SILVER NEWS

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New Flat Panel Television Displays Give Push to Silver

By Samuel Etris, Senior Technical Consultant to The Silver Institute

The large screen flat panel display television sets now featured in home entertainment showrooms rely on a new technology wholly dependent upon silver.

Although only on the market for four years, the sales of flat panel display television have been growing at a rate of more than 20 percent annually. Major electronics firms such as Samsung, Fujitsu, Phillips, Panasonic, Sharp, Sony, Pioneer, and Mitsubishi are committed to improving flat panel display technology and decreasing the costs of production. The price of flat panel 42-inch television sets, recently about US$9,000, is being cut nearly in half as new improvements and the economy of scale take hold.

Flat panel displays consist of two parallel flat sheets of glass. On the back of the glass facing the viewer is a grid of thousands of lines of silver, each thinner than a human hair. These lines conduct the electronic signals activating a special gas that hits color phosphors and more lines of silver on the opposite pane. On impact, these color phosphors react by flashing color for the picture seen by the viewer. The flat panel display is a milestone achievement of microelectronics. It has made the bulky cathode ray tube television obsolete and achieved a "hang-on-the-wall" display.

PHILLIPS

New flat panel screens rely on silver to produce images.

The very large television display panels have found not only enthusiastic users in the home, but also in industry. Large flat panels display fine details in manufacturing processes and, with built-in interactive capability, allow plant operators to touch the screen and control, change, or shut down a process without using a computer keyboard. This convenience is important in food processing, pharmaceutical, and other manufacturing facilities where aggressive sanitation would foul the keyboard. For these applications, flat panel displays are often housed in a variety of mounts such as stainless steel.

Silver is an active metal and can tarnish, but this drawback has been overcome by the use of hermetic enclosures within flat panel displays.

Consultancy DisplaySearch estimates that worldwide sales of 2002 flat panel TV displays will reach 1.82 million units, possibly doubling in 2003 as more consumers replace their older TV sets. Manufacturers are mum on the amount of silver used in flat panel displays, but estimates peg this at an average of one gram per unit, which could consume 113,000 ounces in 2003. Electrical and electronic applications consumed 132.5 million ounces of silver in 2001.

2003 China International Jewelry Fair Set

The "2003 China International Jewelry Fair," jointly sponsored by the Gemological Association of China and National Gems & Jewelry Technology Administrative Center, will be held in the Beijing International Exhibition Center from October 22 to October 25, 2003.

The Fair will include: Gold and Silver Jewelry and ornaments, Gem materials and semi-manufactured goods, Pearls and jade carvings, Producing and processing technology and equipments, mechanical instruments, packing and handicrafts. "The China International Jewelry Fair offers a great opportunity for European and North American jewelry manufacturers to exhibit their products in the exciting and rapidly growing Chinese market," says Paul Bateman, Executive Director of the Silver Institute. "China represents a huge and largely untapped marketplace for silver jewelry."

For information about attending the fair and renting exhibitor booths: Tel: (8610)68040679; Fax: (8610)68045040; E-mail: zhanlan@chinagems.com

Silver Keeps Meat Germ Free

The largest meat recall in U.S. history, some 27.4 million pounds of turkey and chicken products, occurred in October 2002 in a processing plant in Eastern Pennsylvania, the result of an inspection made by the U.S. Department of Agriculture, which found the *Listeria* bacteria. This organism has been blamed for 27 deaths and 130 illnesses in eight states nationwide in 2002, but recent studies at the University of Arizona have established that silver-containing coatings are effective against such bacteria harbored by equipment and air conditioning ducts in food processing plants.

USDA

Studies show that silver is effective against bacteria that infect meat in processing plants.

The studies show the bactericidal effectiveness of a silver-containing natural silicate known as silver/zinc-containing zeolite. When bonded to steel or other hard surfaces it offers significant protection against bacteria.

