

Au Ag

Silver has been the prize of champions since antiquity, emblematic of the best.

Sports trophies around the world share a common theme, they are all made of silver.

NHL Stanley Cup

NFL Super Bowl

Baseball World Series

National Basketball

Americas Cup

Wimbledon

French Open

PGA US Open

“Throughout the coming year a new crop of athletes will compete their way to the top and fulfill their dreams of raising high the trophies of champions, as did those who came before them.

The reward for excelling - for being first - will be silver.”



SILVER AND SOLAR TECHNOLOGY

How is silver used in solar cells? Silver powder is turned into a paste which is then loaded onto a silicon wafer. When light strikes the silicon, electrons are set free and the silver - the world's best conductor - carries the electricity for immediate use or stores it in batteries for later consumption.

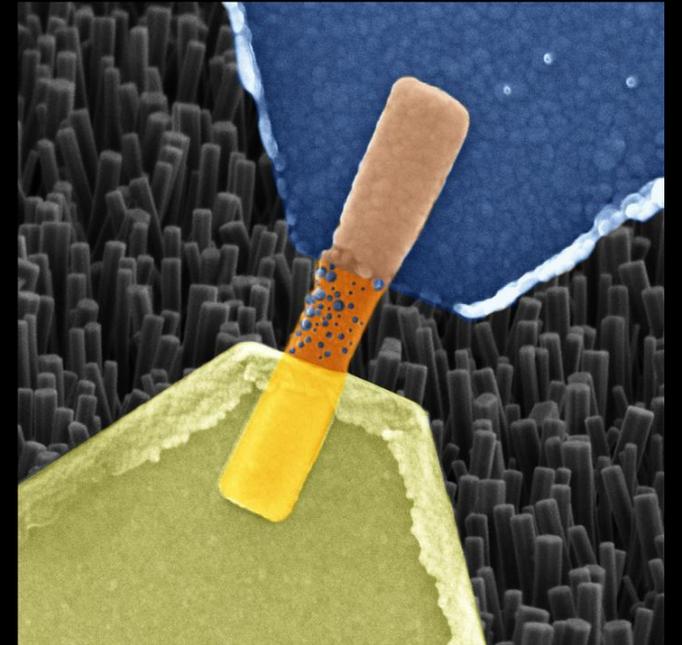


SILVER APPLICATION OF THE MONTH

Artificial Nerve Cell Using Silver Moves Artificial Intelligence (AI) Forward

German and Italian scientists have produced a memristive element - a component whose electrical resistance changes with the amount of current flowing through - that functions similarly to a biological nerve cell. This discovery will help advance the science of artificial intelligence as the element, produced from nanowires, will allow computers to more closely approximate the neural networks of human brains. This could be a large step in the continuing development of artificial intelligence, and silver will play a key role.

The element relies on silver to join it to other components, because silver is one of the world's best electrical conductors and is malleable enough to connect to the nanosized memristive element. The researchers believe that memristive cells may have the best chance of mimicking the function of human neurons and synapses in what they call 'bioinspired computers'.



SILVER IN ELECTRONICS

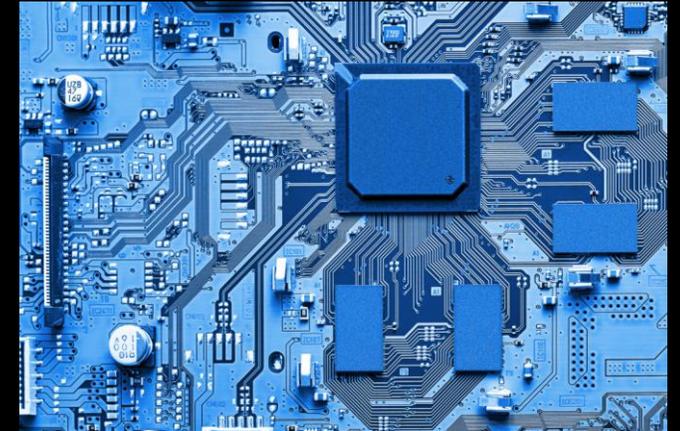
Silver is found in virtually every electronic device. If it has an on/off button, it's likely that silver is inside. Electronics and electrical demand, the largest component of industrial silver demand, consumed 248.5 Moz last year.

