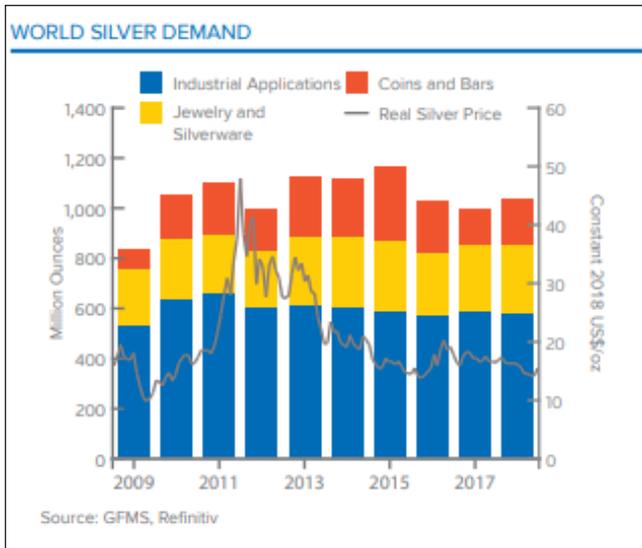


Silver News

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Global Silver Demand Up 4% in 2018, Fueled by Investment Demand and Rising Jewelry and Silverware Offtake: *World Silver Survey 2019*



Industrial applications still make up more than half of silver demand.

Three positive developments emerged in the silver market last year, according to the just-released *World Silver Survey 2019*:

- Total silver demand increased for the first time since 2015, rising 4 percent to 1.03 billion ounces.
- There was a robust recovery in retail investment, led principally by silver bar demand, which climbed sharply last year.
- On the supply side, global mine supply fell for the third consecutive year, following a continuous streak of 13 annual increases before 2016. Silver scrap supply has been in retreat since 2012 and fell by nearly 2 percent last year. These factors led to another tightening of the supply/demand balance, contributing to a physical deficit of 29.2 million ounces (Moz) in 2018.

Silver Demand

The 4 percent growth in total silver demand for 2018, reaching 1.03 billion ounces, marked a three-year high. The silver coin and bar category rose by 20 percent, although the rise was entirely driven by silver bar demand, which jumped by 53 percent. Silver bar demand was led by exceptionally strong sentiment in India, where demand leapt 115 percent higher last year.

Silver jewelry demand moved 4 percent higher in 2018 to 212.5 Moz. India was again the standout, pushing its demand for jewelry up 16 percent to achieve a new record level. Demand also picked up in North America, with the United States posting a 7 percent rise to an all-time high of 17.4 Moz. Global demand for silverware jumped by 6 percent last year to 61.1 Moz, led by a strong recovery in demand from India, which experienced a 10 percent increase to 41.8 Moz. Turkish silverware demand rose by 20 percent to 1.6 Moz, a level not seen since 2009.

Electronics and electrical demand, the largest component of industrial silver demand, consumed 248.5 Moz last year, a 2 percent increase over 2017. China, the United States, Japan, Germany and India were the main demand centers in this category. Brazing alloys and solders consumed 58.0 Moz in 2018, a 1 percent increase over the previous year, led by demand in China, the United States, Japan, India and the United Kingdom.

Silver Supply

Global silver mine production fell 2 percent in 2018, experiencing

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its third consecutive annual decline to 855.7 Moz, following supply disruptions in Canada, Guatemala and the United States. For the second year, the biggest year-on-year variation was posted by primary silver mines, which decreased by 7 percent in 2018 to contribute 26 percent of total mine supply. The lead/zinc sector contributed 38 percent of by-product silver output, followed by copper at 23 percent and gold at 12 percent.

Silver scrap supply fell by 2 percent to 151.3 Moz. Lower silver prices accounted for the bulk of the decline, discouraging suppliers and consumers from recycling their silver valuables.

Following nine consecutive annual increases, identifiable above-ground stocks fell 3 percent last year. North America was the only region to report an increase in above-ground stocks and was up 9 percent, while Europe recorded a 9 percent decline and Asia posted a 14 percent decline.

