
Plasma-enhanced ALD to Minimize Sample Surface Damages

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Picosun Group has introduced a new atomic layer deposition technology that uses plasma instead of high-energy ions to minimize sample surface damages and contaminations. This technology enables the low-temperature deposition of several materials, which is not possible by thermal processes only. Picosun presents a new generation of PEALD based on high-power microwave plasma. The lightweight plasma generator can be combined with the ALD reactors to produce an instrument that is capable of depositing high-quality films with the least contamination.

[Picosun Group](#), the leading supplier of AGILE ALD® (Atomic Layer Deposition) thin film coating solutions, reports excellent results obtained with its next generation R&D PEALD (plasma-enhanced ALD) technology.

PEALD enables deposition at low temperatures and of several materials that could not be deposited with thermal process only. The drawback of PEALD, however, is damage to the sample surface, caused by ion bombardment. Picosun's solution to this is remote plasma method, where the plasma source is located high enough above the sample, and the reactive species hitting the surface are radicals, not high-energy ions.

"Picosun's operating philosophy is based on constant improvement and development, as we want to offer our customers always the best-in-class, leading quality ALD solutions. Our Picoplasma™ equipment has been a hit product in the R&D community since its launch, and we have now upgraded it to a completely new level, to enable even faster processing with superior film quality and purity," says Dr. Jani Kivioja, CTO of Picosun Group.

Picosun's next generation PEALD solution is based on remote, high power microwave plasma (MWP). The compact, lightweight plasma generator can be integrated to existing PICOSUN® R&D ALD reactors as such. The new plasma-ALD solution realizes deposition with virtually no added particles, with extremely low metal contamination and with far shorter cycle times compared to the previously used method. Excellent film quality and uniformity

have been obtained(*), and the new MWP allows wider operating range (in terms of plasma parameters) which widens also the selection of available ALD processes.

"We are pleased to provide our customers with our new, thoroughly upgraded plasma-ALD solution. There are several important application areas, such as medical devices and MEMS, where substrates are sensitive and require processing at low temperatures. Now we have an ideal solution to this, which will again facilitate ALD's breakthrough to yet new components and devices," continues Dr. Kivioja.

(*) Film properties, SiO₂ as an example:

Wafer size, dep. temperature, growth rate	Film non-uniformity (1 σ , 5mm EE, 49pts)	Leakage current (@4MV)	Particles (@>0,25 μ m)	Metal contamination (Fe, Ti, Cr, Mn, Ni, Cu, Zn atoms)
200 mm, 400 °C, 0.86 Å/cycle	1.7 % (~10 nm film)	2.1×10^{-8} A/cm ²	< 60	< 2×10^{10} /cm ²

Picosun provides the most advanced ALD thin film coating technology to enable the industrial leap into the future, with turn-key production solutions and unmatched expertise in the field. Today, PICOSUN™ ALD equipment are in daily manufacturing use in numerous major industries around the world. Picosun is based in [Finland](#), with subsidiaries in [Germany](#), North America, [Singapore](#), [Taiwan](#), [China](#) and [Japan](#), offices in [India](#) and [France](#), and a world-wide sales and support network.

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