonic, Lenovo and LG. The company believes that wearables represent the next major opportunity for their technology and is involved in a range of development projects in the sector.
- The final speaker of the morning session was Sam Stremsoefer, CEO of the French R&D-led firm [Jet Metal Technologies](#). He spoke about the

continued on page 2

company's key markets and applications, which are split between decorative and technical functionalization. The technology relies on the spraying of two water-based solutions (a silver salt oxidant and a reducer) by standard painting equipment at ambient pressure and temperature. This produces a chemical reaction resulting in the immediate growth of a metallic layer on the substrate.

- The afternoon session was started with a keynote delivered by Professor Jim Johnston of [Victoria University of Wellington](#), New Zealand. Johnston's work focuses on the antimicrobial potential of silver, and how this can be utilized within composite materials. He introduced the development and commercialization of antimicrobial silver-wool fiber composites called Nga-pure, which have considerable promise across a range of sectors including clothing, upholstery and wound management. Another presentation was delivered by one of Johnston's former students, Eldon Tate, who is CEO of [Inhibit Coatings](#). Inhibit is developing silver-based antimicrobial and anti-fouling coatings for industrial applications. Their product holds promise in the food preparation and hygiene industry, where minimizing bacterial loads on surfaces is critical. However, they have also identified a number of other potential markets including a range of marine anti-fouling applications.
- Three papers were also delivered at the symposium; Rob MacCuspie of Natural Immunogenics, US; Brobby Kofi Jocelyn from Åbo Akademi University, Finland; and Danielle Gorka of National Institute of Standards and Technology, US. Each discussed different aspects of silver's use in technology, from the analysis and fate of particularly small nanoparticles to a novel method of synthesizing antibacterial paper.



Jet Metal Technologies' metallization system

JET METAL

China Plans Silver Iodide Cloud Seeding Project for Tibetan Plateau

China is planning what may be the world's largest effort to change weather by using silver-iodide cloud seeding to bring up to 10 billion cubic meters (2,641,720,523,581 US gallons) of rain to the Tibetan Plateau, an area about 1,605,793 square kilometers (620,000 square miles).

The area receives less than 10 cm (4 inches) of rain a year, which qualifies it as a desert by U.S. Geological Survey standards, which set 25 cm (10 inches) a year as constituting a desert.

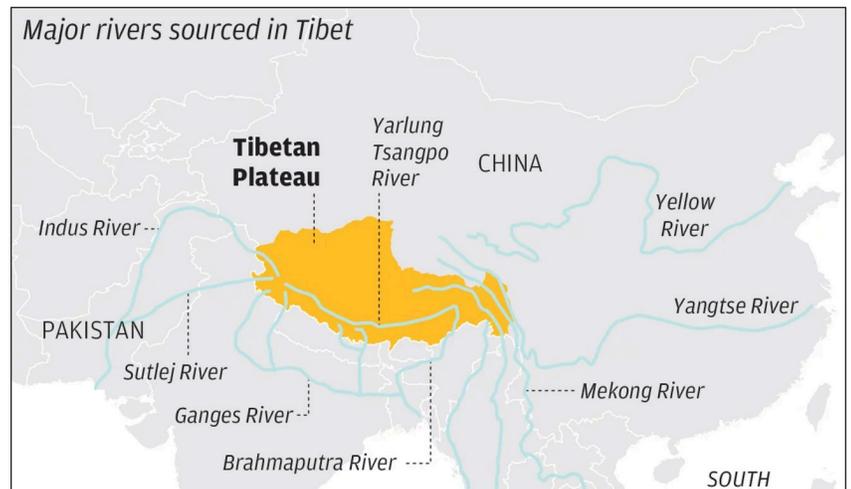
The system would rely on low-cost (50,000 yuan or US\$8,000 each) equipment burning solid fuel that sends silver iodide crystals into the sky. Moisture droplets in the air collect around the crystals, and when they grow large enough they can produce rain. Silver iodide seeding has been used successfully around the world for decades to bring rainfall to arid regions (See [Drones Take to the Skies with Silver Iodide Seeding](#), December, 2013 *Silver News*). Unlike cloud seeding from planes, this system would not require a no-fly zone to guard against interference from air traffic.

The system is being developed by China's state-owned Aerospace Science and Technology Corporation. One of their challenges was to figure out how to burn the silver iodide-producing fuel in the oxygen-sparse mountains that can reach over 16,400 feet (5 kilometers). The company reports that the system is being designed to burn for months without maintenance and emit only water vapor and carbon dioxide byproducts.

Data collected and disseminated by a network of weather satellites will guide the activities of the cloud seeding equipment, deciding when they will be switched on and which units will be activated based on atmospheric conditions.

In a prepared statement, aerospace corporation President Lei Fanpei said: "[Modifying the weather in Tibet] is a critical innovation to solve China's water shortage problem. It will make an important contribution not only to China's development and world prosperity, but also the wellbeing of the entire human race."

