

Silver News

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Silver Industrial Demand Rebounded In 2017, Mine Supply Recorded Second Consecutive Loss: *World Silver Survey 2018*

(million ounces)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Supply										
Mine Production	684.7	717.3	753.0	758.3	791.7	823.3	867.8	895.1	888.6	852.1
Net Government Sales	30.5	15.6	44.2	12.0	7.4	7.9	-	-	-	-
Scrap	200.7	200.6	227.2	261.2	253.8	191.0	165.4	141.1	139.7	138.1
Net Hedging Supply	-8.7	-17.4	50.4	12.2	-47.1	-34.8	16.8	7.8	-18.9	1.4
Total Supply	907.2	916.1	1,074.8	1,043.8	1,005.8	987.4	1,050.0	1,044.0	1,009.4	991.6
Demand										
Jewelry	177.6	176.9	190.0	191.5	187.4	220.6	226.4	226.7	205.0	209.1
Coins & Bars	197.9	94.9	150.3	212.7	159.7	241.1	234.1	292.1	207.8	151.1
Silverware	58.4	53.2	51.9	47.5	43.8	59.3	61.2	63.2	52.4	58.4
Industrial Fabrication	641.9	528.2	633.8	661.5	600.1	604.6	596.3	583.2	576.8	599.0
...of which Electrical & Electronics	271.7	227.4	301.2	290.8	266.7	266.0	263.9	246.0	233.9	242.9
...of which Brazing Alloys & Solders	61.8	53.8	61.2	63.2	61.1	63.7	66.7	61.5	55.3	57.5
...of which Photography	98.2	76.4	67.5	61.2	54.2	50.5	48.5	46.6	45.2	44.0
...of which Photovoltaic*	-	-	-	75.8	58.2	55.9	51.8	59.2	79.3	94.1
...of which Ethylene Oxide	7.4	4.8	8.7	6.2	4.7	7.7	5.0	10.2	10.2	6.9
...of which Other Industrial*	202.8	165.8	195.2	164.2	155.1	160.8	160.6	159.8	152.9	153.7
Physical Demand	1,075.8	853.1	1,026.0	1,113.1	990.9	1,125.6	1,118.0	1,165.3	1,041.9	1,017.6
Physical Surplus/Deficit	-168.6	63.0	48.9	-69.4	14.9	-138.2	-68.0	-121.3	-32.5	-26.0
ETP Inventory Build	101.3	156.9	129.5	-24.0	55.3	2.5	1.4	-17.8	49.8	2.4
Exchange Inventory Build	-7.1	-15.3	-7.4	12.2	62.2	8.8	-5.3	12.6	79.8	6.8
Net Balance	-262.8	-78.6	-73.2	-57.5	-102.6	-149.5	-64.0	-116.1	-162.1	-35.2
Silver Price, \$ per oz.	14.99	14.67	20.19	35.12	31.15	23.79	19.08	15.68	17.14	17.05

“Global silver industrial fabrication demand returned to growth in 2017, increasing 4 percent to 599.0 million ounces.”

Industrial demand for silver, fueled by record photovoltaic growth, rose in 2017 for the first time since 2013. A stronger global economy led to healthy demand from the semiconductor market, resulting in greater silver offtake in electrical and electronics applications as well as brazing alloys and solders. The jewelry and silverware sectors also experienced noteworthy gains in 2017, according to the [World Silver Survey 2018](#) released by the Silver Institute and produced on its behalf by the GFMS Team at Thomson Reuters (GFMS).

On the supply side, global mine supply fell for the second consecutive year, following an uninterrupted streak of 13 annual increases prior to 2016. Silver scrap supply, which has been in retreat since 2012, again registered a loss. These factors led to a tightening of the supply/demand balance, contributing to a physical deficit of 26 million ounces (Moz.) in 2017, the fifth consecutive annual deficit.