According to the U.S. Department of Agriculture, foodborne illnesses affect upwards of 80 millions people annually in the U.S., causing an estimated 5,000 deaths at a cost of over $4 billion. The highest number of deaths are caused by *Salmonella*, followed by *Listeria monocytogenes*, *Escherichia coli*, and *Campylobacter*.

The studies at the University of Arizona show when 530,000 units of *Salmonella typhimurium* are placed on untreated stainless steel pans, 28,000 survived in open air after 24 hours. But on silver/zinc zeolite-coated steel, the number of units surviving after 24 hours was less than 10. Within a few more hours the bacteria are completely inactivated. The results are equally impressive with the three other types of bacteria tested:

Escherichia coli – of the original 140,000 units, 3,700 survived on the untreated steel, whereas only 17 units survived on the silver/zinc zeolite coated steel in the same 24 hour period.

Campylobacter jejuni – of the original 9,800,000 units, 3,600 survived on the untreated steel, whereas less than 10 units survived on the silver/zinc zeolite coated steel.

For *Listeria monocytogenes* – of the original 2,100,00 units, 2,200 survived on the untreated steel, whereas less than 10 units survived on the silver/zinc zeolite coated steel.

Japanese Researchers Produce Film that Changes Color

Reusable Color Paper for Photocopiers Possible

Researchers at the University of Tokyo have developed a film whose color changes when it is exposed to different types and colors of light. The researchers say that paper covered with the film can be used as reusable color photocopier paper.

A solution, which includes titanium oxide particles and silver ions, is applied to a glass substrate which turns the film brown. When exposed to a blue laser, the glass turns blue; when exposed to a white laser, it turns white. The color depends not only the kind and color of laser used, but the size and shape of the silver ions.

The team, led by Tetsu Tatsuma, associate professor at the university's Institute of Industrial Science, said that when information is written on the film, it lasts for at least a week. The film returns to brown when exposed to ultraviolet light.

Kodak Announces High Sensitive Movie Film Without Graininess

Film makers have always had to compromise between highly sensitive film — necessary for low light situations — and the graininess that these films produced which became magnified on a large movie screen. Making a motion picture or TV commercial with low-light scenes or getting greater detail in the background scenes has meant compromising, accepting higher granularity.

Now, Kodak has a solution in its introduction of the Vision2 500T color negative 5218 film, a silver-halide technology, that delivers greater speed with finer grain.

"You can see the difference in movie stock and in commercial stock, and we'll all enjoy the difference in the theaters," said James Stoffel, Kodak senior vice president and chief technical officer. "This product is so much more than a tweaking of current technology."

Simply, Kodak's new two-electron sensitization makes use of the chemical potential stored in the oxidized dyes which are attached to the silver halide crystal. In conventional photography, subsequent reactions of the oxidized dyes to light are not controlled, but in this new technique, two electrons instead of one are absorbed by the crystal, thus doubling the speed of the film. The company holds six U.S. patents on the process.

Silver Research Consortium Formed

Three Projects Begun

The International Lead Zinc Research Organization, based in Research Triangle Park, North Carolina, has formed the Silver Research Consortium (SRC), an organization cooperatively sponsored by silver producers and the Silver Institute.

SRC's mission is to "assist in the defense and enhancement of environmentally appropriate markets with clear promise for the future, and to find new markets through scientific research and technical innovation," its mission statement notes.

According to Chief Executive Jerry Cole, the SRC so far has funded three active projects concerning silver's role in biocide applications, silver's ecotoxicity, especially in the photographic industry, and improved tarnish resistance for sterling products through surface treatments.

Cole said that $100,000 has been committed for these projects in 2003 but more funding is needed. Membership in the SRC is open to any entity with an interest in silver. Research programs will be funded by members on a program-by-program basis. Members are not required to support research programs, but they are encouraged to do so.

