Beneq Equipment

TFS 200R
Thin Film System for Continuous ALD

Thin Film System TFS 200R for ALD Research

The Beneq TFS 200R is the first-ever system designed for research in Roll-to-Roll atomic layer deposition (ALD) and other forms of continuous ALD (CALD). The TFS 200R is used exclusively for depositing thin films on flexible substrates. The flexible substrate is fixed on a rotating cylinder within the reaction chamber. The cylinder itself is surrounded by a number of linear nozzles, each creating an isolated gas region over the full width of the substrate. As the cylinder is rotated, the substrate passes through different gas regions and is coated. For the first time in ALD history, the TFS 200R enables investigation of the dynamic behavior of various precursor chemistries, simulation of process suitability and evaluation of film performance in Roll-to-Roll ALD applications. The TFS 200R is specified for a maximum substrate speed of 300 m/min and maximum process temperature of 200 °C.

The Beneq TFS 200R, with its robust and modular structure, is designed to meet both industrial standards and the flexibility requirements of research today. Commonly available standard components are used. Precursor containers are conveniently small, and they can be easily changed.

Depending on the process needs, the TFS 200R can be equipped with up to 2 heated sources, type HS 80 and/or HS 180. Additionally, the system can be equipped with up to 8 gas lines and up to 4 liquid sources.

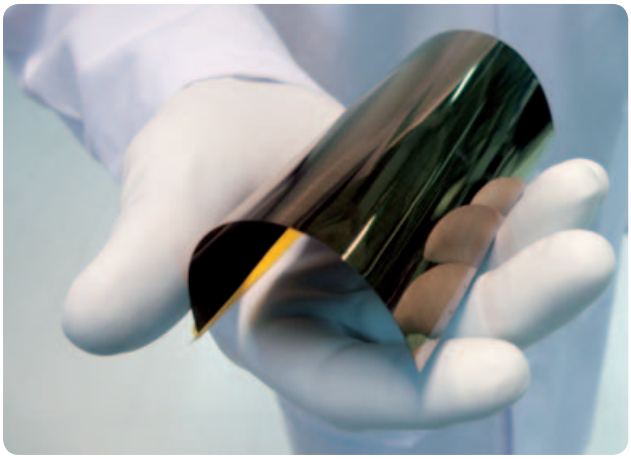
Technical specifications

Process temperature range	25 - 200 °C
Substrate size	up to 300 × 120 mm
Substrate material	polymer film, metal foil or other flexible
Web speed	up to 300 m/min (at 1000 rpm)
Process pressure	1 - 900 mbar (hPa)
Liquid sources, heated	up to 2
Liquid sources, not heated	up to 4
Gas lines	up to 8
Control system	PLC control with PC user interface
Main dimensions, ALD system (L × W × H)	1325 × 600 × 1298 (mm)
Main dimensions, electric cabinet (L × W × H)	1000 × 300 × 1600 (mm)

Features

Performance

- Thin film deposition rate up to 100 nm/min.
- Moving substrate, web speed up to 300 m/min.
- High capacity pump line filter.
- High speed and capacity data logging as well as trend tools for human machine interface (HMI).



A polymer (PET) substrate coated by the TFS 200R.

Versatile and robust

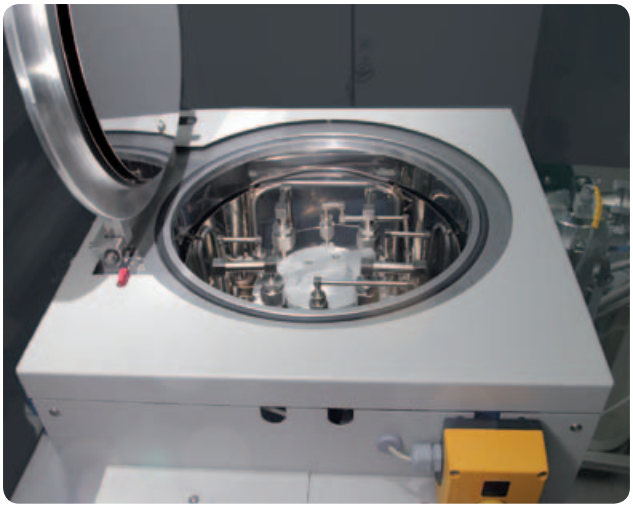
In research, technical reliability and repeatability is of an essence. Also, flexibility in terms of trial setups and process variations is of great importance. Hence, we designed the TFS 200R to be a robust research tool, easily and quickly modified to address different substrate and process requirements.

Features of the TFS 200R include:

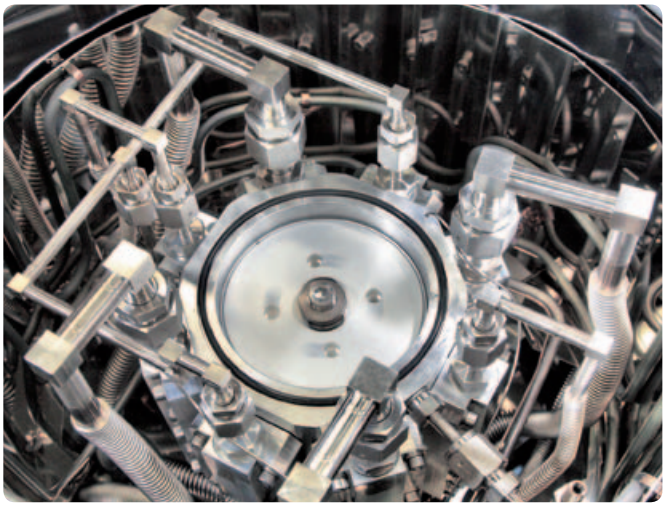
- Cold-wall vacuum chamber for rapid heating and cooling.
- Auxiliary entry ports in vacuum chamber enable *in situ* diagnostics etc.
- Heated substrate and gas feed assembly for uniform substrate temperature and prevention of precursor condensation.
- Class 100 (ISO 5) clean-room compatibility.
- The precursor source configuration, capable of handling gases and liquids, allows for easy, inert change of precursors.

Safety

Beneq takes pride in manufacturing equipment that encompasses ease of use and safety for its users, be that scientist, operator or maintenance personnel. All functions of the TFS 200R are controlled by programmable logic control (PLC) and additional EN safety relays. HMI user interface and data logging are provided for by a PC.



TFS 200R with vacuum chamber lid open.



Rotating substrate holder surrounded by eight linear gas nozzles.

TFS 200R, 1/2012

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