Global silver industrial fabrication demand returned to growth in 2017, increasing 4 percent to 599.0 Moz. This growth was bolstered by another year of photovoltaic demand, rising 19 percent in 2017, the result of a 24 percent increase in global solar panel installations. Brazing alloy and solder silver fabrication recorded a 4 percent annual rise to 57.5 Moz, boosted mainly by solid growth from China and Japan.

The surge in electronics, most notably in semiconductor fabrication demand, led to the electrical and electronics segments delivering the first annual increase in offtake in this category since 2010, with 242.9 Moz consumed last year. Silver demand for the production of ethylene oxide dropped by a third from 2016 volumes to 6.9 Moz, mostly due to a decline in new installations. GFMS estimates that silver’s use in photography, which fell by 3 percent last year, appears to have stabilized, with renewed interest in various photographic applications utilizing silver, only falling marginally over the last few years.

[Click here for further details from World Silver Survey 2018.](#)

Silver-Semiconductor Film Could Hold Vast Amounts of Data as Holograms

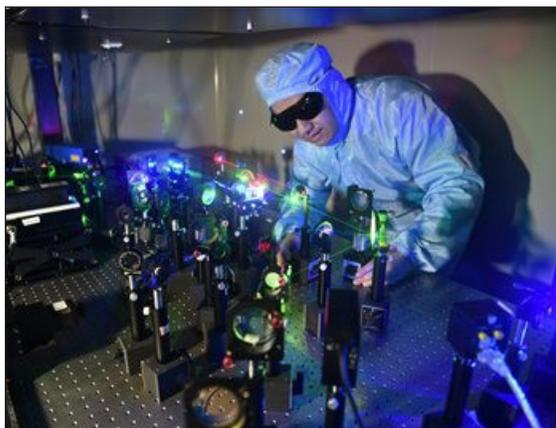
Finding a medium to hold vast amounts of data is a challenge as we produce ever-increasing amounts of information. In addition, current media like Digital Video Discs (DVDs), for example, hold a lot of information but can warp and degrade over time.

One answer may be nanoparticle-based films that are 80 times thinner than a human hair and hold more than 1,000 times the data of a DVD on a piece as small as 100 square centimeters. The films, composed of silver nanoparticles and the semiconductor titanium, hold promise for storing information optically as 3-D holograms.

The information can be recorded on the films by using a laser, and then retrieved at speeds up to 1 gigabyte per second, about twenty times the speed of a typical flash memory.

“In the future, these new films could be incorporated into a tiny storage chip that records 3-D color information that could later be viewed as a 3-D hologram with realistic detail,” said Shencheng Fu, who led researchers from Northeast Normal University in China to develop the new films. “Because the storage medium is environmentally stable, the device could be used outside or even brought into the harsh radiation conditions of outer space.” The researchers plan to test the environmental stability of the new films by performing outdoor tests.

A report on this storage method was published in the journal [Optical Materials Express](#).



Researchers have created a nanofilm that can store data holographically and is environmentally stable. Here, Shencheng Fu carries out experiments with the new film.

NORTHEAST NORMAL UNIVERSITY

Silver Institute to Sponsor Symposium at TechConnect World Innovation Conference 2018

The Silver Institute will sponsor a symposium at *TechConnect World Innovation Conference 2018*, a multi-sector gathering of technology leaders, researchers, innovators, technology prospectors and investors. The *Silver Materials and Innovations Symposium* will be held on two days, May 14 -15, 2018, as part of TechConnect’s 20th anniversary event at Anaheim, California’s convention center.

The *TechConnect World* event includes 35 symposia, technology conferences and expositions, including *Nanotech 2018*, and will bring together more than 4,000 attendees from 70 countries supporting the development and commercialization of new innovations.

This symposium will provide a platform for industrialists and academics to introduce the next generation of scientific breakthroughs reliant on silver.

[Click here for details on the Silver Materials and Innovations sessions.](#)



A Low-Carbon Future Will Need Silver

Demand for silver and other metals will likely rise in what the World Bank calls a “carbon-constrained future,” according to a report from that organization.

[The Growing Role of Minerals and Metals for a Low Carbon Future](#) looks at the implications of a world in which fossil fuels play a decreased role in energy production and more electricity is produced by wind, solar and other environmentally-friendly technologies.

