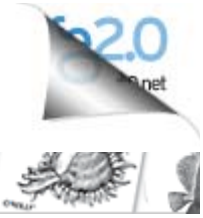

EDITOR'S EYE

The World of Software Development.

by Jon Erickson

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September 07, 2007

Nanoscale Nozzles = High-Res Printing

When it comes writing utensils, it's hard to beat a pencil. They're durable, user friendly, inexpensive, and, assuming the eraser isn't worn down, enable easy editing. Mechanical pencils with replaceable lead were a great leap forward, of course, especially since pencil sharpeners seem to gone the way of buggey whips and pay phones. And if you really want to, you can connect a pencil to a computer, assuming you like working with flat-bed plotters and the like.

But no, #2 pencils aren't good enough for researchers at the University of Illinois, who have improved on a process called "electrohydrodynamic jet printing process" (e-jet) by combining electrically induced fluid flow with nanoscale nozzles. Unlike familiar ink-jet printers which use heat or mechanical vibrations to launch liquid droplets through a nozzle, e-jet printing uses electric fields to pull the fluid out. While this isn't a new, the introduction of nanoscale nozzles and precision controlled electric fields is new.

"We have invented methods for an electrohydrodynamic jet (e-jet) printing process that can produce patterns and functional devices that establish new resolution benchmarks for liquid printing, significantly exceeding those of established ink-jet technologies," says John Rogers, professor of Materials Science and Engineering. What Rogers' team did was build a tiny e-jet printing head that consists of a gold-coated microcapillary nozzle (with a diameter as small as 300 nanometers) mounted on a computer-controlled mechanical support. An organic, Teflon-like coating on the gold ensures the ink

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flows cleanly out the nozzle toward the target. Tiny droplets of ink eject onto a moving substrate to produce printed patterns. Lines with widths as narrow as 700 nanometers, and dots as small as 250 nanometers, can be achieved in this fashion.

Rogers goes on to say that this type of e-jet printing will likely be used for large-area circuits, displays, photovoltaic modules and related devices, and as well as in security, biotechnology. and photonics. "The neat thing is that we find that this extremely high-resolution form of e-jet printing can also be used for diverse systems, such as printing microarrays of DNA spots for bioanalysis, or printing carbon nanotubes and other classes of nanomaterials that are difficult to pattern in other ways," he explains.

Posted by Jon Erickson at 09:36 AM Permalink

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