Silver Price and Investment

The annual average silver price fell by 7.8 percent to \$15.71/oz last year, with prices trading in a \$13.97/oz – \$17.52/oz range. A combination of factors, including a rising U.S. dollar, interest rate hikes, the trade dispute between the United States and China, and lower global economic growth projections from the International Monetary Fund, affected the silver price last year.

Identifiable investment, which consists of net-physical bar investment, coins and medals purchases, and net-changes to exchange-traded product (ETP) holdings, rose by 5 percent in 2018, reaching 161.0 Moz. This rise was entirely attributed to the upsurge in silver bar purchases.

The Silver Institute has published this annual report on the global silver market since 1990 to bring dependable supply and demand statistics to market participants and the public. This 29th edition of the Silver Institute's *World Silver Survey* was independently researched and compiled by the GFMS team at Refinitiv. The report was sponsored by 19 companies and organizations from North and South America, Europe and Asia.

A free PDF of the *World Silver Survey 2019* may be [downloaded here](#).

Bollywood “It” Couple Tout Silver-Based Paint

Two of Bollywood's most popular movie stars — Deepika Padukone and Ranbir Kapoor — who were once an item, are back together in a campaign for antibacterial, silver-based paints called Royale Health Shield, manufactured by [Asian Paints](#).

The reunion of the on-again, off again couple has been the source of many tabloid-type stories, and their video commercial for the antibacterial paint has gone viral.

The film shows Kapoor choosing the wall color for his renovated home. He asks Padukone for advice and she responds that any color will do as long as it is paint with antibacterial powers.

In a prepared statement, Amit Syngle, COO, Asian Paints Limited said, “We are beyond excited to launch this new film with Deepika Padukone and Ranbir Kapoor. It is for the very first time that they are coming together to launch our brand campaign to advocate the best of what our brand has to offer. Today's consumer is more aware and believes in making healthy choices that are safe and hygienic, especially when it comes to their homes. [Asian Paints Royale Health Shield](#) is one such healthy choice for a consumer to make to ensure their walls are bacteria-free. This revolutionary paint contains silver ion technology, as recommended by the Indian Medical Association (IMA), making it the first such paint brand to receive this distinction.”



Click on image to watch the silver-based paint commercial starring Bollywood's Deepika Padukone and Ranbir Kapoor.

California Dental Association Gives Silver Diamine Fluoride a Boost

The California Dental Association (CDA) is sponsoring legislation that would allow Silver Diamine Fluoride (SDF) – an effective and safe cavity preventer, especially in children – to be covered under the state's Medi-Cal Dental Program. (See [Silver Diamine Fluoride Gets OK From Pediatric Dentistry Group, February 2018 Silver News](#).)

Silver Diamine Fluoride was approved for tooth hypersensitivity by the U.S. Food and Drug Administration in August 2014, and the first products were available in April 2015. SDF has been used in other countries for decades, including an 80-year clinical history in Japan.

The Medi-Cal Dental Program provides dental coverage to over 13 million beneficiaries, including 5.5 million children, but does not currently cover the use of SDF for tooth decay.

SDF can stop the progression of tooth decay and stabilize a tooth if further intervention is required. “Since the treatment does not require the use of local anesthesia or caries excavation, the option is particularly beneficial to patients for whom traditional treatment presents challenges, whether due to age, behavioral issues or medical conditions,” according to a statement from the CDA.

Tooth decay is the most common chronic condition experienced by children, according to pediatric dentists. As Gary D. Sabbadini, DDS, noted in the *CDA Journal*, “The public is looking for low-cost, safe, nonsurgical methods to treat children's teeth. While SDF is not a remedy for all dental caries, I am glad that I have a nonsurgical option to offer to parents.”

CDA, the bill's author and other stakeholders are optimistic that Governor Gavin Newsom will sign the bill into law.

CDA will inform members about the status of this bill in the *Update* and on [cda.org](#).

Silver Jewelry Sales Continued Upswing in 2018

Retailers Reporting Double Digit Year-Over-Year Sales Increases

Silver jewelry sales in the United States were strong in 2018 with 52% of jewelry retailers reporting increased sales, according to a survey conducted on behalf of the Silver Institute's [Silver Promotion Service \(SPS\)](#).

