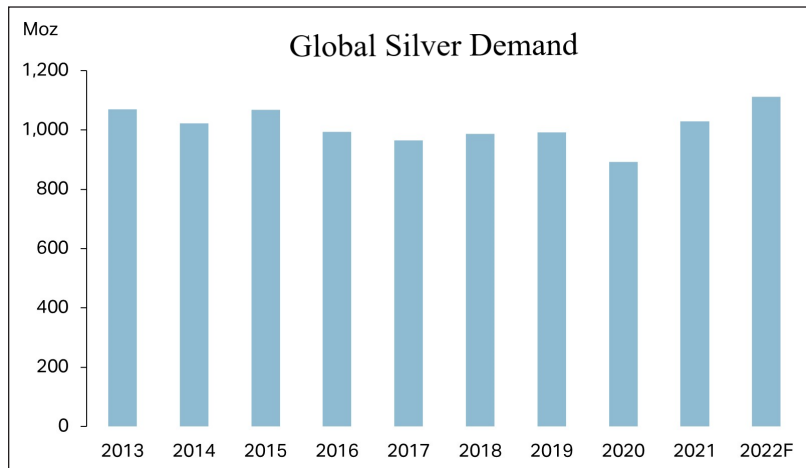


Silver News

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Global Silver Demand Forecast to Reach a Record 1.112 Billion Ounces in 2022



Industrial demand makes up more than half of total demand, which is expected to reach a new high this year.

Total global silver demand is expected to reach an all-time high of 1.112 billion ounces (Boz) in 2022 driven mainly by record silver industrial fabrication -- forecast to grow by 5 percent -- as silver’s use expands in both traditional and critical green technologies, according to data from the Silver Institute.

Silver Demand

Industrial demand, which makes up more than half of total demand, will strengthen due to global economic improvements and mitigation of supply chain disruptions brought on by COVID-19. Silver use in automotive will continue its robust growth as vehicles increase their use of electronic devices. As chip fabrication shortages abate, more silver will find its way into consumer devices, as well. The outlook for silver’s use in the photovoltaic (PV) industry remains bright. Government commitments to carbon neutrality have resulted in a rapid expansion of green energy projects. As a result, even with ongoing efforts to reduce silver loadings, record PV installations are expected to lift silver demand in this segment to an all-time high in 2022.

Jewelry is expected to grow by an impressive 11 percent and silverware by 21 percent.

Silver Supply

Total global silver supply is projected to rise by 7 percent to 1.092 Boz in 2022, mainly from mine production, which is forecast to grow 7 percent to a six-year high this year. After shifting to a market deficit in 2021 for the first time in six years, the silver market is expected to record a supply shortfall of 20 million ounces this year. Silver recycling should be more modest in 2022, with volumes likely to advance by 3 percent, with the rise entirely due to higher industrial recycling.

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Silver Physical Investment, Exchange-Traded Products & Price

Silver physical investment should see double-digit gains in 2022 and hit a seven-year high as investors seek a safe haven from inflation and other economic uncertainties. Silver exchange-traded products (ETPs) reached 1.132 Boz last year, close to record highs, and a level expected to be maintained for much of 2022.

Overall, the 2022 annual average silver price, based on the LBMA silver price, is forecast to be US\$24.80, 1 percent lower than 2021's average price of US\$25.14, an historically high annual average.

For more details on the Silver Institute's thoughts on the 2022 silver market, see the complete press release here: [The Silver Institute](#).

Some Silver Deposits Owe Their Formation to Ancient Bacteria

Naturally occurring bacteria may play a major role in forming silver deposits, according to researchers who found silver in 500-million-year-old fossilized feces from ancient worms in Canada's Northwest Territories.

