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D2S REDEFINES MASK RULES FOR THE 22-NM AND SMALLER TECHNOLOGY NODES

Design for E-beam (DFEB) Mask Technology Makes Advanced Photomask Production Practical

SAN JOSE, Calif., February 23, 2010—D2S™, an emerging design and software company, today announced its new design for e-beam (DFEB) mask technology for the production of advanced optical photomasks with circular and curvilinear shapes. Used in conjunction with currently available e-beam mask writing equipment, D2S DFEB mask technology reduces the write times for masks containing complex or curvilinear features to enable the extension of 193-nm immersion lithography to the 22-nm node and beyond with practical turnaround time.

Currently, mask production costs represent a significant proportion of overall lithography cost of ownership—a trend that continues to rise with each new design node. The pace of this cost increase is expected to accelerate at the 22-nm node due to complex assist features which are essential to extending the use of optical lithography. The fundamental nature of light is circular. Historically, however, both computer-aided design (CAD) systems and variable-shaped beam (VSB) lithography systems have used rectangles because they are easier and faster to process than circles or curves. As a result, today's mask rules are rectilinear and essentially at odds with the nature of light. For 22 nanometers-and-below process technologies, the ability to use curvilinear features for mask lithography becomes critical. D2S DFEB mask technology redefines the rules by leveraging the rounding nature of e-beams to enable practical turnaround times for complex, circular and curvilinear features.

According to Tadashi Komagata, general manager of EB Group at JEOL, "This is the future of mask data preparation. As we prepare for the 22-nm logic node with 193-nm immersion lithography, more complex and circular shapes are going to be required on masks. We are collaborating with D2S on the DFEB mask solution to make circular shapes a reality using our production e-beam mask writing equipment. We're also working closely with D2S and other leaders in the eBeam Initiative to accelerate the adoption of DFEB masks throughout the design chain."

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"Using DFEB mask technology with 193i lithography is an innovative approach to a difficult industry problem and I'm delighted to work with other eBeam Initiative members to implement it," said John S. Petersen, president and chairman of Petersen Advanced Lithography, Inc. and past fellow of International SEMATECH. "As we approach the 22-nm logic node, the assist features need to get more and more curvilinear. But we have to solve the problem of increased mask costs due to significantly higher e-beam shot counts when using curvilinear assist features. The DFEB mask technology solves this by taking advantage of the naturally rounding nature of electron beams to reduce shot count."

"This announcement is the latest step in our goal of continuous innovation in order to bridge the gap between design and manufacturing with e-beam technologies," stated Aki Fujimura, president and CEO of D2S. "D2S can bring the advantages of our DFEB mask technology to high-volume, leading-edge semiconductor manufacturing applications—and with that we can help the semiconductor industry realize the possibility of cost-effective optical lithography at the 22-nm node."

About D2S

D2S is an emerging company providing semiconductor IP and software to maximize existing e-beam technology to reduce mask costs for both low-and high-volume applications. D2S advanced design-for-e-beam (DFEB) mask solution reduces mask write times for high-volume designs with complex and circular features using existing e-beam mask writing equipment. D2S DFEB direct write solution virtually eliminates the costs of masks for low-volume applications and can speed time-to-market by shortening the design-to-lithography process flow. D2S is the managing sponsor of the eBeam Initiative. Headquartered in San Jose, Calif., the company was founded in 2007. For more information, see: www.design2silicon.com.

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