“Key base metals including copper, silver, aluminum (bauxite), nickel, zinc, and possibly platinum, among others, are expected to benefit from a low carbon energy shift over the century,” the report noted. “Key rare earth metals (at least for the three technologies analyzed in depth in this study) are neodymium and indium, among others. However, the actual metals that will experience dramatic increases is unclear and extremely difficult to predict.”

Where will this silver come from? The report notes that the developing countries’ share of silver production (2015) is 40 percent, and 25 percent without China. As for reserves, developing countries will contribute 46 percent of the world’s silver, 38 percent without China. “Most recent silver discoveries have been associated with gold occurrences; however, copper and lead-zinc occurrences that contain by-product silver will continue to account for a significant share of future reserves and resources.”

The report noted that technologies including wind, solar, fuel cells, batteries, electrolysis, hydrogen storage, electric vehicles, and energy-efficient lighting will all use silver, and that the metal is crucial to the transition to a low carbon economy by 2050. “Using a global energy model, the authors find that silver is particularly critical for the energy transition and tellurium, indium, and dysprosium to a lesser extent.”

[Read the report here.](#)

Silver Nanoparticles and Tree Extract May Enhance Soil, Could Mean Healthier Plants and Crops

A combination of silver nanoparticles and extracts of the Northern White-Cedar, an evergreen tree native to North America, has shown to be beneficial to plant growth, according to a team of Asian researchers.

Their study published in the [Journal of Hazardous Materials](#) discussed experiments in which bean seeds were sowed in soil that was treated with different concentrations of silver nanoparticles enhanced with extracts of the Northern White-Cedar. After 60 days they studied the soil particles under an electron microscope and found that the mixture produced an increase in soil porosity, the ability to hold water. They also saw an increase in the dirt's nitrogen level which researchers attributed to a stimulation of the nitrogen uptake in the plants, which means that they used less nitrogen, which in turn leaves more nitrogen in the soil for other plants.

The researchers saw another benefit, too. When studying growth and metabolism, they found that plants in soil with silver nanoparticles and Northern White-Cedar extracts had higher levels of chlorophyll and enzyme activity.

The researchers were from Tezpur University, Visva-Bharati University, and Indian Statistical Institute, all in India; Government Emerson College, Pakistan, and Hanyang University, South Korea.



Silver nanoparticles mixed with Northern White-Cedar extracts and placed in soil can enhance plant growth.

Silver Could Help to Produce Hydrogen for Fuel and Electricity

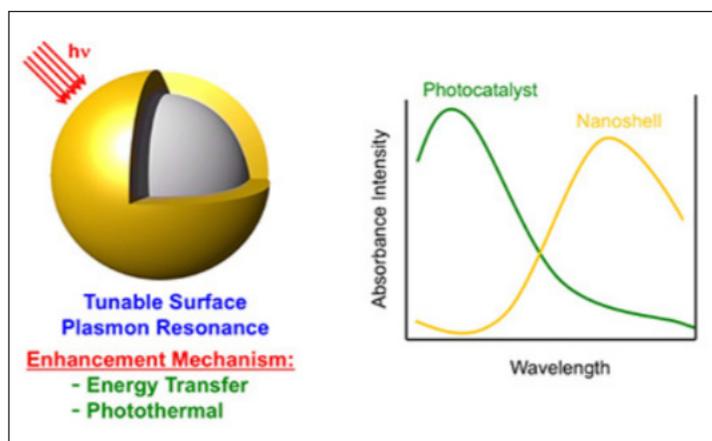
Hydrogen is an environmentally clean fuel which can be produced by splitting water into its two components – hydrogen and oxygen. The challenge is do it efficiently and cheaply. A University of Houston researcher, working with a colleague in Taiwan, hopes to produce hydrogen by using only water and sunlight.

The method uses hollow silver-gold nanoshells to boost the efficiency of catalysts that are powered by the sun, known as photocatalysts. The nanoshells spur the photocatalyst to absorb a wider range of available light thus allowing the system to more efficiently use sunlight and separate hydrogen from water, leaving only oxygen as a byproduct.