Silver's excellent electrical conductivity makes it a natural choice for everything from printed circuit boards to switches and TV screens.

Silver membrane switches, which require only a light touch, are used in buttons on televisions, telephones, microwave ovens, children's toys and computer keyboards.

These switches are highly reliable and last for millions of on/off cycles. Silver is also used in conventional switches like those used for controlling room lights.

For printed circuit boards, used in consumer items from mobile phones to computers, silver-based inks and films are applied to composite boards to create electrical pathways. Similarly, silver-based inks produce RFID tags (radio frequency identification) antennas used in hundreds of millions of products to prevent theft and allow easy inventory control. RFID's are also used in prepaid toll road passes.

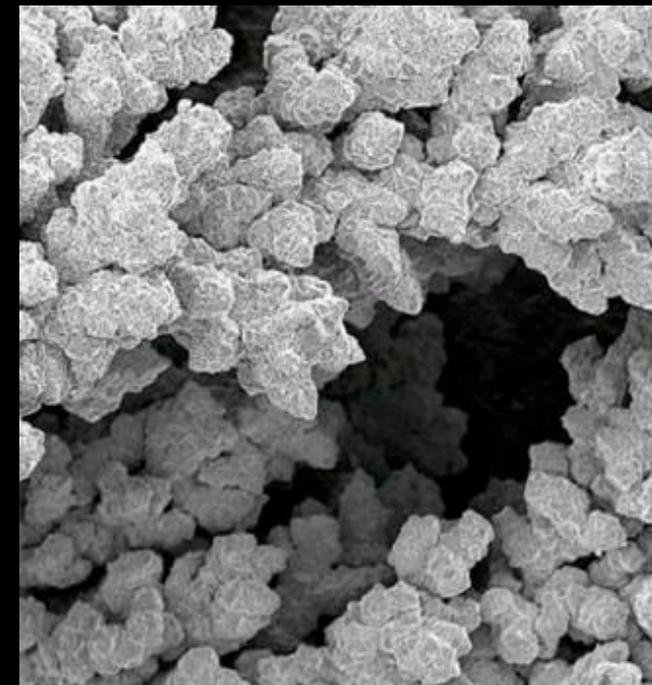


SILVER CATALYSTS

A catalyst is something that helps chemical processes happen. The most common catalyst is heat, but sometimes a catalyst is a substance that facilitates the process without undergoing any transformation itself. **Silver is a common catalyst for many manufacturing processes, often producing items that you use every day.**

Because of its unique chemical properties, silver is a vital catalyst in the production of two major industrial chemicals: ethylene oxide and formaldehyde. Because the silver is not effected by the reaction, it is almost completely recovered after it is used.

Nearly 10 million ounces of silver are used each year to produce ethylene oxide. Ethylene oxide is the foundation for plastics including polyester, a textile used in both mainstream fashion and specialty clothing. This same substance is an ingredient in molded items such as insulating handles for stoves, key tops for computers, electrical control knobs, domestic appliance components, and electrical connector housings. About 25% of ethylene oxide production is used to manufacture antifreeze coolant for automobiles and other vehicles. Silver catalysts can also be used to produce formaldehyde, a chemical produced from methanol. It is the building block of solid plastics adhesives, laminating resins for construction plywood and particle board. Formaldehyde also helps to produce finishes for paper and electronic equipment, textiles, surface coatings that resist heat and scratches, dinnerware and buttons, casings for appliances, handles and knobs, packaging materials, automotive parts, thermal and electrical insulating materials, toys and many other products.



SILVER IN BRAZING AND SOLERINDG

When metal pieces such as pipes, faucets, ducts and electrical wires are joined together the process is called brazing or soldering based on how much heat is applied to the junction.

Without silver, none of these connections would be as strong, leakproof or as electrically conductive as the original materials.

Adding silver to the process of soldering or brazing helps produce smooth, leak-tight, electrically conductive and corrosion-resistant joints. Silver brazing alloys are used in everything from air-conditioning and refrigeration to electric power distribution. They are also crucial in the **automobile and aerospace industries.**

Silver brazes and solders combine high tensile strength, ductility and thermal conductivity.

