

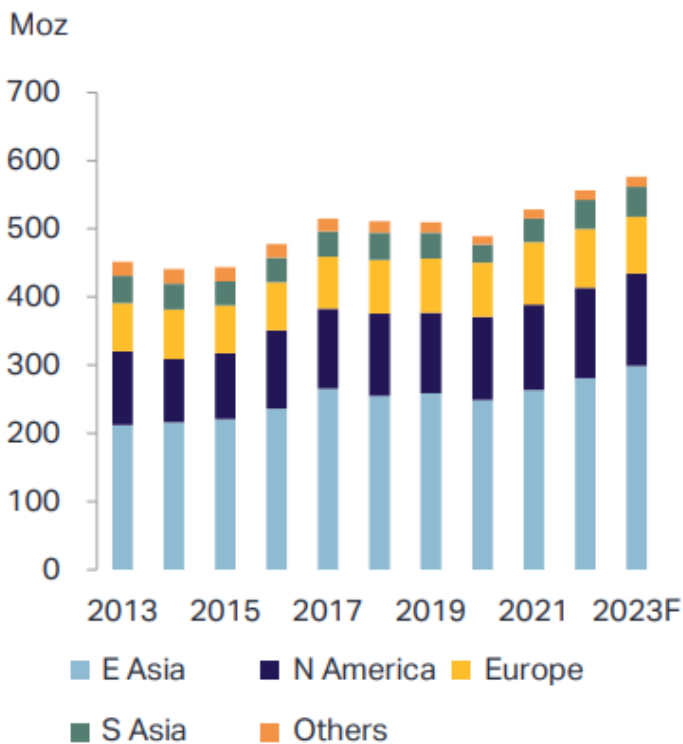
Silver News

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Worldwide Total Silver Demand Hits Record High in 2022

Silver Market in Structural Deficit

Industrial Fabrication Forecast



Source: Metals Focus

Led by end-uses in the green economy, industrial demand is forecast to rise yet again, by 4%, to a new record high this year.

All major silver groups recorded high demand in 2022, contributing to a new total global record of 1.242 billion ounces. In particular, industrial demand – which makes up nearly half of all silver demand – rose by 5 percent, physical silver investment rose by 22 percent, jewelry increased 29 percent, and silverware jumped 80 percent. This upward demand has risen 38 percent since 2020 as countries continue their recovery from the COVID-19 pandemic.

Because of record high demand and lower mine production, the silver market had a 237.7 million-ounce deficit, the second such deficit in as many years. “Importantly, the combined 2021 and 2022 deficits more than offset the cumulative surpluses of the previous 11 years,” noted the *World Silver Survey 2023*, released by the Silver Institute and produced by [Metals Focus](#), a London-based independent precious metals consultancy. The *Survey* predicts another ‘hefty’ deficit in 2023.

“In 2023, we expect industrial fabrication will reach another all-time high, boosted by continued gains in photovoltaic (PV) applications as well as healthy offtake from other industrial segments,” the *Survey* stated. “Led by end-uses in the green economy, industrial demand is forecast to rise yet again, by 4% to a new record high this year.”

On the demand side, all fabrication categories hit record highs except for photographic and brazing and soldering, the latter category due to a manufacturing slowdown in China as a result of pandemic restrictions. Overall industrial demand reached a record 556.5 million ounces, which was attributed mostly to photovoltaic offtake – 140.3 million ounces – automobiles, the buildout of 5G networks, and increased demand for silver catalysts in the manufacture of ethylene oxide, an industrial compound mainly used to produce consumer and commercial chemicals.

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Jewelry was another bright spot as fabrication rose 29 percent to a record 234.1 million ounces worldwide. Silverware also hit a record high of 73.5 million ounces, a rise of 80 percent over the preceding year. Both records were mainly due to Indian consumption as employment and incomes returned to pre-pandemic levels.

On the supply side, “Global mined silver production fell marginally in 2022, by 0.6% y/y to 822.4 million ounces,” the *Survey* noted. “This followed strong growth of 5.8% the previous year as mines recovered from the disruption caused by COVID.” This mining drop was largely attributed to lower by-product output from China and Peru which was mostly offset by production increases from Mexico, at 3.1 million ounces; Argentina, 3.0 million ounces, and Russia, 2.2 million ounces.

Physical silver investment rose for the fifth consecutive year to a high of 332.9 million ounces with India reporting a 188 percent increase.

To read a press release about the *Survey* [click here](#).

[Click here](#) to download a complimentary copy of *World Silver Survey 2023*.

Silver Jewelry Continues to Deliver Results for U.S. Jewelers, According to New Survey

Best Holiday Margins Compared to Other Jewelry Items

U.S. jewelry retailers reported a 52% increase in sales last year, confirming that silver jewelry continues to be a leading merchandise category for sellers, both in driving sales and providing margin, according to a survey conducted online from February 9 to March 8 by [The Jewelers Collective \(TJC\)](#), a leading jewelry magazine, on behalf of the Silver Institute.

