ACM Research Introduces Thin Wafer Cleaning System for High-volume Power Semiconductor Device Manufacturing

Patented Touch-free Bernoulli Handling and Processing System Supports Wet Processes for Ultra-thin Wafers With High Warpage

Fremont, Calif. – Sept. 15, 2020 – ACM Research, Inc. (NASDAQ: ACMR), a leading supplier of wafer-processing solutions for semiconductor and advanced wafer-level packaging (WLP) applications, today announced the introduction of its Thin Wafer Cleaning System, a high-throughput, four-chamber system designed for single-wafer wet processes, including cleaning, etching and surface finishing. The system is intended for the manufacture of both metal-oxide-semiconductor field-effect transistor (MOSFET) and insulated-gate bipolar transistor (IGBT) devices for the power semiconductor market, and features complete touch-free handling and processing based on the Bernoulli effect to eliminate possible wafer damage and improve final device yield. It supports 200mm and 300mm Si wafers and is suitable for Taiko wafers down to 50-micron thickness, ultra-thin wafers of less than 200-micron thickness, high aspect ratio (>10:1) deep-trench wafers as well as double-thickness bonded wafer pairs.

ACM delivered its first Thin Wafer Cleaning System to a China-based analog/power semiconductor manufacturer in the second quarter of 2020, with revenue recognition subject to qualification and acceptance.

"To compete for market share, power device manufacturers must expand their MOSFET and IGBT manufacturing lines to include wafer thinning equipment, without significantly increasing the overall fab footprint," said David Wang, ACM's Chief Executive Officer and President. "We have responded by developing a four-chamber tool that offers much higher throughput than the currently available two-chamber systems. Additionally, we outfitted the tool with a proprietary contactless handling and processing system to prevent these fragile wafers—which can be as thin as 50 microns—from being damaged during the backside thinning and cleaning processes, thereby increasing overall device yield."

Modor Intelligence, a market research consulting firm, expects the IGBT market to increase from US$5.4 billion in 2019 to US$9.4 billion in 2025, based on the broad application range of IGBTs to modern appliances such as cookers, microwaves, electric cars, trains, variable-frequency drives, variable-speed refrigerators, air conditioners, lamp ballasts, municipal power transmission systems and stereo systems. Modor Intelligence also reports that sales of electric cars in Europe, North America and China are creating new avenues for IGBTs to support infrastructure and for manufacturing electric vehicles.[1]

Furthermore, keeping up with the miniaturization trend while improving device performance has sparked demand for smaller pitch, deeper trench and thinner wafers. Yole Développement, a market research and technology analysis firm, predicted that the market for thinned wafers will increase from 100 million in 2019 to 135 million in 2025, a compound annual growth rate (CAGR) of more than 5%. Yole Développement expects this market growth to be driven by memory, CMOS image sensors and power silicon carbide components as well as LED and laser diodes.[2]

This new tool's handling system is programmable to accommodate deep-trench, Taiko and ultra-thin wafers, or bonded wafers. The robot arms for loading and unloading, as well as the chuck, have been designed for non-contact wafer handling using a proprietary method based on the Bernoulli effect. Nitrogen gas (N2) provides constant pressure to keep the wafer floating in place on the arm, which can be flipped for processing on either side while still holding the wafer in place. This allows for handling high-warpage wafers without contact.

During the wet process, the wafer sits front-side down on a Bernoulli chuck, where an N2 flow cushions the wafer, protecting it and keeping it dry. This proprietary design, using ACM's patented technology on a Bernoulli chuck, features a recipe-controlled gap between the wafer and chuck to meet requirements for undercut width control on the wafer device side edge, as well as pin-mark-free control. Additionally, the system can be configured to include an optional thickness measurement function.

ACM's Thin Wafer Cleaning System has been designed to meet manufacturers' needs. After mechanical grinding/polishing is performed to achieve desired thickness, ACM's handling system supports these ultra-thin, high-warpage wafers throughout subsequent critical processes, including silicon thinning using a wet-etch step to eliminate microcracks. Additionally, by implementing a different combination of chemistries, this tool can be used for cleaning, photoresist removal, thin-film removal and metal etching.

Each chamber can be configured with up to four swing arms for delivering process chemistries such as wet etchants, solvents, RCA cleaning chemicals, deionized water and nitrogen. Additionally, the chambers are designed to allow reclaiming of two types of chemicals.

ACM's Thin Wafer Cleaning System is available for purchase now. For more information, please call the ACM regional company contact listed below.

About ACM Research, Inc.
ACM develops, manufactures and sells semiconductor process equipment for single wafer or batch wet cleaning, electroplating, stress-free polishing and thermal processes critical to advanced semiconductor device manufacturing, as well as wafer-level packaging. The company is committed to delivering customized, high-performance, cost-effective process solutions that semiconductor manufacturers can use in numerous manufacturing steps to improve productivity and product yield.

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References

1. https://www.mordorintelligence.com/industry-reports/insulated-gate-bipolar-transistor-igbt-market
2. http://www.yole.fr/iso_upload/News/2020/PR_THINNING_EQUIPMENT_MATERIALS_Technology_Market_Overview_YOLE_June2020.pdf

Statistical Data
The information included in this press release contains statistical data and estimates, including forecasts, that are based on information disclosed publicly by Modor Intelligence and Yole Développement in their respective publications listed under "References" above. These publications represent research opinions or viewpoints and are not representations of fact. The publications speak as of their original publication dates (and not as of the date of this press release), and the opinions

expressed in the publications are subject to change without notice. While ACM is not aware of any misstatements regarding any of the statistical data or estimates presented from these publications, estimates, and in particular forecasts, inherently involve numerous assumptions and are subject to risks and uncertainties, as well as change based on various factors, that could cause results to differ materially from those expressed in the data and estimates presented in this press release. Readers are cautioned not to place undue reliance on any statistical data or estimates, and ACM undertakes no obligation to update any statistical data or estimates, whether as a result of new information, future events or otherwise.

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