

Application: 4254

Multibeam Groundbreaking Semiconductor Manufacturing Technology

Page: General Information

Provide information about the company to be considered for the award. If you will be nominating an individual, specify the nominee's employer.

Name of Organization/Company

Multibeam Corporation

Additional Contacts

I do not wish to list additional contacts

Page: Entry Information

Entry Title

Multibeam Groundbreaking Semiconductor Manufacturing Technology

Category

R03. Technical Innovation of the Year - Manufacturing Technology

Technical Innovation of the Year Submission Format

Written Answers

a. Briefly describe the organization that achieved the nominated technical innovation: its history and past performance (up to 200 words). Required

Multibeam Corporation is a semiconductor production tool manufacturer that leads the multi-column electron beam lithography market with a platform that enables rapid prototyping and production of leading-edge semiconductors with fastest time-to-market advantages for special applications like secure chip ID, advanced packaging, photonics, and more.

The company has re-innovated e-beam lithography for rapid prototyping and production at the leading edge with fastest time to market for advanced packaging, photonics, secure chip ID, and other special applications.

This maskless multi-column platform is the industry's only e-beam solution that offers full-wafer direct-write patterning capabilities with fine resolution in a modular architecture that is optimized for scale. The fully automated system features multiple miniaturized e-beam delivery columns that write independently for ultra-high throughput, and advanced algorithms that enable unprecedented directional control. The result: fastest time-to-first wafer at low operational costs - taking a highly valuable technology that was once stuck in lab environments due to its low throughput, and making it fit for high-volume fab level production.

The company is lead by CEO Dr. David K. Lam, former founder and CEO of Lam Research, who has been previously inducted into the Silicon Valley Hall of Fame for his prior innovations in the plasma etch space.

b. Outline the nominated technical innovation. Be sure to describe it in terms that someone with limited knowledge of the technology can understand and appreciate (up to 250 words). Required

Multibeam has developed an innovative technology leveraging electron beam lithography and re-innovating it to be fit for high volume rapid production environments. The Multibeam systems allow integrated circuit (IC) chip makers/designers to reap the benefits that inherently come with direct-write electron beam lithography (lower production costs and faster time to market as this method requires NO masks to write, as well as high resolution and adaptability, and very large field of view and depth of focus), all the while benefitting from a 100x increase in productivity given Multibeam's miniature multi-column e-beam design.

E-beam has always been valued for its high resolution, precision, and adaptability capabilities, but it never delivered the productivity needed to be used in a fab or production environment - until now. Today's most rapidly growing applications like AI, high performance computing, and high speed communications REQUIRE chips to be produced with very fine features and to be packaged very closely with other heterogeneous material. Multibeam is huge ENABLER of these capabilities.

As the industry's first lithography system capable of large field of view and high pattern resolution, Multibeam's system is an enabling technology for both legacy IC production and new high-growth applications like advanced packaging, device personalization for enhanced security, multi-project wafers and more. The maskless capability also drastically reduces the cost of patterning wafers in low-volume IC production and enhances quick-turn fabrication of special devices. Multibeam's Intellectual Property (IP) portfolio consists of 46 awarded U.S. patents protecting the technology and its applications.

c. Explain why the technical innovation you have highlighted is unique or significant (up to 250 words). Required

Multibeam has re-innovated conventional single-electron-beam lithography to enable high-speed, adaptive, and high-resolution patterning for a range of current and emerging applications. We've been able to solve key limitations, transforming e-beam lithography from a mere R&D curiosity to an incredibly advantageous tool for integrated circuit (IC) production. At the heart of the company's technology is an array of miniature e-beam columns that provide a maskless, high-throughput, and flexible platform for wafer writing, capable of drastically reducing lithography costs, safe-guarding the IC supply chain, and revolutionizing microelectronics manufacturing for device makers.

MEBL exhibits well over 10x productivity in most applications compared to conventional e-beam lithography technology. MEBL's productivity yield and broad range of unprecedented capabilities can be attributed to 3 key architectural design elements: (1) miniaturized electron columns arrayed to write simultaneously and independently across 200mm and 300mm wafers; (2) write-on-the fly technique allowing each column to write continuously while the stage is in motion, eliminating the need for the timely "step, settle, repeat", process – yielding a 5x increase in throughput over incumbent technologies; and (3) lower beam energies in the range of 5-10keV, which requires a 2-7x lower (yet more efficient) dosage to expose a given resist.

Direct-write lithography eliminates the upfront cost and time required to manufacture a full mask set associated with bringing a new chip from design to fabricated reality. The first exposure of a new mask layer can happen about 100x faster, down from weeks to hours.

d. Reference any attachments of supporting materials throughout this nomination and how they provide evidence of the claims you have made in this nomination (up to 250 words). Optional

Website give a bit more background information on Multibeam. Producers of the world's first high productivity electron beam lithography systems.

