Picosun’s cluster ALD solutions enable next generation power electronics

ESPOO, Finland, 6th October 2020 – Picosun Group, the leading supplier of AGILE ALD® (Atomic Layer Deposition) thin film coating solutions for global industries, strengthens its position in power electronics market with several cluster ALD system sales to prominent manufacturers in Europe, USA and Asia.

“Power electronics is an important, fast growing market for Picosun. ALD has potential to solve various challenges manufacturers are facing in this field, and our solutions have enabled our customers to create significant added value in terms of device quality and throughput. At Picosun, we have developed several turn-key production ALD solutions specifically for 4-8 inch wafer markets such as power devices. Especially our cluster ALD systems, such as the PICOSUN® Morpher which we launched last year, have been extremely well received by our customers,” says Juhana Kostamo, Head of Customer Solutions/Deputy CEO of Picosun.

Power components are crucial in a wide range of applications from consumer electronics to transportation, energy production and distribution, including renewables such as wind and solar power generation. These components are typically manufactured on 4-8 inch compound semiconductor wafers such as GaN and SiC. These materials provide various benefits compared to pure silicon, for example higher electron mobility, higher threshold voltage, and ability to operate at higher temperatures. Challenges do exist, however, as GaN and SiC power devices are prone to high interface trap density (leading to parasitic currents and reduced electron mobility) and gate leakage current, and poor threshold voltage stability.

Interface trap density can be reduced by combining pre-cleaning methods with high permittivity, large bandgap insulators. High quality, defect-free high-k dielectric layers such as Al₂O₃, AlN or ZrO₂ etc. are key in reducing power devices’ gate leakage current and to improve electron mobility and threshold voltage stability. A good example here are GaN-based HEMTs (high electron mobility transistors), which are important in various large scale practical applications, and which require efficient gate insulation and surface passivation to achieve optimal functionality.

ALD stands as a superior deposition method here compared to other thin film coating technologies such as PECVD, as ALD produces the most conformal, uniform, and defect-free films with accurate, digitally repeatable thickness control and sharp interfaces. With the right selection of ALD deposition equipment, even multilayer processing is possible i.e. various functional material layers and/or stacked films/nanolaminates can be manufactured in one process run.
PICOSUN® Morpher is a disruptive ALD production platform designed for up to 8 inch wafer industries such as power electronics, MEMS, sensors, LEDs, lasers, optics, and 5G components. Morpher’s operational agility makes the system adaptable to various and changing manufacturing needs, on all business verticals from corporate internal R&D to production and foundry manufacturing, where both the end products and/or customers’ requirements may change rapidly. Morpher can handle several substrate materials, batch and substrate sizes, and ALD materials with leading process quality. Multilayer deposition is possible, and cluster design allows integration of also other processing units such as pre-clean, RIE etc. for fully automated, high throughput continuous vacuum operation.

“In its versatility and transformability, Morpher is the epitome of our principle ‘Agile ALD’. Innovation, constant development and improvement of our ALD solutions to enable our customers’ success is our driving force at Picosun. This applies also to Morpher platform and we have some truly exciting additions to this product family coming in the near future,” summarizes Kostamo.

Picosun provides the most advanced AGILE ALD® (Atomic Layer Deposition) thin film coating solutions for global industries. Picosun’s ALD solutions enable technological leap into the future, with turn-key production processes and unmatched, pioneering expertise in the field – dating back to the invention of the technology itself. Today, PICOSUN® ALD equipment are in daily manufacturing use in numerous leading industries around the world. Picosun is based in Finland, with subsidiaries in Germany, USA, Singapore, Taiwan, China, Korea and Japan, offices in India and France, and a world-wide sales and support network. Visit www.picosun.com.

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