



## Coming soon to a screen near you...

As we all know, nothing can compete with the resolution and readability of the printed page. Computer displays just can't match the brightness, contrast and resolution that paper comes by so naturally—at least, not yet.

But within just a few years, we might have to rethink that notion. New technologies are being developed right now which will offer much lower power consumption, higher luminescence properties, high resolution, the elimination of backlighting, wider viewing angles, and reductions in weight and thickness over liquid crystal displays (LCD) and other current display technologies.

At the Society for Information Display show just concluded in San Jose, California, the big buzz was about organic light-emitting diodes (OLED), a new flat screen technology pioneered by Kodak. An OLED is an electronic device made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted.

More economical and durable than LCDs and much cheaper to produce than plasma screens (which just last year were predicted to be the next wave), the first generation of OLED displays is already showing up in car stereos and cell phones. But by early 2003, we could see OLED technology in portable computers and large computer screens, with refresh rates fast enough to handle even full motion video. In addition to Kodak, companies like Sony, Philips, DuPont and Samsung are all building OLED prototypes in the race to unveil the first high end commercial products. Ultimately, OLED displays could be made so flat that they roll up when not in use—just like (dare we say it?) paper.

Meanwhile in late May, E Ink Corporation announced that it will partner with Japanese print giant Toppan Printing Company on a color version of its active matrix “electronic ink” display, a screen which is three to six times brighter than a standard LCD, is viewable under both bright and low light conditions, and lets viewers see an image from any angle. And just like paper, this screen is reflective, requiring no backlighting as with conventional displays.

Electronic ink is made of millions of microcapsules roughly the diameter of a human hair, each of which contains positively charged white or colored particles and negatively charged black particles suspended in a clear fluid. When a negative electric field is applied, the positively charged particles are attracted to the top of the capsule where they become visible. To produce an electronic display, the ink is printed onto a sheet of plastic film (using existing screen printing processes) which is then laminated to a layer of circuitry. The circuitry controls a pattern of pixels which can be controlled by a display driver.

E Ink says it expects final commercial products to be twenty to fifty percent lighter and thinner than LCDs, since they eliminate the weight and thickness of one glass or plastic sheet. They will also draw less than one-tenth the power—in fact, an electronic ink screen continues to display a fixed image even after it is shut off. Black and white models are projected to be available by 2003, and color by the following year.

Is print dead? Not quite, perhaps. But new technologies such as OLED and electronic ink may replace much of the utility that paper serves today—and make tree-cutting redundant. 🌍

