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Synova's Laser MicroJet® technology achieves unprecedented performance on MEMS chips in inkjet print heads

Water Jet-Guided Laser Performs Damage-Free, 2.5-Second-per-Slot Cutting of Silicon Barrier Chips, Improving Manufacturing Performance by 100 Percent Over Traditional Approaches

LAUSANNE, Switzerland, Jan. 24, 2006—Synova, the world pioneer and leader in water jet-guided laser technology, today announced it has achieved unparalleled performance results on inkjet print heads. These Micro-Electro-Mechanical Systems (MEMS) devices, the newest market for Synova's patented Laser MicroJet technology, require high-quality, high-speed slotting of silicon wafers that are diced into the barrier chips through which ink passes from the reservoir into the nozzles. In production environments, the Synova water-driven laser has proven superior to competitive approaches, reducing the cutting time to just 2.5 seconds per slot—faster than any previously implemented slotting technique—with no damage.

At a greater than 25-percent share, inkjet print heads represent the largest portion of the total MEMS component market. As competition in the printer marketplace continues to intensify, manufacturers of MEMS inkjet heads must address the dual challenge of reducing fabrication costs while improving product performance. Previously implemented mechanical techniques for silicon wafer slotting have a number of drawbacks. Etching processes require a mask step, making them both slow and costly, while sandblasting creates holes with conical edges, limiting their diameter and density. Dry laser techniques, while somewhat more effective, typically generate debris and micro-cracks that hamper device quality and performance.

The Synova Laser MicroJet overcomes these challenges, ablating the silicon material quickly and efficiently without causing any residual damage. The most recent performance data indicates slotting speeds of 80 mm per second in nine passes, or 2.5 seconds per slot using a 35-micron nozzle. These results indicate a 100-percent improvement over the previous laser implementation, and a near 200-percent improvement over sandblasting. The theoretical speed limit is 1 second per slot (equivalent to the linear cutting speed of the same thickness), meaning that with further parameter optimizations, the speed can continue to be increased.

"We are thrilled to report such stellar results for the Laser MicroJet in this new market," said Synova's Chief Executive Officer, Dr. Bernold Richerzhagen. "Having successfully established this technology in the semiconductor market, we are now able to leverage its advantages for wafer dicing beyond semiconductors, broadening its reach into the MEMS/nanotechnology market. In proving its ability to match stringent performance requirements for laser slotting of inkjet print heads, the water jet-guided laser has tangibly illustrated its versatility, and we look forward to developing exciting new applications in the future."

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Laser MicroJet Advantages
In the inkjet print head application, the Laser MicroJet's cutting path follows a "race track" geometry, enabling a minimal amount of material ablation. In addition, the slot width is easily changeable, if necessary. Unlike conventional dry lasers, the water jet-guided laser is cylindrical and the laser beam parallel, so the working distance can be up to several centimeters long, resulting in constant kerf width and parallel kerf walls. Also, the water jet cools the material edges between pulses, so heat damage is nonexistent, as is contamination, due to the laser's high kinetic energy, enabling full removal of the molten material. The water jet is very thin (between 20 and 100 microns), so it applies negligible force to the wafer, which cannot be chipped or cracked by the high-power (up to 100W) laser. This enables higher die fracture strength than is possible with a conventional dry UV laser.

From a product-design perspective, the Laser MicroJet is highly optimized for time, cost and space savings. Its compact, modular platform structure features multiple head options (2, 4, 8 or more) and a linear wafer-transfer system, including wafer cleaning and drying, cassette loading, kerf check and automatic alignment. Synova has also sourced the highest-quality dynamic XY stages available—enable 4 m/s performance, with 1-micron precision—allowing Synova tools to reach the theoretical limit of cutting time.

Currently, Synova has more than 50 Laser MicroJet systems in the field at 30 different customer sites worldwide. These production-proven systems include four machines slotting silicon wafers for inkjet print heads. In 2005, three ink jet printer manufacturers completed a full evaluation of the water jet-guided laser process, including printing tests and long-life tests. Based on those results, these firms are now in discussion with Synova to acquire multiple machines.

Editors interested in learning more about Synova's Laser MicroJet technology are invited to attend the company's technical presentation titled, "Laser Slotting of Inkjet Printer Chips" on Thursday, January 26, 2006 at Photonics West (Conference 6107, Session 4) beginning at 11:50 a.m. at the Hilton Santa Clara Hotel, Santa Clara, Calif.

About Synova
Founded in 1997, Synova is a leading supplier of state-of-the-art laser solutions for the semiconductor, electronics, flat panel display (FPD) and industrial micro-machining industries, among others. As the inventor of laser dicing technology, Synova—through its proprietary Laser-MicroJet® (water jet-guided laser) technology—is fast emerging as the ideal provider for addressing the exacting manufacturing specifications and low cost-of-ownership (CoO) requirements associated with the volume production of today's advanced electronic devices. Headquartered in Lausanne, Switzerland, Synova is a privately held company with subsidiaries located in Hong Kong, South Korea, Japan and the United States. Additional information about the company is available on the Internet at: *www.synova.ch*

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