The launch date and size of the project is pending final government approval.



The silver iodide cloudseeding proposal would add water to many rivers that drain from the Tibetan Plateau.

SOUTH CHINA MORNING POST

Antibacterial Silver So Common in Leisure Wear that Radiologists are Warning Patients About MRI Burns

Patients undergoing MRI (Magnetic Resonance Imaging) are routinely asked to remove all metallic belongings from the scanning area as well as clothing items that contain metallic fasteners, hooks and unusual zippers. Although reported in the [American Journal of Neuroradiology](#) in 2013, radiologists recently have been stepping up their warning to patients about leisure wear, especially yoga pants, that contain silver threads because of the growing popularity of antibacterial clothing.

There have been increased incidences of reported cases of thermal burns caused by invisible silver-embedded microfibers in fabrics. At the University of California - Los Angeles's Medical Center, patients are warned: "As the prevalence of fabric containing non-detectable metallic microfiber increases in athletic and 'tech' clothing, the importance of having patients change into safe facility-provided garments before MR imaging is emphasized."

In other words, change into a hospital gown.

The hospital even named several brands by name: Athleta, Columbia Omniheat, Duluth Trading Co., Juzo USA, Lululemon and Tommie Copper.

It took radiologists a while to realize that the silver threads were causing the issue because there was no visual indication of the metal being in the fabric. Now, radiologists are asking patients who are wearing *any* clothing with tags that state 'anti-bacterial' or 'odor-free' to change, because chances are strong that the fabric contains silver.



FACEBOOK/LULULEMON

Metallic fibers in your Lululemon yoga pants can heat up dangerously during an MRI.

Silver-Imbedded Underwear: Smart or Lazy?

Four Danish entrepreneurs in their 20s have consumers wondering if they're being environmentally smart or simply lazy by introducing silver-imbedded underwear that they claim only needs to be washed several times a month.

"Our business is sustainable fashion. The traditional way of buying, wearing, washing and throwing away overpriced underwear is a terrible waste of resources. And it is extremely harmful to the environment," 27-year-old Mads Fibiger, CEO and co-founder of Organic Basics, said in a prepared statement.

The company had used a successful 2017 crowdfunded campaign dubbed SilverTech 1.0 to produce other clothing based on antimicrobial silver. This latest campaign, called [SilverTech 2.0](#), is also crowdfunded, but it uses silver in a different way than its predecessor.

"SilverTech 2.0 is different from SilverTech 1.0 because it uses only recycled materials and we also use seamless knitting technology for added comfort and durability. SilverTech 2.0 still uses the antimicrobial properties of silver, but in a different way. We use Polygiene, a safe, bluesign approved recycled silver treatment and apply it directly on the fabric for optimal odor control," the company states. "SilverTech 2.0 is more functional than 1.0. We've used nylon for 2.0, a moisture wicking fabric that's also more durable and it feels lighter on the skin. Overall, it's more durable, breathable, comfortable and sustainable."



Click the image to learn about SilverTech 2.0 underwear

Graphene and Silver Combination Can Detect Low Levels of Ultraviolet Light

Sensors Could Protect People from Cancer-Causing Rays

Graphene – a form of carbon made from a single sheet of graphite – is the strongest material ever tested. It also is a good conductor of electricity and heat, and is nearly transparent. Since its ‘rediscovery’ in 2004 (its properties were first seen in 1947, but scientists were not able to exploit them), more applications are being found every day. (See [Silver Plus Graphene May Lead to Stronger Weapons Against Bacteria](#), June 2017 *Silver News*)

Now, a team of researchers from the Indian Institute of Science (IISc) in Bengaluru, and Max Planck Institute for Intelligent Systems and University of Stuttgart, Germany, have developed a silver nanoparticle-graphene hybrid photodetector device with an increased capability to detect ultraviolet (UV) light.

The technology may lead to more sensitive sensors such as those to keep people safe from cancer-causing UV rays. It could also provide early sensor warnings for food, fabrics and other items that can deteriorate under UV exposure.

One method of producing UV-sensitive graphene is to sensitize the graphene with plasmonic nanostructures (structures that concern the interaction between the electromagnetic field and free electrons in a metal) because light causes electricity to flow in these structures. This electricity can be measured thus producing a sensor. Unfortunately, this only works well for visible light and not UV rays.

By adding silver to the graphene, however, and producing a graphene-plasmonics hybrid material, it becomes very sensitive to UV rays.

The researchers were able to produce a regular, large area array of silver nanoparticles each about 50 nanometers. Onto this array, graphene is deposited. The authors of the study, appearing in the journal [Nanoscale](#), noted: “The device fabrication strategy is scalable and modular” making it easier to commercialize the process.

