

THEIA

R&D SCALE WAFER COATING SYSTEM

THEIA combines production proven design and system components of our commercial solution APOLLO in an R&D package that delivers unmatched performance, flexibility, reliability, and safety. THEIA is field upgradeable to accommodate the ever-changing needs of scientists and engineers. THEIA enables a seamless transition from R&D to production. Recipes created with THEIA can be sent to APOLLO for a simple and straightforward path to commercial scale production.



Key Features

- Field-upgradeable and scalable
- Ultra fast deposition 120-300 Å/min
- Maintenance at intervals of 50 µm
- Proprietary valves with <1 msec speed and 100 millions cycle lifetime
- Better than 1 % uniformity across wafer and between batches

Applications

- ALD precursors development
- Environment barrier coatings
- Interface and adhesion layers
- Corrosion protection
- Abrasion resistant coatings
- Area selective chemistry development

Forge Nano is delivering THEIA around the world to enable a new generation of advanced technologies. THEIA features best in class maintenance and world class service, from our dedicated team of US based engineers and scientists.

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Basic specifications and configurations

Performance:

THEIA delivers ultra fast deposition with Forge Nano's patented SMFD-ALD™, in a low cost system for R&D budgets. Sub-second ALD cycle times allow efficient and rapid exploration of applications requiring thick films. Covering challenging patterned substrates such as advanced-generation DRAM device wafers, membranes, sensors, electron multipliers, etc. with aspect ratios up to 1,000.

Capabilities:

THEIA is ideal for exploration of newly developed ALD precursors. At the initial stage, ALD precursors are often extremely expensive (\$1,000/gm is not unusual) and are available in very small quantities. Users also benefit from the many mature high productivity ALD processes that include HfO_2 , ZrO_2 , Ta_2O_5 , SiO_2 , $<300\text{ }^\circ\text{C}$ TiN, BN, GaN, Nb_3N_5 and more, available as turn-key processes from Forge Nano.

Configuration:

THEIA is available in 3 wafer size configurations (75mm to 200mm). All configurations can be retrofitted in the field with flexible field-upgradeable options.

Design:

THEIA incorporates our millisecond response ALD manifold that integrates 10 of our patented Fast Pneumatic Valves (FPV) to deliver over 100 million trouble-free cycles of composite and nanolaminate ALD films. This manifold is the only ALD manifold that can switch composition every cycle without any throughput penalty. Field proven since 2005, our valves set records for speed, reliability, lifetime and safety, while performing at temperatures as high as $220\text{ }^\circ\text{C}$. Forge Nano's ALD valves are the only doubly contained, spill-free UHP valves on the market.

Optional features:

In-Situ QCM monitors ALD processes with better than 5% of a monolayer at millisecond time-resolution. Used for ALO process optimization, detailed mechanistic studies, kinetics, and stability of precursors. Also valuable for surface cleaning processes, nitridation, oxidation, reduction, densification, silicide formation, annealing, precursor sublimation, de-chlorination and more.

Forge Nano is a leading materials science company harnessing the power of Atomic Armor, the company's proprietary ALD nanocoating technology, to accelerate manufacturing innovation, transform product performance and achieve a more sustainable future for a range of industries around the world. Atomic Armor produces superior coatings that can unlock a material's performance at the atomic level and deliver custom solutions from small-scale R&D and laboratory work to large-scale, high-volume production lines.

Forge Nano puts the world's leading Atomic Layer Depositions authorities at your fingertips. Contact our experts to learn about this breakthrough in materials science.

www.forgenano.com