# [***BRIGHT DIGITAL DISPLAYS COULD LEAP FROM CELL PHONES TO TV SCREENS***](https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:4B7X-MV50-005J-C4GW-00000-00&context=1516831)

St. Louis Post-Dispatch (Missouri)

January 3, 2003 Friday Five Star Lift Edition

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**Section:** BUSINESS; Pg. C1; PROFILE/ORGANIC LIGHT-EMITTING DIODES (OLEDS)

**Length:** 1060 words

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**Dateline:** NEW YORK

**Body**

\* A new technology that uses organic molecules might make innovations in lighting more dramatic than those in consumer electronics.

A new technology that makes ***cell-phone*** screens glow like a firefly's tail might be destined to brighten displays on everything from television sets to digital cameras.

Built on organic molecules, or polymers, that glow when they're electrified, the technology could spur the creation of roll-up computer screens that fit in a breast pocket or sheets of radiant lighting that shimmer like the aurora borealis.

"Imagine a plastic film or a fiber-optic cable that emits light, that you can bend in any shape you want," said Stewart Hough, vice president at Cambridge Display Technologies. "It's one of those limited-by-your-imagination things."

Hough's company is developing a polymer-based version of the technology, known as organic light-emitting diodes, or OLEDs. A diode is a piece of electronics in which current flows in only one direction.

Chemical, electronic and lighting companies -- such as Kodak, Samsung, Philips, DuPont -- are pouring money into research and development of OLEDs, rushing tiny screens to market and scrambling to race ahead of competitors.

For now, the monochrome screens appear on a handful of products: ***cell phones***, MP3 players, car stereos. As the bright screens mature into full-color displays with an active matrix that permits video, analysts say, they'll jump to digital-camera displays, auto dashboards, laptop screens and TV sets.

Estimated at $80 million in 2002, global sales of OLEDs are expected to hit $2.3 billion by 2008, said Kimberly Allen, research director at iSuppl i/Stanford Resources, a firm that tracks the industry.

As the technology progresses, analysts say, it will replace the silicon-based LCD, or liquid crystal display, that's used in everything from watches and calculators to flat-screen monitors and some TV sets.

OLED screens comprise arrays of tiny diodes made of organic materials used in plastics and polymers. The diodes in today's little screens are sandwiched between layers of glass, glowing in various colors as electricity flows through them. The delicate organics wither and die at a hint of moisture, so glass is needed to keep them dry.

Experts say it will be a decade or so before someone figures out how to make a durable OLED screen on a plastic base, perhaps a flexible one, which would require flexible circuit boards and other components.

A few companies, including DuPont and Bell Labs, are working on bendable plastic electronics for such a screen.

"You could put it on curved surfaces," said Alan Heeger, professor of physics at the University of California at Santa Barbara. "You can imagine nifty-looking things."

Heeger, whose discoveries in polymer conductivity earned him and two colleagues a Nobel prize in 2000, said the innovations in lighting could be more dramatic than those in consumer electronics.

OLEDs, coupled with mature, inorganic LED technology that brightens traffic signals and auto taillights, could replace incandescent and fluorescent light bulbs with wallpaper that changes lighting patterns and colors, sheets of radiant film that could be cut to size, or light cords that accent walls, handrails or steps, Heeger said.

Today's products are comparatively mundane.

The first OLED emerged in a Pioneer car stereo in 1998. Since, others have shown up in ***cell phones*** made by Motorola, Fujitsu and LG; an MP3 player made by Taiwanese firm Delta Optoelectronics; and a Philips men's shaver sold under the Norelco brand.

The shaver, with an orange screen that displays battery life, turned up in the latest James Bond movie, "Die Another Day."

For next year, Samsung is making a ***cell phone*** with the first full-color OLED display, for sale in South Korea.

Kodak is shipping 2-inch horizontal OLED screens to a consumer-device manufacturer that it declined to name. The screens, configured in the manner of those used in digital cameras, are the first to use active-matrix technology that can play video, said Daniel Gisser of Kodak's display-products unit. The product will emerge in the first half of 2003, he said.

Larger screens for hand-held computers and video cameras might be ready in a year or two, said Paul O'Donovan, a Gartner Dataquest analyst.

Prototypes of 15- and 17-inch screens have been cooked up, but none is expected to hit stores for years. O'Donovan said OLED monitors for personal computers might be available in four to five years, with TV sets in five to 10 years.

"The trouble is scaling them up," O'Donovan said. "They've got a 2.5-inch screen working impressively. The real technological leap will be to expand these into the replacement of televisions."

One manufacturing technique, pioneered by Cambridge Display Technologies in Britain, allows the screens to be printed by inkjets that can spray glow-producing polymers onto sheets of glass.

In a few years, analysts and experts predict, the onset of flexible plastic displays will allow roll-to-roll printing, making the screens far cheaper to build than an LCD, which must be assembled in a vacuum.

OLED screens have several other advantages. Because their polymers emit light, they do away with the power-sucking backlight used by LCD screens. Without the backlight, the screens are lighter and thinner - display models are just a quarter-inch thick - and run longer on a smaller battery.

In ***cell phones***, this means longer talk time between charges.

OLED screens also respond to movement much faster, allowing them to play video without the blurry muddle of LCD screens. Colors are sharper, and contrast is higher, making 2-inch screens large enough for TV watchin g. The screens can be viewed from wide angles, unlike most LCDs. And the manufacturing process produces less toxic waste.

But today's screens start to degrade after about 10,000 hours of use, with blue pixels dimming sooner than others, O'Donovan said. As colors die, the screens take on a magenta hue, he said.

This means OLEDs aren't ready for long-life products, such as TV sets and computer monitors. For now, they'll appear in products with short life cycles, such as hand-held computers, digital cameras and ***cell phones***.

"There's a lot of money going into (research and development), and a lot of companies are working on it," O'Donovan said. "These problems could be solved sooner rather than later."

**Graphic**

PHOTO, GRAPHIC(3) Color Graphic / Illustration from THE ASSOCIATED PRESS - Glowing outlook for organic displays/ Researchers hope a display system used in ***cell phones*** and digital assistants can be added for laptop computers and TV screens. The technology, called organic light-emitting diodes, or OLEDs, could become a lighter, thinner alternative to liquid-crystal displays./ / Glass: Protects organic compounds inside fro harmful moisture/ Transport anode: Three organic layers: Polymers glow when electrified/ Metal Cathode/ Horizontal and vertical driver circuits: Electric currents of 2 to 10 volts are applied to specific pixels along the grid./ Hole transport layer/ Emitting layer: Negative and positive ions meet, producing combination of red, green and blue light/ Electron transport layer/ / SOURCES: Sanyo Electronic Co., Eastman Kodak ; Color PHOTOS BY DAVID DUPREY / THE ASSOCIATED PRESS/ (1) Steve Barry, an engineer for Kodak, begins working on organic light-emitting diodes, or OLEDs, in an encapsulation chamber in Rochester, N.Y./ (2) Kodak can mount its OLED display on a board for evaluation.

**Load-Date:** December 17, 2003

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