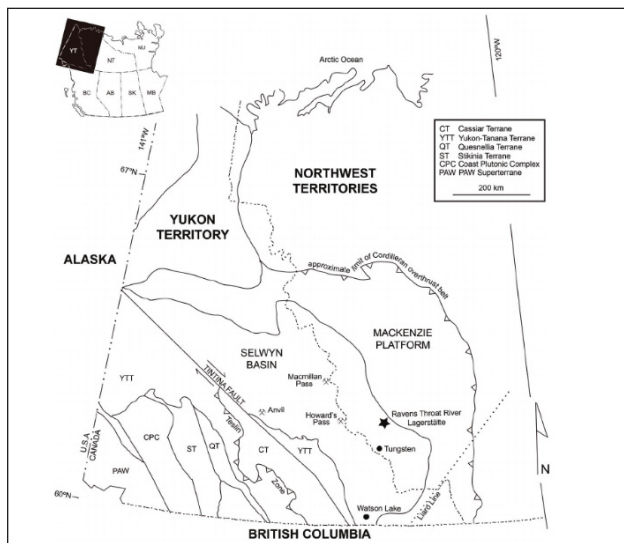
The area, near the Arctic Circle, was once situated near the equator. As the continents shifted over millions of years, the rocks containing bacteria and other organic material migrated north. "North America looks different now than it did in the Cambrian period," said Julien Kimmig, assistant research professor in [Penn State's Earth and Environmental Systems Institute](#), in a prepared statement. "Nowadays the Ravens Throat River Lagerstätte (a lagerstätte is a deposit of preserved fossils, sometimes including soft tissue) is in the middle of the Mackenzie Mountains, but during the period we're studying, we're looking at a deeper shelf environment completely underwater."

When Kimmig and his colleagues from the [University of Saskatchewan](#) studied the fossilized feces under an electron microscope they found, as expected, carbon, pyrite and aluminum silicates, but they also were surprised to see something else. "And then something really shiny popped up in the middle of the screen of our instrument, and when we looked at it, it turned out to be elemental silver," said Kimmig. They checked surrounding rocks for additional silver deposits but didn't find anything beyond trace amounts. "If you look at silver deposits, usually you find other elements associated with silver, like lead and zinc," Kimmig, the [study's](#) lead author, said. "We didn't see elevated amounts of these elements at our site, so there were different mechanisms at work behind the creation of this deposit compared to ore deposits. The Mackenzie Mountains have some rich ore deposits, and there are several mines in the region, but none has a composition of elevated silver without elevated levels of another metallic element."

It has been well documented that bacteria can extract silver from mine tailings so there was an established link between the two. Upon further study, Kimmig and his team realized that microbial activity likely played a role in accumulating silver in the fossilized worm dung.

He said: "We likely had the poop first, then we had some bacteria or algae growing on the poop, and some of those were likely leaching silver out of the water column. To form the biggest piece of silver we found, which measures 300 micrometers, the microbial colony must have been a relatively decent size." The silver probably was extracted from brine located in the ocean, he noted.

"It might also indicate that while fluid flow plays a big role in the formation of ore deposits, some ore deposits might have had bacterial help, and these microorganisms could have played a major part in creating some of our bigger silver or gold deposits in the geologic past," Kimmig concluded.



Large silver deposits in the Ravens Throat River Lagerstätte in Canada's Northwest Territories may have been formed by bacteria.

Five Companies Recently Joined the Silver Institute

The Silver Institute continues to expand its membership and welcomes the following companies to its roster.



MAG SILVER

[MAG Silver](#) is a Canadian development and exploration company, based in Vancouver, Canada. Its principal focus is the Juanicipio Project, jointly developed with Fresnillo Plc as the operator. The project is located in the Fresnillo Silver Trend in Mexico, one of the world's premier silver mining camps. MAG Silver Corp. trades on both the TSX and NYSE-A under the symbol MAG.



[Dolly Varden Silver Corp.](#) is a Canadian mineral exploration company focused on the creation of one of the largest high-grade, undeveloped precious metals assets in British Columbia's Golden Triangle. The company is listed and traded on the TSX-V under the symbol DV and on the OTCQX under DOLLF.



[Endeavor Metals Group](#), based in West Palm Beach, Florida, deals in physical precious metals. Established in 2013, the company is a member of the National Coin and Bullion Association, the Numismatic Guarantee Corporation, the Professional Coin Grading Service, and the American Numismatic Association Certification Service.



[Avino Silver & Gold Mines](#) is a Vancouver, British Columbia-based mining company that has operated in Mexico for more than 50 years. In the coming years, one of Avino's objectives will be to adopt an inclusive ESG strategy and embrace stronger social responsibility. Avino trades on both the TSX and the NYSE/AMERICAN under symbol ASM:CA.



[Beijing G&S Digital Technology Corp.](#), based in Beijing, China, is building a digital service platform for gold and silver products in China, using a blockchain technology that tracks silver from production to circulation. They are currently working with the China Gold Group, a state-owned gold corporation, to sell gold bars and jewelry, and will soon expand into silver.