Indeed, jewelry sales appear likely to remain strong, as 88% of the retailers said they were optimistic that silver jewelry sales growth will continue for the next several years, and 46% said they were very optimistic. Moreover, when compared to other jewelry items sold during the holiday season, they rated silver jewelry as the best margins at 38% compared to diamond jewelry at 21%, bridal jewelry also at 21%, gold jewelry at 18% and platinum jewelry at only 2%.

Other highlights of the survey distributed to jewelry retailers and TJC subscribers were:

- 61% of retailers said that they increased their silver jewelry inventory in 2022 by an average of 21%
- 51% said silver jewelry is essential to their business, while 27% said it is important
- Retailers said their silver jewelry sales, as a percentage of their overall jewelry sales, averaged 28% of their unit volume and 19% of their dollar volume
- The average store growth in 2022 for silver jewelry sales was 14%

The complete survey results can be downloaded here: [2022 Silver Jewelry Survey Results](#).

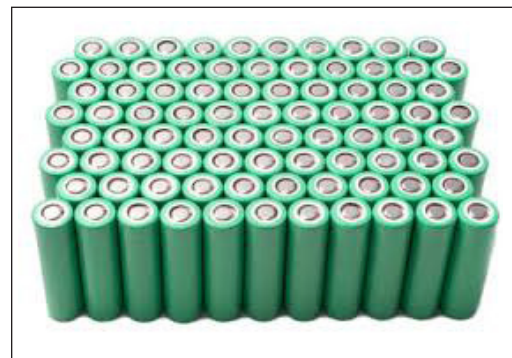
This was the 13th year the Silver Institute commissioned such a survey.

Silver Nanoparticles Hold Promise for Longer-Lasting Lithium Batteries

Popular lithium batteries have one major flaw. After a large number of recharging cycles, the lithium itself actually changes the chemical composition of the battery, causing it to fail. This process, known as *lithiation*, can be mitigated by using silicon as an electrode and punching it with atomic-sized holes to increase its porosity, German scientists suggest.

As it turns out, researchers in Hamburg, Germany, have found great success at producing these battery-extending holes by shooting silver nanoparticles at silicon. “Silicon still has the highest potential to serve as an electrode material for lithium-ion batteries,” said Patrick Huber, a researcher at [Deutsches Elektronen-Synchrotron DESY](#), a Research Centre of the Helmholtz Association. “Our new etching technique may form the basis for a new generation of battery cells with a high charge density and a large number of charging cycles...,” he said, in a prepared statement. Stella Gries, principal author of the team’s [published paper](#), added: “We suspect that the geometric shape of the silver nanoparticles has a strong influence on the way the particles eat into the silicon.”

Although the exact mechanism is not yet fully understood, the team says that the silver nanoparticles bore into the silicon forming a fine network of tunnels of several different shapes (some even appear like corkscrews) that prevent lithium’s deleterious effect on the battery, perhaps by allowing more oxygen to infiltrate the silicon.



Silver may hold the answer to longer lasting lithium batteries.

USDA Develops Antimicrobial Natural Cotton Wipes Using Embedded Silver

The United States Department of Agriculture has developed machine-washable antimicrobial wipes embedded with silver ions that can be used at least 30 times to clean hard and non-porous surfaces before being discarded.

Most antimicrobial wipes are made from synthetic fibers such as polyester and polypropylene and are thrown out after one use. Moreover, they don't degrade for hundreds of years. This newly-developed wipe is composed of natural raw cotton that decomposes in landfills when it is no longer viable. Another advantage of using raw cotton is that it doesn't need processing which requires chemicals and energy. The only added material is silver. The wipes can be reused after being cleaned in a washing machine.

“Silver nanoparticles are one of the popular antimicrobial agents used for producing odor-inhibiting, anti-infective textile products and other personal health products,” said Sunghyun Nam, research engineer at Agricultural Research Service's (ARS) [Cotton Chemistry and Utilization Research Unit](#) in New Orleans.

The team noted that consumers wet the wipes with tap water before using and that the cloths killed 99.9 percent of dangerous bacteria *Staphylococcus aureus* and *Pseudomonas aeruginosa*, both of which can cause infections.

“We also found that the wipes still successfully killed pathogens even after being washed 30 times in the laundry,” said Nam, in a prepared statement. “The wipes regenerate their antimicrobial surface every time they are wet or washed because the embedded nanoparticles act as a reservoir of silver ions. These wipes are designed to gradually give off low levels of silver ions from the nanoparticles embedded inside the cotton fiber over the full course of the time of use and deplete nanoparticles.”