Tequila Maker Using Silver Ion Filtration

Stoli Group USA’s [Cenote Tequila](#), is filtering its water used for tequila through silver ions.

In a [recent on-line interview](#), master distiller Arturo Fuente discussed the company’s Cenote brand and his job as distiller. He noted: “We play a key role in overseeing the entire process to ensure no mistakes are made that could cause contamination to the spirit. It is our job to make sure we’re placing the best liquid into the barrels to rest. We pay close attention to the details that others might not have the time for... Our water is sourced from an artesian well located at our distillery ([Fabrica de Tequila Finos](#)), which sits at the base of the Jalisco volcano. The water goes through reverse osmosis and carbon filters with silver ions to eliminate any chance of impurities.”

Cenote tequila is not the only spirit-maker to use silver ions to purify water. Golia vodka, produced from Mongolian wheat and water from the Khuiten Peak, is distilled at least six times through silver and platinum filters to remove any impurities. (See [New Mongolian Vodka Distilled Through Silver Filters](#), February, 2014 *Silver News*). Other vodka makers including [Silver Dollar](#), [Fortuna](#) and [Kvint](#) also pass water through silver filtration systems.



Master distiller Arturo Fuente

Worried About Smartphone Radiation? Silver Can Lower the Risk

Many studies have been performed over the last two decades to learn whether mobile phones pose a potential health risk because of the electromagnetic radiation they produce so close to the user's head. So far no adverse health effects have been established, according to the World Health Organization, although similar radiation has been shown to heat and injure soft tissue.

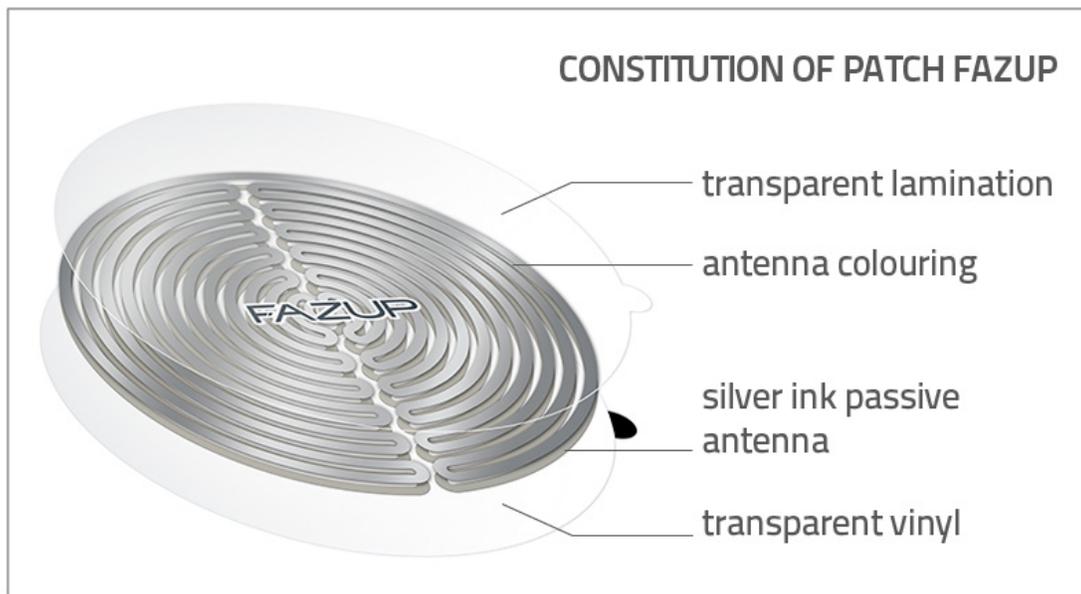
For those who don't want to take the risk, Swiss-based startup [FAZUP](#) has a solution that relies on silver.

The company's 'patch' is a silver ink-printed antenna that attaches to the back of a smartphone, and the company claims it directs electromagnetic waves away from the user's head. Company officials also say that the patch reduces Specific Absorption Rate, (SAR), a measure of the rate at which energy is absorbed by the human body when exposed to a radio frequency. The higher the SAR, the more chance for cell and tissue damage, and officials say that the patch reduces SAR levels on average by 80% and as high as 99% for some smartphone models depending upon which band they operate on. The patch also acts as a heatsink drawing heat away from the phone during heavy usage.

Smartphone makers are required in some countries to make public their SAR rates. Because each model is different, the patch should be attached at slightly different locations on the phone case.

Smartphones vary their transmitting power based on distance from the nearest cell tower. The farther the distance, the more power the phone is forced to employ and it does so automatically. FAZUP officials say that this power hike produces more harmful radiation so patch users in poor reception areas will see the greatest benefits. They also note, however, that users who mainly text or surf the web – which means the phone is further from their heads – are exposed to much less radiation and significantly lower risk.

FAZUP retails for about US\$41.



Click the image see the FAZUP patch in action.

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