Silver-tin solders are used for bonding copper pipe in homes, where they not only eliminate the use of harmful lead-based solders previously used, but also provide the piping with silver's natural antibacterial action. Major faucet manufacturers also use silver-based bonding materials to incorporate these advantages. Refrigerator manufacturers use silver-based bonding materials to provide the flexibility required for constant changes in the temperature of the cooling tubes.

Because of health concerns, the traditional 63% tin/37% lead solder used to build electronic equipment is quickly being replaced by a combination of silver, tin and copper solder. New laws bans all products containing more than a trace amount of lead, mercury, cadmium and several other hazardous substances. **Silver is and will continue to be a popular and healthy substitution for the metals that are currently being phased out.**



SILVER BEARINGS

With continuous operation at high temperatures, engines require a stronger type of bearing than other machinery.

This is where silver enters the picture. When steel ball bearings are electroplated with silver, they become stronger than any other type of bearing. Jet engines, for example, rely on silver bearings because they can function continuously and at very high temperatures. So do helicopter engines.

Not only is a silver-coated steel ball bearing strong, but the silver acts as a lubricant, reducing friction between the bearing and its housing. This increases the performance and longevity of the engine. Despite high internal temperatures, silver-coated bearings provide superior performance and a critical margin of safety for engines. Even in the event of an oil pump failure, for instance, silver-plated bearings provide enough lubrication to allow a safe engine shutdown before serious damage can occur.



SILVER IN MEDICINE

Even before people fully understood how silver worked as an antibiotic, the metal was used to **prevent the growth of dangerous germs. On long ocean voyages, for example, silver coins were dropped into water and wine casks to keep the liquids fresh.** For decades, physicians placed several drops of silver nitrate into newborns' eyes to prevent infection. During World War I, battlefields wounds were wrapped in silver foil and silver sutures were used to close deep wounds.

More recently, silver coatings are being placed on medical devices such as breathing tubes and catheters to help fight infections. It's also being applied to artificial bones and scaffolding used to keep bones in place while they mend. Silver is found in bandages and ointments because it keeps bacteria at bay, allowing the body to heal faster.

Silver has also been shown to be effective against bacteria that are becoming resistant because of the overuse of chemical antibiotics. For example, a **life-threatening Staph germ called MRSA (Methicillin-resistant *Staphylococcus aureus*)**, often referred to as a "**superbug**" and found in healthcare facilities, is resistant to almost all chemical antibiotics. To fight back, many facilities are employing silver-embedded equipment including surgical tools, needles, stethoscopes, furniture, door handles, furniture, linens and even paper files. Only during the past few years have scientist learned how silver works as a biocide. Silver ions **can penetrate the cell walls of bacteria – without injuring mammalian cells - thus destroying the chemical and structural bonds essential for the bacteria's survival and growth.**



SILVER AND YOUR AUTOMOBILE

Everyday, our motor vehicles are becoming more and more computerized, and silver plays a vital role in their operation. Over **36 million ounces of silver are used annually in motor vehicles**. For example, every electrical connection in a modern car is activated **with silver-coated contacts**. **Starting the engine, opening power windows, adjusting power seats and closing a power trunk are all accomplished using a silver membrane switch**.

Not only does silver make our cars go, it provides safety. Silver-ceramic lines fired into the back window (and now the front windshield on some newer cars) generate heat to melt ice and keep the glass fog-free.

In the engine compartment itself, silver is often used in **high-performance spark plugs** and antifreeze in the radiator is produced from ethylene oxide, which is a compound made using silver during the chemical process.



SILVER IN WATER PURIFICATION

Millions of water purifiers are sold each year and silver is inside many of them. **Silver prevents bacteria and algae from building up** in their filters so that they can do their job - getting rid of bacteria, chlorine, trihalomethanes, lead, particulates and odor. Silver, in concert with oxygen, acts as a powerful sanitizer that offers an alternative to, or an augmentation of, other disinfectant systems.

Silver ions are being added to water purification systems in hospitals, community water systems, pools and spas. Silver also helps to prevent Legionnaires' disease, which is caused by buildup in pipes, connections and water tanks.

Water-borne illness is a major problem in developing nations. The full extent to which silver can help treat the issue of clean drinking water has yet to be seen, but ongoing research is showing its usage to be an exciting development **for the global water supply**.

