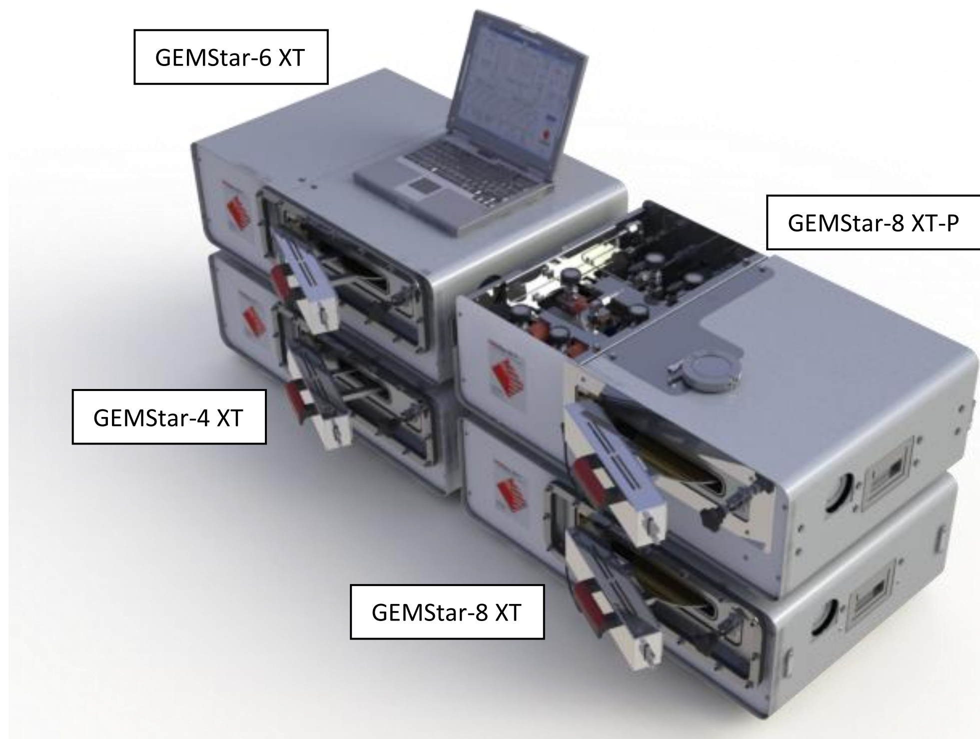
Introducing the Next Generation ARRADIANCE® GEMStar XT™ Benchtop ALD Platform

Including 8”, 6” and the new 4” ALD systems, plus Plasma ALD capability



Powerful Compact Economical Reliable

Molecular Innovation™

GEMStar XT™ ALD Platform

The GEMStar XT platform is the next generation of the popular GEMStar line of full-feature, benchtop Atomic Layer Deposition Systems.

Now available in 8”, 6”, and our new, economical 4” reactor, GEMStar XT combines the power of GEMStar with many enhanced features and industry leading compact design that makes GEMStar XT the ideal choice for any research or pilot production need.

ARRADIANCE® GEMStar ALD systems deposit insulating, metal and semiconductor films with superior electrical, passivation and barrier properties. They are designed for uniform, conformal films on planar as well as high aspect ratio structures on a broad range of substrate materials and sizes.

Retains Key Features of GEMStar

- Compact, benchtop size.
- Reaction chamber fits up to 8” (200mm) wafers, or 3D objects up to 1.3” (33mm) tall.
- 300°C hot wall design with convective heating to achieve ±1°C temperature uniformity across the substrate (optional heated chuck allows higher process temperatures up to 500°C).
- 8 high-speed ALD valves connected to 2 external gas lines and 6 bottles, provide the flexibility to process up to 8 precursors.
- 2 heated bottles (4 heated optional) and an inert gas-assist line for low vapor pressure precursors.
- Showerhead gas delivery with a horizontal linear array of injectors ensures uniform gas distribution over the entire reaction chamber.
- Exposure control with a downstream vacuum stop valve for conformal ALD films on high aspect ratio structures, 3-D objects and powders.

Adds Powerful New Features and Flexibility

- GEMStar-8 XT-P plasma-ready system allows top-down, remote ICP Plasma ALD capability which can be retrofitted.
- Metalorganic and Oxidizer/Reducer precursor manifolds with maximum temperature of 200°C
- Larger optional KF50 heated vacuum line for high pumping speeds and shorter cycle times.
- Convenient Glovebox interface option available on all GEMStar XT systems.
- Software with enhanced safety and usability.

GEMStar Operational Control

The Arradiance System maintains complete control over key deposition parameters such as temperatures, exposure, pulse, purge, background pressure.

- Precursor temperature is precisely controlled with increasing temperatures from bottle to manifold to reaction chamber, to avoid condensation of gases in the precursor lines.
- Metalorganic and oxidizer/reducer precursors are mounted on separate manifolds in GEMStar-6 and 8, increasing the lifetime of valves and eliminating film deposition on manifold walls.
- High-speed ALD valves ensure precise precursor dosage for atomic scale film thickness control and nanolaminate structures.
- Quick flow manifold and high conductance foreline yield fast purge and shorter cycle times.
- Standard KF40 metrology port allows attachment of optional QCM or particle coater.
- Internal GEMStar USB control module.
- User created and saved recipes allow flexibility and batch-to-batch consistency.
- Diagnostic system logging creates traceable data of all system parameters during all runs.

