Intelligent Micro Patterning, LLC in the News
EE Times

ELECTRONIC ENGINEERING
EETIMES
The industry newspaper for engineers and technical management
ISSUE 1334 WWW.EET.COM MONDAY, AUGUST 16, 2004

Litho unmasked on the desktop

Unit yields fatter feature sizes at slimmer prices

By Chappell Brown

Hancock, N.H. — A full, production version of a desktop photolithographic system with a footprint of only 4 x 4 feet is rolling out at a scaled-down price of between $100,000 and $300,000.

The centerpiece of the system from Intelligent Micro Patterning LLC is a micromirror-based optical projection scheme that defines patterns directly on photoresist without requiring a photomask. The production version, a follow-up to the company's current system, is used for prototyping work and lends itself to fabricating microelectromechanical systems.

"The real savings with our system comes from the drastically reduced turnaround time for defining features," said Jay Sasserath, chief executive officer of Intelligent Micro Patterning (St. Petersburg, Fla.). While a set of masks may run from $5,000 to $10,000, engineering costs

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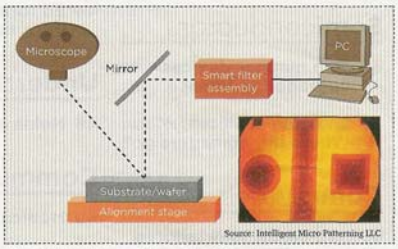

The SF-100 defines patterns 7 to 200 microns wide on a substrate (shown) using multiple photoresists but no photomasks.

Desktop litho system sidesteps masks

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mount during the week or so it takes to get a set of photomasks back from a design service. Intelligent Micro's desktop exposure system, dubbed the SF-100, is able to produce prototypes almost instantly. The company said it will make a formal announcement about the SF-100 in a few weeks.

There is a catch, however: The SF-100 can only produce circuits with feature sizes down to about 5 microns, far behind leading-edge photolithographic systems. Still, for a wide variety of applications—microfluidic single-chip labs, RF-MEMS, bioengineered components—it offers fast prototyping and low-cost production.

Today's microelectromechanical-systems production technology rarely needs to get below 1-micron feature sizes, and MEMS suppliers have been riding on the excess capacity of out-of-date semiconductor fabs. But working with a full-scale fab is a slow process, since prototypes must be run to verify a design. In addition to the SF-100, Intelligent Micro said it offers consulting services to help MEMS designers get total control of the production process.

One customer is the Universidad Politécnica de Madrid, which is setting up a complete microfluidics fabrication facility. The SF-100 is used to produce etch masks, and Intelligent Micro experts are helping biologists at the Spanish university set up etching and deposition systems to create a self-contained fabrication facility.

For MEMS and other applications, the SF-100 offers fast prototyping and low-cost production.

Sasserath co-founded Intelligent Micro in 2001 with David Fries, who developed the process while a professor at the University of South Florida, in St. Petersburg. The basic technique is based on an imaging system that projects a pattern directly onto a polymer photoresist. The rest of the process is identical to standard circuit fabrication techniques.

"We use the industry-standard mercury arc lamp as a light source so the photoresist processes are readily available," Sasserath said. Substrates are positioned on a computer-controlled stage and pattern alignment is performed with a microscope that acquires an image in the ultraviolet part of the spectrum where the photoresist is not active.

Patterns can be defined with software on a PC, which drives the micromirror-based imaging system with a standard video output. "Another important advantage of our system is the ability to project patterns onto irregular surfaces," Sasserath said. "We are not just limited to silicon or gallium arsenide substrates."

For example, a recent customer developing knee implant micromechanical systems will be using the SF-100 as a prototyping tool. Another customer is using the system to build passive components directly into chip packages, the company said. Typically, the system needs to be tweaked for different applications due to the unusual surfaces that customers use.

"With silicon circuit definition, you have the advantage of working with a standard wafer. Our customers often need modifications for different types of substrates or systems," Sasserath said.

The equipment is expected to find a wide number of applications in microfluidic and RF-MEMS products, two big areas for MEMS technology.