Beneq

Equipment

P400A/P800
Thin Film Systems for Atomic Layer Deposition

P400A and P800 for Industrial ALD Applications

The Beneq P400A and P800 are robust and reliable ALD systems designed for industrial-scale production and product development. They are ideal for scaling up thin film deposition from R&D phase to full-size industrial production. Suitable substrate materials for coating include wafers, glass, metal or plastic sheets, 3D objects and porous bulk materials. The P400A and P800 ALD systems are dependable, industrially proven and mature in terms of technical distinction. The design is based on 25 years of continuous (24/7) operation in demanding industrial applications, such as thin film electroluminescent (TFEL) display production.

Most of our industrial customers call for dedicated processes and production setups. To facilitate this, our experienced Beneq ALD team and coating systems are at our customers' service. Beneq has several in-house P400A and P800 systems to cater for a wide range of coating needs in application development and thin film R&D. This way, customers looking for production equipment can verify the technical and financial performance of the process and equipment, before making an investment. In addition, we offer the possibility of low-volume production until our customer's own fabrication has been set up.

Technical specifications

	P400A	**P800**
Process temperature range	25 - 550 °C	25 - 550 °C
Vacuum chamber dimensions	⌀ 350 × 1000 (mm)	⌀ 750 × 1600 (mm)
Reaction chamber types and dimensions	Customized case and substrate specific (within the boundaries of the vacuum chamber), *e.g.*,: - chamber inner dimensions 250 × 250 × 1000 (mm) - chamber for max. planar substrate 370 × 470 (mm)	Customized case and substrate specific (within the boundaries of the vacuum chamber)
Precursor sources	5 parallel feeding lines for gas, liquid and solid precursors. More than 10 precursors possible.	5 parallel feeding lines for gas, liquid and solid precursors. More than 10 precursors possible.
Control system	PLC control with PC user interface	PLC control with PC user interface
Main dimensions (L × W × H)	2400 × 930 × 2420 (mm)	3200 × 1340 × 2460 (mm)

Features

Meeting industrial needs

- Short time to market. Immediate scale up to production after R&D phase.
- Extensive logging for repeatable production control.
- UPS supported functions, the process can pass power breaks without loss of yield.
- Low need for maintenance.
- Optional clean room wall installation saves valuable clean room space.
- Unique mini-environment design consisting of a reaction chamber and a precursor delivery manifold. The reaction chamber is loaded outside the vacuum chamber and can be optimized for each use. Batch and substrate size can vary from run to run.
- Project- and product-dedicated reaction chamber setups enable efficient and versatile use without risk of cross-contamination.
- Mini-environment and proprietary filtering design separate cleaning work from the P400A system base. No downtime due to cleaning.

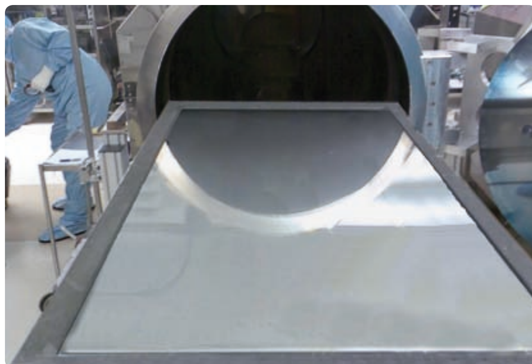
Process stability

- Cost-efficient hot-wall and high-capacity batch system.
- Unique thermally stable source block construction with patented rapid embedded dosing valves and integrated flow channels.
- Vacuum pumping system with multiphase, proprietary high-capacity precursor de-activation and filtration system to enable high-volume batch processing.
- Highly repeatable processing with dedicated temperature measurement system and adjustable pumping speed.
- Over-heating prevented by additional PLC with dedicated thermocouples, apart from normal heating loop, for increased production safety.
- Industry-proven high repeatability and reliability in production, based on 30 years of development.

P400A with reaction chamber in loading position.

Scaled to large batches and thick film stacks

Opposite to general belief, many ALD processes use thick film stacks (> 1 µm). Thick batch processes necessitate optimized handling of precursor source materials and advanced process waste management. The P400A and P800 come equipped with a multiphase filtering system, which is capable of handling large amounts of precursors. During process runs, precursor de-activation functions guarantee that the system allows no chemicals that could cause film growth, to pass through to the vacuum pump. The vacuum filter is of large-volume type with high gas conductance. The large waste handling capacity of the system enables typical cleaning intervals of approximately 1 year in R&D mode and 3 to 6 months in production. For process and coating run design, the user-friendly recipe editor for nanolaminates, mixed films and complex coating design structures is capable of handling hundreds of different layers in the same run. The operator can independently name valves, heaters and subprograms. Recipe editing is easy and can be done on a laptop computer, using any common text editor.



Deposition cycle times from 2 to 4 seconds are possible for both large surface areas (left) and large volume batches (right). The substrate size to the left is 600 ×1200 (mm). The number of substrates to the right is 288 pcs.

P400A/P800, 5/2010

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