Easy Maintenance

Simplified system maintenance results from:

- Convenient and ergonomic benchtop access from the top and back to critical parts, vacuum, power and gas connections.
- Easy top access to precursor delivery system for swapping out precursor bottles.
- Modular system design allows for easy service and cleaning of parts, with minimal down time.
- Exhaust gases are flowed through a thermal decomposition trap prior to the vacuum pump.

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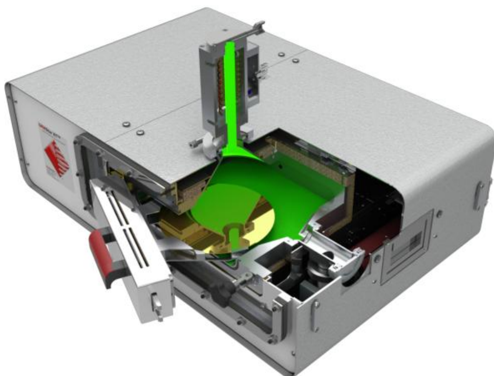
GEMStar XT™ ALD Platform

System Specifications	
Substrate size	GS-4 XT: up to 4" (100mm) wafer or square substrate GS-6 XT: up to 6" (150mm) wafer or square substrate GS-8 XT: up to 8" (200mm) wafer or square substrate All systems can fit up to 1.3" (33mm) tall 3D solids, or a stack of 5 or 9 wafers
System Dimensions (w x d x h)	32" x 25" x 12" (82cm x 64cm x 31cm) – fits on standard desktop or lab bench.
System Weight	150 lbs
Deposition Modes	Dynamic flow for high speed and low aspect ratio deposition. Static flow for conformal deposition on high aspect ratio features and powders.
Control System	GEMFlow™, Windows® based software suite with advanced GUIs. Import/export of Excel compatible recipes and data. Internal GEMStar USB control module.
Substrate Temperature	25°C – 300°C < ± 1°C up to 8" wafer
Deposition Uniformity	< ± 1 % (1σ) within wafer (Al_2O_3 from TMA and H_2O) < ± 2 % (1σ) batch-to-batch (Al_2O_3 from TMA and H_2O)
Shell / Cabinet	Stainless Steel with removable top panels and rear facilities interface
Compliance	CE, CSA
System Options	Glovebox Interface 500°C Heated Chuck Ozone Generator module Thermal Abatement Unit Pump Package GS-6 XT and GS-8 XT upgradeable to Plasma Enhanced ALD
Precursor Specifications	
Precursor Handling	GS-4 XT: 4 ALD precursor valves standard (2 metalorganics, 2 oxidizers) GS-6 XT & GS- XT: 8 ALD precursor valves standard (4 metalorganics, 4 oxidizers)
Precursor Thermal Control	Up to 200°C heated manifolds and 2 heated sources standard (up to 4 optional)
Inert Gas Assist	1 metalorganic source with inert gas assist for ultra low vapor pressure precursors
ALD Valves	High-speed, 2-way ALD valves with 10msec actuation, integrated into manifold
Precursor Cylinders	150cc, DOT certified, stainless steel cylinders with manual shut-off valves
Carrier/Purge/Vent Gas	N2, high-speed MFC, 200sccm
Facilities Specifications	
Gases	80 ± 5 psi regulated Clean Dry Air (1/4" Swagelok) 20 ± 5 psi High purity N_2 (>99.999%); N_2 purifier recommended 5 – 20 psi Process Gas supply
Power	110 – 120 VAC; 50/60Hz; 20 Amps IEC C19 20 Amp AC plug/connector
Vacuum	Recommended 2-stage, rotary vane vacuum pump. >12 cfm pumping capacity with NW25 sized foreline (Edwards E2M18).

GEMStar XT™ ALD Platform

GEMStar XT Benchtop Product Line	GS-4 XT	GS-6 XT	GS-8 XT	GS-8 XT-P
Reactor Type	Thermal ALD	Thermal ALD	Thermal ALD	Thermal ALD Plasma Ready
End Effector (Single Layer) Optional Batch Layers – STD Si Wafer Custom End Effectors Available On Request	100 mm DIA 5	150 mm DIA 5	200 mmDIA 5	200 mm DIA 5
Max Process Temp, °C Optional Heated Platen (Single Layer)	300 -	300 500	300 500	300 500
Material GAS Manifolds	1	2	2	2
ALD Valve/Ports Total Single Vapor Push (Assist) Port	4 STD	8 STD	8 STD	8 STD
Maximum Manifold Temp, °C	200	200	200	200
Material Bottles 150cc DOT Certified Option	0 Up to 4	3 Up to 6	3 Up to 6	6
Material Bottle Heating Zones 175 °C Option	0 2	2 4	2 4	2 4
External GAS Ports With ON/OFF Ball Valve Option	0 Up to 1	1 Up to 4	2 Up to 4	2 Up to 4
Vacuum Pump Port Option	KF25 KF50	KF25 KF50	KF25 KF50	KF50
Metrology Port	KF40	KF40	KF40	KF40
Laptop With GS SW pre-installed	Option	STD	STD	STD
Glove Box (EFEM) Interface	Option	Option	Option	Option
Base System Power	120VAC/20A	120VAC/20A	120VAC/20A	120VAC/20A
Ozone System	Option	Option	Option	Option
Plasma System	-	Upgradeable	Upgradeable	Option



- Top-Down Remote ICP Plasma Option Yields Excellent 8” Uniformity and Film Quality

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