Solar Cells Supply Power for Silver-Based Pool Purifier

Floatron — a silver-based water purification device using techniques developed by NASA's Apollo space program — is a small solar-powered ionization product that sends silver and copper ions throughout a pool to purify and soften the water.

FLOATRON

Floatron, powered by solar cells, gives off silver ions that purify pool water.

According to the company, Floatron, Inc. in Phoenix, Arizona, the device nearly eliminates the need for harmful chemicals such as chlorine. Company officials note that Floatron can reduce chlorine use by 80 percent, and other less hazardous purifying oxidizers may be substituted such as bromine, hydrogen peroxide or oxygen-based compounds.

As the device floats on water, sunlight is converted into electricity by the solar cells. The low-power current energizes a specially alloyed mineral electrode below the waterline, causing the release of silver and copper ions into the surrounding water. Floatron costs nothing to power and operate. The only part requiring replacement is the mineral electrode, which will last approximately one to three swimming seasons and takes only a minute to change. Replacement cost is minimal, the company notes. Floatron retails for US$249.00 (www.floatron.com).

World's Smallest Light Source Comes From Silver

By exposing molecules of silver to an electric current, researchers at the Georgia Institute of Technology have created what may be the world's smallest light source.

Once developed, the technique could lead to new types of microscopic-sized lights for nano-machines, microscopic light sources for industry and secure cryptographic writing techniques.

By exposing silver-oxide film to electrical current of approximately one ampere, the researchers 'activated' some of the silver oxide molecules, which then appeared within 'discolored' regions in the film. When electrodes were attached to the film and an alternating current applied, a thin line of silver clusters began to emit light in colors that varied depending on the size of the clusters.

"When you zoom in more closely, you can see the emissions coming from single molecules," said Robert Dickson, assistant professor in Georgia Tech's School of Chemistry and Biochemistry. "This is the first time that anyone has seen electroluminescence from individual molecules. These molecules emit very strongly, and are very robust."

For Future Reference
Silver Prices 1979-2002

2002	High	Low	Average
Dec	4.80	4.42	4.65
Nov	4.59	4.41	4.52
Oct	4.50	4.27	4.39
Sep	4.65	4.45	4.56
Aug	4.67	4.40	4.52
July	5.10	4.60	4.91
June	5.11	4.82	4.90
May	5.03	4.53	4.72
Apr	4.74	4.40	4.57
Mar	4.67	4.47	4.53
Feb	4.54	4.29	4.42
Jan	4.70	4.22	4.46

2001	High	Low	Average
Dec	4.58	4.13	4.33
Nov	4.20	4.03	4.09
Oct	4.67	4.20	4.39
Sep	4.72	4.14	4.41
Aug	4.26	4.14	4.18
July	4.28	4.19	4.23
June	4.46	4.29	4.35
May	4.60	4.29	4.42
Apr	4.45	4.30	4.36
Mar	4.49	4.28	4.38
Feb	4.79	4.41	4.54
Jan	4.81	4.49	4.67

Year	High	Low	Average
2002	5.11	4.22	4.60
2001	4.70	4.22	4.44
2000	5.55	4.56	4.97
1999	5.76	4.87	5.22
1998	7.26	4.62	5.51
1997	6.34	4.16	4.88
1996	5.82	4.68	5.18
1995	6.10	4.38	5.19
1994	5.78	4.57	5.28
1993	5.44	3.52	4.30
1992	4.32	3.63	3.94
1991	4.55	3.51	4.03
1990	5.35	3.94	4.82
1989	6.20	5.02	5.47
1988	8.06	6.01	6.53
1987	11.25	5.35	6.99
1986	6.32	4.85	5.49
1985	6.89	5.48	6.14
1984	10.17	6.25	8.15
1983	14.74	8.38	11.46
1982	11.30	4.81	7.93
1981	16.53	7.97	10.53
1980	50.35	10.20	20.66
1979	35.00	5.93	11.20

(COMEX settle)

The Silver Institute
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