Survey Highlights:

- The average store growth in 2018 for silver jewelry sales was 16%.
- Retailers said their silver jewelry sales, as a percentage of their overall jewelry sales, were on average 24% of their unit volume and 18% of their dollar volume.
- 51% said silver experienced the best inventory turnover rate in 2018; 12% said diamond; 14% said bridal and 12% gold.
- 84% of retailers say they are optimistic that silver jewelry sales will continue to grow.
- The best maintained margins during the Holiday Season were:
 - Silver Jewelry 40%
 - Diamond Jewelry 23%
 - Bridal Jewelry 17%
 - Gold Jewelry 15%
 - Platinum Jewelry 5%

SPS Director Michael Barlerin said, "The Silver Promotion Service is obviously gratified by what the survey demonstrated. We are also grateful that the optimism for silver's ongoing performance remains so strong." The survey, conducted by [INSTORE](#), was fielded in February 2019. This was the tenth consecutive year that SPS has commissioned such a survey.

Read the entire survey [here](#).

Silver Microneedle Patch Delivers Vaccine with No Pain; Stops Spread of Disease Through Needle Reuse

Although most of the world's vaccines are administered from hypodermic needles, a new type of delivery system known as the microneedle patch is catching on. Each patch consists of a small square of material that has an array of tiny medication-containing needles on its underside. When the patch is applied to the patient like a bandage, the microneedles pierce only the top layer of skin, not reaching any of the underlying nerves.

Researchers from the University of South Australia, who are developing this more patient-friendly system to administer vaccines, say that the silver-loaded dissolvable microneedle patches not only sterilize the injection site to inhibit the growth of bacteria, but also dissolve after administration.

"Injections are one of the most common health care procedures used for vaccinations and curative care around the world," said the lead researcher, Professor Krasimir Vasilev. "Up to 40 per cent of injections are given with improperly sterilized syringes and needles, placing millions of people at risk of contracting a range of illnesses or diseases. Our silver-loaded microneedles have inherently potent antibacterial properties which inhibit the growth of pathogenic bacteria and reduce the chance of infection."

The antibacterial abilities of the silver-loaded micro-needles were tested against bacteria often associated with skin infections. The silver was effective in wiping out *golden staph*, *staphylococcus epidermis*, *Escherichia coli* (E. coli) and *pseudomonas aeruginosa* bacteria. The silver-loaded microneedle patches produced a 24-hour bacteria-free zone around the patch administration site.

The silver-loaded microneedles are in a pattern of 15 x 15 needles, each 700 microns long. Because they never go deep enough to hit a nerve, the needles are painless. And, because the microneedles are composed of a water-soluble polymer, they dissolve one minute after application, leaving behind only the medicine.

One of the driving forces behind developing the microneedle patch is that using the same syringe on different people can spread disease. [The World Health Organization](#) estimates that needle sharing causes up to 1.7 million people to be infected with Hepatitis B, 315,000 with hepatitis C, and as many as 33,800 with HIV each year.

"Infection from unsafe injection practices occurs all over the world, so technologies that protect people from unnecessary infection are critical. The dissolvable feature of our silver-loaded microneedles ensures absolutely no risk of reuse, removing one of the greatest causes of infection," said Vasilev. "By incorporating the antibacterial silver nanoparticles into the dissolvable microneedles, we've created a very promising vehicle for safe vaccine and drug delivery around the world."

Silver Keeps the International Space Station Healthy for Astronauts

Harmful bacteria can survive in space under zero-gravity conditions. That can make for some pretty unhealthy living and working conditions on the International Space Station (ISS), which has been continually inhabited since November 2000.

One of the areas which scientists found particularly rife with bacteria is the toilet door. Such infestations are more dangerous for astronauts in space because prolonged time in orbit has been shown to reduce a person's immune system. Microgravity, along with solar and cosmic radiation, change the immune-regulatory system of the crew, leaving them more susceptible to pathogens.

