Lam Research Introduces Breakthrough Deposition Technique to Enable Next-Generation MEMS for 5G and Beyond

Pulsus™ is the semiconductor industry's first pulsed laser deposition tool designed for mass production

FREMONT, Calif., March 26, 2024 /PRNewswire/ -- Lam Research Corp. (Nasdaq: LRCX) today introduced the world's first production-oriented pulsed laser deposition (PLD) tool to enable next-generation MEMS-based microphones and radio frequency (RF) filters. Lam's Pulsus™ PLD system delivers aluminum scandium nitride (AlScN) films with the highest scandium content available. This paves the way for advanced consumer and automotive devices with enhanced performance, capability and functionality. Pulsus is now shipping to select specialty device manufacturers.

This new deposition technique can help advance device designs and accelerate product roadmaps in the specialty market.

The addition of Pulsus PLD to the Lam portfolio further expands Lam's comprehensive range of deposition, etch and single-wafer clean products focused on specialty technologies and demonstrates Lam's continuous innovation in this sector.

"Lam leveraged deep expertise in specialty semiconductor technologies, proven capabilities in deposition, and a strategic collaboration with CEA-Leti to bring this game-changing solution to customers on our production-proven 2300® platform," said Chris Carter, group vice president and general manager of the Customer Support Business Group at Lam Research. "This new deposition technique can help advance device designs and accelerate product roadmaps in the specialty market."

Cutting-Edge Films Drive High Performance Devices
RF filters play a critical role in 5G, WiFi 6 and WiFi 6E performance by increasing the number of bands a network can handle while also improving each user's experience. MEMS microphones are valued for a high signal-to-noise ratio that allows them to capture even muffled sounds accurately — essential for voice control features and noise cancellation in 5G-enabled devices.

Pulsus uses breakthrough technology to deposit high-quality films that optimize RF filters and MEMS microphones. The higher the scandium level in the film, the better the performance of the devices. Pulsus delivers films composed of at least 40% scandium — the highest concentration available today. These films feature low dielectric loss and twice the piezo coefficient of current sputtered films, optimizing electrical conversion to drive enhanced sensitivity in RF filters and better performance in MEMS microphones. Further, improved piezoelectric qualities make it feasible to replace lead zirconate titanate (PZT) with lead-free AlScN.

In Pulsus' PLD process, an intense laser pulse is used to strike a target material. The target is vaporized, creating a stable, dense plasma plume that is deposited in thin layers onto a wafer. This process is vital for achieving high-quality, uniform films with precise control over thickness and stress. Pulsus represents the first time lasers have been used for thin film deposition in high-volume manufacturing.

Pulsus Provides Unique Benefits for Specialty Technologies
"Demand for manufacturing equipment used to make MEMS devices grew to over$940M in 2023 and could keep growing as chipmakers find new ways to improve device performance. The superior film quality of Pulsus holds tremendous value for 5G applications that require strong piezoelectric performance," said John West, deputy director of manufacturing and global supply chain at Yole Group. "Pulsus is an innovative solution to help optimize specialty devices now and advance technology roadmaps for varied applications to come."

The PLD capabilities of Pulsus, supported by Lam's 2300 platform design, ensure exceptional film uniformity and quality at a fraction of the cost per wafer versus conventional deposition methods. This efficiency can help chipmakers boost manufacturing yields and accelerate their product roadmaps.

In addition to AlScN, Pulsus can deposit a wide range of complex, multi-element materials that cannot be applied by other methods. Lam is exploring new materials to meet the demands of the specialty technology market for applications such as AR/VR and quantum computing.

"The Pulsus PLD system is unique in its ability to deposit numerous materials, including AlScN, with outstanding thin film properties," said Sothachett Van, head of investment and supplier partnership group, CEA-Leti. "We are excited to see this technology mature into a high-volume manufacturing solution for piezoelectric MEMS devices."

Learn more at www.lamresearch.com.

Media Resources

- Visit the Lam Newsroom to access related images.
- Read the Lam blog.
- Learn more about the Pulsus PLD system.

About Lam Research
Lam Research Corporation is a global supplier of innovative wafer fabrication equipment and services to the semiconductor industry. Lam's equipment and services allow customers to build smaller and better performing devices. In fact, today, nearly every advanced chip is built with Lam technology. We combine superior systems engineering, technology leadership, and a strong values-based culture, with an unwavering commitment to our customers. Lam Research (Nasdaq: LRCX) is a FORTUNE 500® company headquartered in Fremont, Calif., with operations around the globe. Learn more atwww.lamresearch.com.

Caution Regarding Forward-Looking Statements
Statements made in this press release that are not of historical fact are forward-looking statements and are subject to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Such forward-looking statements relate to but are not limited to: market and industry expectations and the performance of the Pulsus system. Some factors that may affect these forward-looking statements include: trade regulations, export controls, trade disputes, and other geopolitical tensions may inhibit our ability to sell our products; business, political and/or regulatory conditions in the consumer electronics industry, the semiconductor industry and the overall economy may deteriorate or change; the actions of our customers and competitors may be inconsistent with our expectations; supply chain cost increases and other inflationary pressures have impacted and are expected to continue to impact our profitability; supply chain disruptions have limited and are expected to continue to limit our ability to meet demand for our products; and natural and human-caused disasters, disease outbreaks, war, terrorism, political or governmental unrest or instability, or other events beyond our control may impact our operations and revenue in affected areas; as well as the other risks and uncertainties that are described in the documents filed or furnished by us with the Securities and Exchange Commission, including specifically the Risk Factors described in our annual report on Form 10-K for the fiscal year ended June 25, 2023 and quarterly report on Form 10-Q for the fiscal quarter endedDecember 24, 2023. These uncertainties and changes could materially affect the forward-looking statements and cause actual results to vary from expectations in a material way. The Company undertakes no obligation to update the information or statements made in this press release.

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