

Indium

U.S. Geological Survey Commodity Specialist Micheal W. George has prepared the following information on indium — a rare metal used in coatings on television and computer screens.

Indium was discovered in Germany in 1863. Although it is a lustrous silver-white color, the finders named the new material for the “indigo” spectral lines the mineral created on the spectrograph. Indium ranks 61st in abundance in Earth’s crust and is about three times more abundant than silver or mercury.

The earliest known use of indium was in 1934, when small amounts were added to certain types of gold dental alloys. Demand for indium continued to increase during World War II and later for use in nuclear control rods.

Fifty years ago, indium played a key role in the development of the first transistor radios, ushering in a new age of consumer electronics. Now, indium coatings are used to defog aircraft and locomotive windshields and to keep glass doors on commercial refrigerators and freezers frost-free. Indium also is at the forefront of advanced technology, as a small but critical element in liquid crystal displays (LCDs).

Indium oxide with 10 percent tin oxide (indium tin oxide) is an ideal film for converting data from electrical to optical form in flat-panel displays for televisions and computers because it exhibits good heat reflectivity, electrical conductivity and optical transparency. The use of indium in thin film for LCDs is increasing at an exponential rate and is garnering media attention because of the possibility of indium shortages.

Currently, more than 70 percent of indium consumed in the world is used in such thin-film products. Several companies in Southeast Asia have announced that they are not only opening new plants, but that they also are increasing the size of the glass to make bigger displays.

Indium (used in small amounts) has also been essential to recent breakthroughs in light-emitting diode (LED) technologies for lighting and electrical displays. LED lights are resistant to mechanical shock, temperature changes and have a long life. The renovation of the illumination of the Thomas Jefferson Memorial, in Washington, D.C., used 17,000 LEDs, reducing electrical requirements by 80 percent, using 20 percent fewer fixtures and increasing lighted areas by more than 30 percent.

Most indium is recovered as a byproduct of zinc refining and, to a lesser extent, from the refining of tin. As of 2003, the world reserve base for indium was an estimated 6,000 tons.

Worldwide indium demand in 2003 exceeded primary production, which was estimated at 250 tons. With world inventories nearly exhausted, and the world demand for indium estimated at 450 tons in 2003, recycling is expected to increase. Currently, 50 percent of consumed indium tin oxide is from recycled sources, but the share from recycled sources could be as high as 75 percent in 2004.

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Sample of metal indium with penny for scale. Image from *Minerals in Your World*.