CRISTA MADISON

Researchers producing washable antimicrobial cotton wipes at the ARS Southern Regional Research Center in New Orleans.

Silver Makes Better Solar Cells Even Better

Perovskite – a mineral composed of calcium compounds – is on its way to replacing silicon as the material of choice for solar cells. Not only is it cheaper and more abundant than silicon, but modern processing techniques allow it to rival silicon in efficiency.

If that isn't enough reason to use perovskite, engineers at the [University of Rochester](#) have found a way to more than triple its efficiency by adding a layer of silver underneath it.

Like all solar cell materials, light excites the electrons causing them to jump from their atoms and into wires (most likely made of silver) that carry away the electricity. However, sometimes the electrons fall back into the holes they just left and this reduces their efficiency. By placing the perovskite on a layer of silver, or alternating layers of silver and aluminum oxide, the likelihood that the thrown off electrons will refill the holes is reduced. In fact, the engineers demonstrated that these silver layers boosted light conversion by 3-1/2 times.

“A piece of metal can do just as much work as complex chemical engineering in a wet lab,” said Chunlei Guo, lead author of the [study](#). “As new perovskites emerge, we can then use our physics-based method to further enhance their performance.”



CHLOE ZHANG

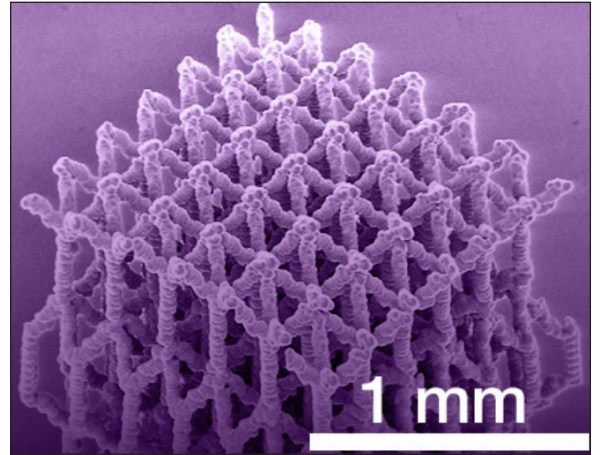
An artist's impression of a perovskite solar cell with a new layer of material underneath, which boosts efficiency by creating reflections of electron-hole pairs.

3D-Printed Scaffolding and Silver Nanoparticles Provide Bone Surgery Infection Control

Bone surgeries are not only complex but bring a high risk of infection, because they entail the use of ‘scaffolding,’ man-made structures that hold bone pieces in place while they heal and regenerate.

Despite a high level of infection control during operations, bacteria can cling to scaffolds, thus slowing recovery and necessitating a long course of antibiotics. Now, scientists at the [Complutense University of Madrid](#) have suggested that 3D printing composites of nanoporous material – containing pores between 2 and 50 nanometers and spread with silver nanoparticles that fill the holes – could help mitigate infection.

The study did not test the efficacy of the silver impregnated scaffolding on live subjects, but laboratory experiments showed their effectiveness: “Antimicrobial assays indicated that bacterial growth inhibition and biofilm [a community of cells on a material] destruction were directly proportional to the increased presence of silver nanoparticles in the matrices.” They concluded: “3D printed scaffolds with hierarchical pore structure and high antimicrobial capacity have potential applications in bone tissue regeneration.”



An example of 3D-printed bone scaffolding.

Silver Helps Produce Unique Electrons That Can Reduce Greenhouse Gases, Break Down Pollutants

Most people have never heard of a ‘solvated electron,’ which is a free electron floating in a solution – often water or ammonia – that can break down carbon dioxide or chemical pollutants safely and sustainably. They also can help turn carbon dioxide into non-fossil fuels and reduce greenhouse gases during the manufacturing process of fertilizers.

But there’s a catch. Solvated electrons are difficult and expensive to produce, but chemists at [Rice University](#), [Stanford University](#) and [The University of Texas at Austin](#) have shown that coating a metal electrode with silver nanoparticles can increase the number of solvated electrons by 10 times.

“Making solvated electrons in high quantities is very challenging,” said co-corresponding author Sean Roberts of UT Austin, in a prepared statement. “Our results show quantitatively how nanostructuring of electrode surfaces can really boost the rate with which they generate solvated electrons. That could potentially open up new ways of driving chemical reactions.”

The team first showed that they could make solvated electrons by shining light on silver electrodes placed in water. Then, they learned that they could increase the yield of solvated electrons tenfold when they coated the electrodes with silver nanoparticles.

“A key challenge remains,” said co-author Christy Landes of Rice. “The silver nanoparticles in our experiments were arranged at random, mimicking the tiny imperfections one might find on the surface of a flawed material. The next step is optimization.”

The research was supported by a grant from the [U.S. National Science Foundation](#).

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