This method could be a step forward in clean energy production because most hydrogen currently is produced from a method known as 'steam-methane reforming,' in which high temperature steam breaks hydrogen away from a methane source such as natural gas. Producing the steam, however, takes a lot of energy, especially from burning fossil fuels.

Being able to produce hydrogen reliably and cheaply using only water and sunlight would be a major breakthrough, according to T. Randall Lee, Cullen Distinguished University Chair in Chemistry and Associate Dean for Research in the University of Houston College of Natural Sciences and Mathematics. "If you can use sunshine to generate fuel from water, that's a really clean source of energy," said Lee.

The project is funded by a \$150,000 grant from the U.S. Air Force Office of Scientific Research. Lee's collaborator is Tai-Chou Lee (no relation) of National Central University in Taoyuan City, Taiwan.



Hollow silver-gold nanoshells may boost the efficiency of photocatalysts to generate hydrogen from water, powered only by sunlight.

Survey Results Show Solid U.S. Silver Jewelry Sales in 2017

Jewelry retailers in the United States described strong silver jewelry sales last year, with 59% reporting increased sales in 2017, according to a survey conducted on behalf of the Silver Institute's Silver Promotion Service (SPS). The results also showed that silver jewelry continues to be a leading merchandise category for retailers, especially in driving sales when compared to other precious metals.

Highlights from the 2017 survey include:

- The average store growth for silver jewelry sales was 17%.
- Retailers report that jewelry sales, as a percentage of their overall jewelry sales, were on average 36% of their unit volume and 29% of their dollar volume.
- 57% reported that silver experienced the best inventory turnover rate in 2017; 19% said diamond; bridal and gold each accounted for 12%.
- The best maintained margins during the holiday season were:
 - Silver Jewelry 51%
 - Bridal Jewelry 18%
 - Diamond Jewelry 15%
 - Gold Jewelry 13%
 - Platinum Jewelry 3%
- The age group buying the most silver jewelry is 20-40, according to 47% of the retailers. The 41-50 age group was second.
- Retailers said the best-selling opportunity with silver was female self-purchase.
- 93% of retailers say they are optimistic that silver jewelry sales will continue to grow.

The complete survey can be downloaded here: [2017 Silver Jewelry Survey Results](#)

Doctoral Student Lauded for Work on Silver Nanoparticles and Water Purification

A doctoral student at Arizona State University's Ira A. Fulton Schools of Engineering has won two awards from [The Sustainable Nanotechnology Organization](#) for his work in using silver to prevent the formation of 'biofilms' that form in food and beverage processing machinery and water treatment plants. Biofilms are a build-up of bacteria, sometimes causing 'biofouling' that can clog equipment. This can result in contaminated foods and liquids, as well as machinery breakdowns.

Douglas Rice won awards in two categories, the first for a nanotechnology research poster competition and the second for a 'Nano Pitch' to judges on a research project proposal. For the Nano Pitch, Rice, who is working on a doctoral degree in the Civil, Environmental and Sustainable Engineering program, had 100 seconds to sell judges on the value of his research efforts.

Rice focused on modifying feed spacers with silver nanoparticles that can stop the formation of bacteria-causing biofilms in water purification systems that use reverse osmosis to produce fresh water from sea water. "Feed spacers provide a channel for the salt water to flow through, as well as encourage this water to cross the reverse osmosis membrane, leading to fresh water that can be safely used by people," he said, in prepared remarks.

"Through our research we have been able to improve the performance of the feed spacers using silver, which kills bacteria. The project has also helped us to better understand what properties contribute most to a material's ability to withstand biofouling."



Doctoral student Douglas Rice won awards for both a nanotechnology research poster competition and a Nano Pitch to judges on a research project proposal involving silver nanoparticles and water purification.