"Spaceflight can turn harmless bacteria into potential pathogens," said senior study author Elisabeth Grohmann of Beuth University of Applied Sciences, Berlin, in a prepared statement. "Just as stress hormones leave astronauts vulnerable to infection, the bacteria they carry become hardier -- developing thick protective coatings and resistance to antibiotics -- and more vigorous, multiplying and metabolizing faster."

The safest and perhaps simplest way to get rid of the microbes is a coating of silver and ruthenium, according to astronauts who tested the new combination. The surface coating is called *AgXX*. (Ruthenium is a rare metal belonging to the platinum group of the periodic table and is inert to most other chemicals. The element offers some antibacterial powers.)

AgXX works by killing bacteria as well as certain fungi, yeasts and viruses, Grohmann noted. "The effects are similar to bleach except the coating is self-regenerating, so it never gets used up."

After coating the door to the space toilet with *AgXX*, the space station astronauts tested the surface for bacteria three times over a 19-month period. After the first six months, the *AgXX*-coated surface remained bacteria-free. However, six months later, nine strains of bacteria were found and three more strains were discovered by the end of the study period.

In the long term, the *AgXX*-coated surface had 80 percent fewer bacterial strains compared to an uncoated area of bare steel. Interestingly, the coating's germ-killing powers were lessened but not because the material itself became less effective. Instead, a build-up of dust and dirt decreased the coating's ability to make contact with bacteria.

"With prolonged exposure time a few bacteria escaped the antimicrobial action. The antimicrobial test materials are static surfaces where dead cells, dust particles and cell debris can accumulate over time and interfere with the direct contact between the antimicrobial surface and the bacteria," Grohmann explained.

NASA astronaut Serena Auñón-Chancellor, who handles plumbing aboard the ISS, said: "Most importantly, no serious human pathogens such as *Methicillin-resistant Staphylococcus aureus* (MRSA) or *Vancomycin-resistant Enterococci* (VRE) were found on any surface. Thus, the infection risk for the crew is low."

"Immunosuppression, bacterial virulence and therefore infection risk increase with duration of spaceflight," Grohmann added. "We must continue to develop new approaches to combat bacterial infections if we are to attempt longer missions to Mars and beyond."

The researchers' results are in the journal [*Frontiers in Microbiology*](#).



NASA astronaut Serena Auñón-Chancellor performs plumbing duties inside the International Space Station's toilet. She reported success in using silver to kill dangerous germs.

Why Do Electrical Bandages Heal Wounds Faster?

Silver Helps Researchers Learn Why

Doctors know that a small amount of electricity applied to wounds makes them heal faster, but they never knew why it worked. Now, using silver-imbudded bandages, recent studies at Ohio State University are shedding light on this mystery, and this may lead to better wound treatments.

“The goal is to heal non-healing or chronic wounds, and, if infection is present, to remove infection,” said Shaurya Prakash, an associate professor of mechanical and aerospace engineering and co-author of a recent study about his team’s research. In a prepared statement, he continued, “And what we wanted to understand was the mechanism behind why these electroceutical treatments work to kill bacteria.” He added: “If infection is present, wounds will not heal. We need to find a way to get through the biofilm to the bacteria.”

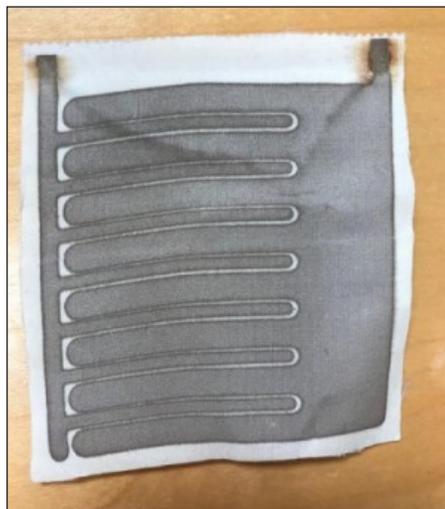
Biofilms, a collection of microorganisms made up of fats, proteins and even bacteria, live on skin and wounds. The biofilms help healing by forming a protective barrier that keeps outside microbes from infecting a wound, but they also prevent topical treatments, including antibiotics from reaching the wound. The effect of the barrier is that while it keeps the wound protected it also can prolong the healing process.

