Freescale and Photronics explore paths to faster, cheaper and more powerful chips

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AUSTIN, Texas - Aug. 16, 2005 - As the industry approaches the limits of optical lithography, Freescale Semiconductor (NYSE:FSL, FSL.B) and Photronics (NASDAQ: PLAB), have teamed up to assess the technical and commercial merit of specific resolution enhancement technologies (RET) intended to increase semiconductor customer profitability.

The joint exploratory development aims at extending the life of current-generation lithography tools to ensure the production of chips that are small, fast and powerful enough to enable pervasive computing and advanced wireless applications.

"The advanced development by Freescale and Photronics will be a significant influence on mass production of 65-nm CMOS devices and below," said Dr. Joe Mogab, senior technical fellow and director of the Advanced Products Research and Development Laboratory for Freescale. "Our joint advanced lithography work with Photronics will help provide us with the necessary RET improvements to provide the best and most cost-effective solutions for our customers' businesses."

The collaboration is a three-year commitment that began in Q404. Freescale supplies representative patterns and unique analytical support, wafer imaging and data analysis, while Photronics supplies test reticles and reticle fabrication details.

Christopher Progler, PhD, Photronics CTO, said, "There are inherent and interrelated challenges in design, photomask and lithography as semiconductor technology transitions to 90-nm, 65-nm and beyond. Our alliance with Freescale will play a significant role in expediting our customers' time-to-silicon, maintaining cost and improving chip yield."

Advancing Lithography

The resolution limit of optical lithography generally has been considered to be the wavelength of the exposure light. However, by employing RET, the minimum printable feature size can be reduced to less than 50 percent of the exposure wavelength.

In a departure from standard industry practice, Freescale worked with Photronics to test multiple RET processes: six percent embedded attenuated phase shift masks (EAPSM), complementary phase shift masks (CPSM) and chromeless phase lithography (CPL). They found little statistical differences between the methods with respect to critical dimension control achieved at the 65-nm node. However, the researchers did find

significant differences in other important metrics associated with specific RET implementation such as line-edge roughness and 2D image acuity. The companies have joined efforts to explore how these differences and other process improvements can be used to extend RET applications.

Freescale and Photronics have co-authored a number of papers detailing their collaborative activities, two of which won Best Paper awards at Photomask Japan and BACUS. To learn more about these findings or to request a copy of these papers, contact emilie_harris@lpp.com.

About Photronics

Photronics is a leading worldwide manufacturer of photomasks. Photomasks are high precision quartz plates that contain microscopic images of electronic circuits. Key elements in the manufacture of semiconductors, photomasks are used to transfer circuit patterns onto semiconductor wafers during the fabrication of integrated circuits. They are produced in accordance with circuit designs provided by customers at strategically located manufacturing facilities in Asia, Europe and North America. Additional information on the Company can be accessed at www.photronics.com.

About Freescale Semiconductor

Freescale Semiconductor, Inc. (NYSE:FSL, FSL.B) is a global leader in the design and manufacture of embedded semiconductors for the automotive, consumer, industrial, networking and wireless markets. Freescale became a publicly traded company in July 2004 after more than 50 years as part of Motorola, Inc. The company is based in Austin, Texas, and has design, research and development, manufacturing or sales operations in more than 30 countries. Freescale, a member of the S&P 500®, is one of the world's largest semiconductor companies with 2004 sales of $5.7 billion.

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