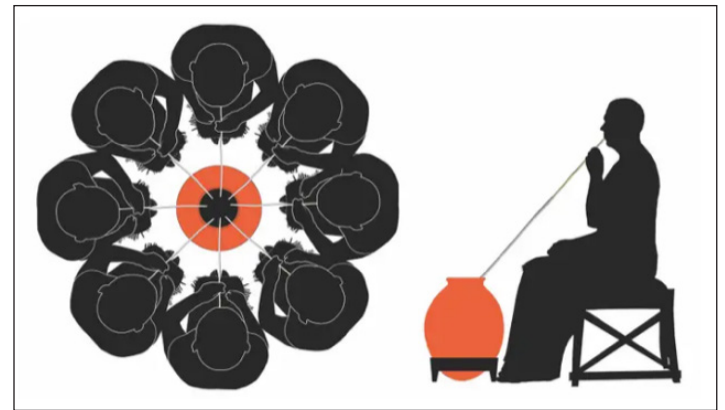
Were 5,000-Year-Old Silver Tubes Really Drinking Straws?

As the world reconsiders the environmental impact of disposable plastic straws, archeologists are now rethinking the purpose of 5,000-year-old silver and gold tubes on display in a Russian museum. Experts once thought that the tubes were either ceremonial staffs or canopy supports but they may be reusable drinking straws.

A team led by Viktor Trifonov of the [Russian Academy of Sciences](#) in St. Petersburg believes that the eight, 3-foot-long slender tubes, excavated from a burial mound in 1897 in what is now Armenia, were used by the Maikop culture for ceremonial beer drinking from a communal container. Four of the straws have silver or gold bull figurines that can move up and down the tubes.

Writing in the journal [Antiquity](#), Trifonov and his team noted: "If correct, these objects represent the earliest material evidence of drinking through long tubes -- a practice that became common during feasts in the third and second millennia BCE in the ancient Near East."

The scientists base their theory on the finding of traces of barley starch and cereal from domesticated plants and pollen grain from a lime tree, which could be ingredients of beer. The theory is bolstered by evidence that beer brewing began at least 13,000 years ago in the Middle East and spread worldwide from there. Clay tablets found in Iraq and Iran dating from about 7,000 years ago show people drinking with straws from a communal vessel.



This reconstruction shows how Bronze Age people may have used silver straws to drink from a communal vessel.

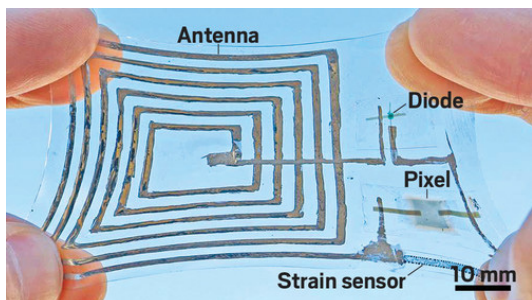
Silver Helps Connect 'Stretchy' Electronic Components

Engineers have made great strides in the field of 'wearables' that stretch and twist to conform to the body of the person wearing the device. But what happens if some of the components used in that elastic-like device are too rigid? That's the case with many common components like transistors and resistors, but diodes can now be crossed off that list, according to researchers at [Stanford University](#).

They have produced what they say is the world's first stretchy, high-frequency diode, a device that allows high frequency current to flow in one direction but not the other, which makes it useful for radio frequency identification (RFID) tags often used for inventory control, shipping sensors and anti-shoplifting tools, as well as body sensors. Many of the flat antennas used in RFID tags are composed of silver ink that has been printed onto a plastic or rubber base.

Researcher Zhenan Bao, whose team has produced other stretchable innovations, described this latest development for *Chemical & Engineering News*: "Electrodes and semiconductors that can pass a high current and also tolerate high mechanical deformation didn't exist, so we had to invent those materials." She said they added silver film to the connecting points to ensure low resistance connections to the rest of the circuitry.

In the journal [Nature](#), the team wrote: "... we show the operational feasibility of our diode by integrating it with a stretchable sensor, electrochromic display pixel and antenna to realize a stretchable wireless tag. This work is an important step towards enabling enhanced functionalities and capabilities for skin-like wearable electronics."



An electrical component known as a 'stretchy' diode flexes along with this printed-on antenna.

Silver and Mussels Team up for Dental Health

The durability of a dental filling is only as good as the bond between the resin that composes the filling material and the tooth itself. While searching for new and better bonding materials, researchers have found promise in an adhesive protein found in mussels and are using silver to help test how well that material adheres to teeth.