Joint PR/blog with Synopsys explains how we've partnered with this world-class EDA leader to further accelerate innovation with Multibeam systems.

3D InCites (semiconductor community) announcement of Technology Innovation award winners - Multibeam was a winner in this category!

Paper/presentation published at SPIE Advanced Lithography & Patterning conference - further explains our innovation/distinction from other single beam e-beam platforms

Paper/presentation published at Lithography Workshop conference - further explains our innovation/distinction from other single beam e-beam platforms

Paper/presentation published at SEMI MSTC conference - further explains how our technology provides breakthrough capabilities for next-gen performance improvements in MEMS and Sensor devices, which are often used in medical applications, autonomous vehicles, navigation systems, and a number of other advanced technologies, devices, and applications

Paper/presentation published at IEEE ECTC conference - further explains how our technology enables the next generation of advanced packaging of semiconductors. With Multibeam high productivity direct write, current limitations in packaging IC chips with heterogeneous materials are no longer a roadblock to the level of connectivity these integrated chips can support

Press release indicating the initiation of our partnership with SkyWater Technology (very first customer who will be receiving our inaugural system this May). This PR explains why our partnership with SkyWater signifies a great milestone for their customers, and explores some of the intended uses they have planned for the Multibeam system once it is in their fab.

Webpage Link

<https://multibeamcorp.com/> (<https://multibeamcorp.com/>)

Would you like to add an additional webpage link?

Yes

Webpage Link 2

<https://www.synopsys.com/blogs/chip-design/electron-beam-lithography-multibeam.html> (<https://www.synopsys.com/blogs/chip-design/electron-beam-lithography-multibeam.html>)

Would you like to add an additional webpage link?

Yes

Webpage Link 3

<https://www.3dincites.com/2024/02/announcing-the-winners-of-the-2024-3d-incites-awards/> (<https://www.3dincites.com/2024/02/announcing-the-winners-of-the-2024-3d-incites-awards/>)

Would you like to add an additional webpage link?

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Web Page Link 4

https://spie.org/advanced-lithography/presentation/Full-wafer-maskless-patterning-with-sub-50nm-resolution-and-large/12956-62?enableBackToBrowse=true#_=_
(https://spie.org/advanced-lithography/presentation/Full-wafer-maskless-patterning-with-sub-50nm-resolution-and-large/12956-62?enableBackToBrowse=true#_=_)

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Web Page Link 5

https://www.semi.org/en/connect/events/mems-and-sensors-technical-congress-mstc-speaker-abstract-bio-ken-macwilliams?utm_medium=event&utm_source=tp-ingo&utm_campaign=AM-AD-20240118--MSTC24 (https://www.semi.org/en/connect/events/mems-and-sensors-technical-congress-mstc-speaker-abstract-bio-ken-macwilliams?utm_medium=event&utm_source=tp-ingo&utm_campaign=AM-AD-20240118--MSTC24)

Would you like to add an additional webpage link?

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Web Page Link 6

<https://ectc.net/program/session1.cfm> (<https://ectc.net/program/session1.cfm>)

Would you like to add an additional webpage link?

Yes

Web Page Link 7

<https://www.skywatertechology.com/skywater-technology-and-multibeam-corporation-form-partnership-to-deploy-multibeams-innovative-mebl-system/>
(<https://www.skywatertechology.com/skywater-technology-and-multibeam-corporation-form-partnership-to-deploy-multibeams-innovative-mebl-system/>)

Would you like to add an additional webpage link?

No

Supporting Document

No File Uploaded

Would you like to add an additional supporting document?

Yes

Supporting Document 2

Download File (https://stevies-tech.secure-platform.com/file/66543/eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJtZWVpYUlkIjo2NjU0MywiYWxsbn3dOb3RTaWduZWRVcmwiOiJGYWxzZSI6ImInbm934568-multibeam-about_us-60sec-1920x1080-16x9-5409943979-v1%20%28Original%29.mp4)

Would you like to add an additional supporting document?

Yes

Supporting Document 3

Download File (https://stevies-tech.secure-platform.com/file/66544/eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJtZWVpYUlkIjo2NjU0NCwiYWxsbn3dOb3RTaWduZWRVcmwiOiJGYWxzZSI6ImInbm93uwugFU-8aiOK_7hI629zR_-4OMKg9ScmGCPi63iW0?A%20new%20generation%20of%20e-beam%20lithography-Multibeam_REPRINT...pdf)

Would you like to add an additional supporting document?

No

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Terms and Conditions

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