The researchers learned that ‘electroceutical’ bandages — those with a small electrical current flowing through them — made of certain materials can break through the barrier and allow medicines to reach the wound. The best materials tested turned out to be haboti silk, a common Japanese textile. Prakash and his team silk-screened silver lines onto the silk, and attached a small device to deliver electricity to the biofilm.

When electricity was applied, the current disrupted the biofilm and began to destroy the bacteria. The researchers hypothesized that the electric current produced hypochlorous acid, a chemical that kills bacteria but leaves healthy tissue unscathed.

The study was conducted in a laboratory setting and not on animals or people, Prakash noted.

The research was funded by Ohio State’s Center for Clinical and Translational Science L-Pilot Program, which is funded by a multiyear Clinical and Translational Science Award (CTSA) from the U.S. National Institutes of Health. The research has also received support from Ohio State’s Infectious Disease Institute.



This prototype electroceutical bandage uses silk-screened threads of silver to help wounds heal quicker.

Silver Catalyst Helps Reduce Carbon Monoxide Emissions

Engineers, especially those in the automotive and truck industries, are continually searching for ways to reduce carbon monoxide emissions from vehicles. Currently, catalytic converters help turn carbon monoxide into harmless carbon dioxide, but the process often doesn’t go far enough.

Now, Russian chemists at National University of Science and Technology MISiS University in Moscow have developed a catalyst consisting of boron nitride and silver nanoparticles that allows conversion of carbon monoxide at only 193 degrees C (380 degrees F), which is relatively low for these kinds of processes. They hope to lower the temperature further by adding more silver.

Currently, platinum is a common catalyst for internal combustion engines but platinum is expensive and, scientists are learning, may not be the best catalyst. Hybrid materials based on hexagonal boron nitride and silver nanoparticles are promising. The Russian scientists in concert with their Australian team members produced the nanosilver particles through the decomposition of silver nitrate in a solution of polyethylene glycol then blasted by ultraviolet light. The 10 nanometer silver particles are deposited on a layer of boron nitride and the polymer matrix of polyethylene glycol.

Experiments showed that the most effective concentration of silver nanoparticles was 1.4% by weight. By increasing the concentration, scientists hope to lower the temperature necessary for the carbon monoxide to carbon dioxide conversion to take place. Because of the still too-high temperature, however, the catalyst is not yet suitable for vehicles but can be suitable for limiting carbon monoxide emissions in factory processes.

How Much Silver is in a Smartphone?

The Amount May Surprise You

Wanting to call attention to the amount of rare and valuable metals used in a typical smartphone, scientists at the University of Plymouth, UK, put an iPhone in a blender, heated the pulverized result to 500 degrees C (932 degrees F), then dissolved the powder in acid to separate out the materials.

The phone consisted of 900 milligrams of tungsten, 70 of cobalt, 36 of gold and 90 of silver. Most of the silver was used in electrical connections, switches and miniature components. The phone also contained more common materials such as 33 grams of iron, 13 of silicon and 7 of chromium, as well as smaller quantities of other abundant substances.

More than 1.4 billion smartphones are produced each year, and the scientists led by Arjan Dijkstra and Colin Wilkins, geologists from the University's School of Geography, Earth and Environmental Sciences, wanted to illustrate the growing reliance on rare earth materials that puts new demands on the global mining industry.

Dijkstra said: "We rely increasingly on our mobile phones but how many of us actually think what is behind the screen? When you look, the answer is often tungsten and cobalt from conflict zones in Africa. There are also rare elements such as neodymium, praseodymium, gadolinium and dysprosium, not to mention quantities of gold, silver and other high value elements."

Wilkins, Lecturer in Economic Geology, added in a prepared statement: "Mining can be part of the solution to the world's problems. But we are now in a climate where people are becoming more socially responsible and interested in the contents of what they are purchasing. Partly on the back of this, several of the major mobile phone companies have committed to upping their recycling rates. It is a positive sign that the throwaway society we have lived in for decades is changing, and we hope this project will encourage more people to ask questions about their own behaviors."



Click the image to watch a smartphone pulverized by a blender.

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