Mussels and other shellfish like barnacles exhibit sticking power on rocks, vessels, piers and other waterborne objects. This adhesive quality has fascinated dental researchers for years and they have studied various animals to understand how their glue-like properties can be applied to dental adhesives. "Mussels need to maintain their adhesiveness under harsh marine environments, including humidity, drastic change of water temperature and pH value, sudden shocks and so on," said Professor Cynthia Kar Yung Yiu, Clinical Professor in Pediatric Dentistry, [University of Hong Kong](#), who is leading the research team. In a prepared statement she added: "These are similar to the daily activities that happen in the oral cavity. Our research aimed to understand the adhesive properties of the compounds from mussels, which may improve the durability and longevity of dental fillings."

What's always been a challenge, however, is how to test their adhesive power, and this is where silver played a large role.

One method was to expose the bond to various temperatures like those found in a person's mouth from drinking a very hot or very cold beverage, for example. The international standard for testing dental adhesives requires the material to be subjected to 5 degrees C and then 55 degrees C for many cycles and then checked for adhesive strength. An acid was added to the test and then researchers followed that with a silver nitrate solution. In many cases, the cycle of hot and cold caused cracks to appear and researchers were able to see the reflection off of the silver particles that had infiltrated through 'nanoleaks' that would have otherwise been difficult to observe.

Experiments showed that the mussel-derived compound, (known as DMA) strengthen the resin-dentin bond and could increase the longevity of a dental filling. "This research discovered that DMA is effective in strengthening the resin-dentin bond and improves its durability. The cytotoxicity is also similar to the resin monomers in traditional dental adhesives. It is believed that this compound may be commercialized in the future," said James Kit Hon Tsoi, Associate Professor in Dental Materials. Other team members who authored the [study](#) were from Wuhan University and Peking University Shenzhen Hospital.



Silver is being used to understand how mussel-derived material can be used as dental adhesives.

New Laser Method Expands Use of Silver Nanowires

Silver nanowires are fast becoming a common component of many consumer electronic devices, ranging from smartphones to ‘wearables’ that monitor a wearer’s vital signs. However, although silver offers the highest conductivity of any metal, when it’s brought to nanosize the wires can exhibit resistance when produced by a common method that employs lasers.

The method, known as femtosecond laser direct writing (FsLDW), uses lasers to build nanowires and is prized for its ability to construct true three-dimensional wires (other methods produce flat wires) which, in turn gives more flexibility. Because nanowires are so often used as part of bendable devices, such as body sensors, making more flexible nanowires is a great advantage.

The laser technique has a major disadvantage, though. It produces nanowires by connecting nanoparticles but at the same time leaves nanosized gaps between the particles, which causes electrical resistance. To combat this, a group of engineers from the [Institute of Photonics Technology of Jinan University](#) (China) and the [Institute of Physics and Chemistry, Chinese Academy of Sciences](#) have proposed a plasmon-enhanced laser nanosoldering method that relies on a laser that oscillates at a much different frequency. This enhanced laser technique ‘smooths’ out the nanowire and helps to eliminate the gaps that cause increased electrical resistance.

This new method will allow increased use of silver nanowires in future devices, the engineers wrote in the journal [Opto-Electronics Advances](#) as it “provides an efficient and cost-effective technique to rapidly produce large-area metal nanowire electrodes and capacitors with high conductivity, excellent uniformity, and good flexibility.”

US Mint Women’s Suffrage Coin Wins “Most Historically Significant Coin” Award

A US silver bullion coin commemorating the women’s suffrage movement won first place in the 2022 Coin of the Year’s “Most Historically Significant Coin” category.

The one-dollar, .999 silver coin celebrates the 100th anniversary of the ratification of the 19th Amendment, which stated: “The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.”

The obverse (heads) design shows profiles of three women, each wearing a hat to symbolize the styles worn during decades of the suffrage movement. The woman in the foreground is wearing a hat with the year 1920, the year that the 19th Amendment was ratified by Congress. The reverse (tails) design shows “2020” being dropped into a ballot box inscribed with “VOTES FOR WOMEN” on the box.

The 400,000-mintage coin is sold out from the US Mint but is available from private vendors for approximately US\$100.

The Coin of the Year awards program is an internationally conducted competition sponsored by *World Coin News*.



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