



Agency Contact:

David Moreno

MCA

Tel: +1-650-968-8900, ext. 125

E-mail: dmoreno@mcapr.com

EBEAM INITIATIVE SURVEY INDICATES RISING OPTIMISM IN EUV LITHOGRAPHY AND MULTI-BEAM TECHNOLOGY FOR PHOTOMASK PRODUCTION

Survey results to be presented at BACUS 2015; ZEISS announced as new Initiative member

SAN JOSE, Calif., September 29, 2015—The eBeam Initiative, a forum dedicated to the education and promotion of new semiconductor manufacturing approaches based on electron beam (eBeam) technologies, today announced the completion of its fourth annual **eBeam Initiative members’ perceptions survey**. A record **64 industry luminaries** representing 35 different companies from across the semiconductor ecosystem—including chip design, equipment, materials and manufacturing as well as photomasks—participated in this year’s survey. The eBeam Initiative also completed its **first-ever merchant and captive mask makers’ survey**. In related news, **ZEISS**, a leading innovator in lithography optics for semiconductor manufacturing, **has joined the eBeam Initiative**.

Among the results of the members’ perception survey, respondents expressed **increased optimism in the implementation of EUV lithography** for semiconductor high-volume manufacturing (HVM) compared to last year’s survey, while at the same time acknowledging that EUV lithography is expected to add greater complexity to photomask manufacturing. In addition, **expectations on the use of multi-beam technology for advanced photomask manufacturing continue to remain strong**. Results from the eBeam Initiative’s first mask makers survey—which not only provides insight into the challenges and opportunities for photomask manufacturers but also gives mask makers a way to assess their own progress relative to their peers—indicate **growing mask complexity across many fronts**. The complete results of both surveys will be presented and discussed by an expert panel today during the eBeam Initiative’s annual members meeting at the SPIE Photomask Technology Conference in Monterey, Calif., and are available for download at www.ebeam.org.

Select Highlights from eBeam Initiative Member Survey

- **62 percent of respondents predict that multi-beam technology will begin to be used for photomask production by the end of 2016** to address the critical problem of mask write times as the industry moves to smaller geometries.
- **Mask makers appear to be the most optimistic about the availability of multi-beam mask writers**, with a near-unanimous **96 percent** of mask makers participating in the survey indicating that multi-beam will be used for HVM mask writing by the end of 2018, compared to 65 percent of all equipment suppliers.
- Among five next-generation lithography (NGL) technologies being considered for advanced semiconductor fabrication, respondents predict **EUUV as the most likely NGL method** to be used in at least one manufacturing step by 2020, with an average confidence rating of 62%.
- At the same time, 59 percent of respondents predict that **EUUV will drive the need for complex mask shapes**.

Select Highlights from Mask Makers Survey (data from Q3 2014 through Q2 2015)

- Mask sets below the 22-nm logic node are **exceeding 60 masks for the first time**, while mask sets have seen a long-term growth rate of 13 percent since the 250-nm node.
- Average mask writes times have exceeded the nine-hour mark (9.6 hours) while the longest write time reported was 72 hours.
- A strong majority (75 percent) of mask makers predict that they will **modulate exposure dose on a per-shot basis in 2017**.

“eBeam technology is critical to enabling the continuation of Moore’s Law, regardless of which lithography approach is used for semiconductor design and cost scaling,” stated **Dr. Markus Waiblinger, senior product manager, strategic business unit Semiconductor Metrology Systems of ZEISS**. “As an innovator in the use of eBeam technology for optical and EUV mask inspection, review and repair solutions, ZEISS applauds the eBeam Initiative for educating the semiconductor supply chain about new developments in eBeam technology and for providing a forum for greater collaboration. Efforts like the annual members’ survey and now their first mask makers’ survey play an important role in fulfilling that charter, and we’re pleased to have the opportunity to participate as a new member of the eBeam Initiative.”

“On behalf of the eBeam Initiative, I wish to thank all of our members—including our newest member ZEISS—for their participation in our fourth annual members’ perception survey,” stated **Aki Fujimura, CEO of D2S, the managing company sponsor of the eBeam Initiative.** “2015 has truly been **an exciting year** for the Initiative, as members of the eBeam community continue to step forward with new solutions to solve some of the semiconductor and photomask industry’s **most pressing manufacturing challenges**. Interest and excitement in eBeam technology continues to grow, which is reflected in the **record turnout of responses** that we received for our annual survey, as well as the strong reception from the global mask community toward our inaugural mask makers’ survey. Feedback from these surveys is invaluable in helping guide our education efforts within the eBeam supply chain, and we look forward to presenting our results for both surveys at the SPIE Photomask Conference later today.”

About The eBeam Initiative

The eBeam Initiative provides a forum for educational and promotional activities regarding new semiconductor manufacturing approaches based on electron beam (eBeam) technologies. The goals of the Initiative are to reduce the barriers to adoption to enable more integrated circuit (IC) design starts and faster time-to-market while increasing the investment in eBeam technologies throughout the semiconductor ecosystem. Members, which span the semiconductor ecosystem, include: aBeam Technologies, Advantest, Alchip Technologies, AMTC, Applied Materials, Artwork Conversion, Aselta Nanographics, Cadence Design Systems, CEA-Leti, D2S, Dai Nippon Printing, EQUIcon Software GmbH Jena, eSilicon Corporation, Fraunhofer CNT, Fujitsu Semiconductor Limited, GenISys GmbH, GLOBALFOUNDRIES, Grenon Consulting, Hitachi High-Technologies, Holon, HOYA Corporation, IMS CHIPS, IMS Nanofabrication AG, JEOL, KLA-Tencor, Maglen, Mentor Graphics Corporation, Multibeam Corporation, NCS, NuFlare Technology, Petersen Advanced Lithography, Photronics, Sage Design Automation, Samsung Electronics, STMicroelectronics, Synopsys, tau-Metrix, Tela Innovations, TOOL Corporation, Toppan Printing, Vistec Electron Beam GmbH, Xilinx and ZEISS. Membership is open to all companies and institutions throughout the electronics industry. To find out more, please visit www.ebeam.org.

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