Silver Helps Produce High Value Chemicals

Organic chemicals such as butanol and hexanol are considered ‘high value’ substances because they are used in many applications such as coatings, chemical synthesis, solvents and fuels. Indeed, about four million tons of 1-butanol are produced worldwide. Producing these chemicals has a downside, however. Not only do they come from fossil fuels, a declining and expensive resource, but their production requires processes that are considered environmentally damaging.

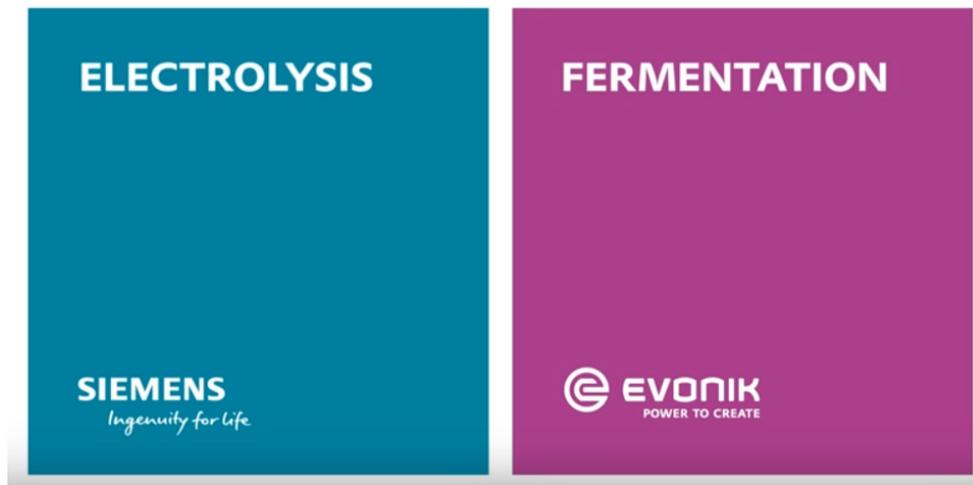
Now, scientists from [Siemens](#) and [Evonik](#) have developed a system that produces butanol and hexanol through an environmentally-friendly process using water, carbon dioxide and solar energy. In a [research paper](#), they describe how “such a decentralized industrial plant with a capacity of 10,000 tons of butanol and/or hexanol per year might operate.”

The first step combines electrolysis technology -- to convert carbon dioxide and water into hydrogen and carbon monoxide -- using electricity. This conversion relies on a silver-based cathode to chemically reduce the carbon dioxide into the other two substances. From there, the scientists are using a fermentation process, partly relying on photosynthesis, to convert the carbon monoxide into the butanol and hexanol. Photosynthesis is the process by which trees and plant leaves use chlorophyll and enzymes to synthesize the sugar glucose, which they use as fuel to grow.

This two-step process – electrolysis and fermentation – are now being tested in a laboratory setting under the project name ‘Rheticus,’ which will run for two years. The first test plant is scheduled to go on stream by 2021 at the Evonik facility in Marl, Germany, which produces chemicals including butanol and hexanol. The next stage could see a plant with a production capacity of up to 20,000 tons a year, twice what the journal article discussed, researchers say. There is also potential to manufacture other specialty chemicals or fuels, according to Evonik officials. About 20 scientists from the two companies are involved in the project. Siemens and Evonik are each contributing their own core competencies to this research collaboration. Siemens is providing the electrolysis technology for the first step and Evonik is contributing the fermentation process, the second step.

“We are developing a platform that will allow us to produce chemical products in a much more cost-effective and environmentally-friendly way than we do today,” said Günter Schmid, who is responsible for technical projects at Siemens Corporate Technology, in a prepared statement. “Using our platform, operators will in the future be able to scale their plants to suit their needs.”

“We want to demonstrate that artificial photosynthesis is feasible,” said Thomas Haas, who oversees Evonik’s strategic research group.



Click the image to see an environmentally-friendly way of producing butanol and hexanol.

Larry Kahaner
Editor

www.silverinstitute.org
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THE
SILVERINSTITUTE

1400 I Street, NW, Suite 550
Washington, DC 20005
T 202.835 0185
F 202.835 0155