Pioneer 120 Advanced Pulsed Laser Deposition System

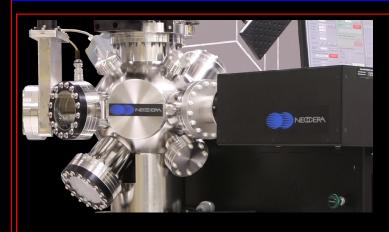


- Stand-alone turn-key PLD System.
- Deposition of epitaxial films, multilayer heterostructures and Superlattices.
- Deposition of nanoscale thin films using *insitu* RHEED diagnostics.
- Oxygen compatibility for oxide film depositions.
- Upgrades: Load-lock, Laser Heater, RF/DC Sputtering, Combinatorial PLD,
- Integration with XPS and ARPES UHV Cluster tools.



10 000 Virginia Manor Road Beltsville, Maryland 20705, USA. Phone: (+1) 301-210-1010, FAX:(+1) 301-210-1042 www.neocera.com

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ubstrate Back-side Temperature Target Setpoint Percent Power Mode	0 0 0 0.0 Auto	Multiple Step Heating Program	Automatic Reset / Shut-off Ramp Down Heater(s) After Time Remaining 00.00:00 Automatically Tum Off Turbo Heater When Done No	Engage Abort
Control Type Setpoint 🚽 Ramp Rate 🚽 % Power Output 🚽 Status		Start Abort % Reset Controller	Turbe Heater (Pfeiffer) Control Heater Status Off Heater (001) On	Update
ubstrate Front-sid Temperature	e Heater Control		Chamber Bakeout Heater Control Temperature 0 Target Setpoint 0	
Control Type Setpoint Ramp Rate Status	Ramp Rate Temperature	Start Abort Reset Controller	Control Type Ramp Rate Temperat Setpoint 9 0 Ramp Rate 9 20.0 deg/m	Abort

Deposition Chamber

- 12" diameter spherical chamber
- 4.5" CF UV grade silica laser port.
- 4.5" CF port for RHEED gun.
- 6" CF port for RHEED screen.
- 6" CF pumping port.
- 6" CF port (for RF / DC Sputtering)
- 2.75" CF port for vacuum gauge.
- 8" CF port for substrate heater stage.
- 8" CF port for target carousel stage.
- Additional 2.75" and 1.33" CF ports.
- Access door on hinges (non-UHV).

Programmable Radiative Substrate Heater

- Substrate temperature: 850°C (max).
- Substrate rotation:1-30 RPM (360° substrate rotation, compatible with future RHEED upgrade.
- Substrate size: 2-inch diameter (max), minimum dimension : 10 x10 mm².
- Substrate sizes compatible with future load-lock upgrade.
- Heater temperature is controlled by a programmable PID controller
- Heater is oxygen compatible up to 1 atmosphere of oxygen.
- Heater is top-mounted with substrate surface facing and parallel to ground.
- Pre-ablation shutter is included.
- K-type thermocouple provides input to the PID controller.
- The controller is integrated with Neocera System software (Labview 2013).



Pioneer 120 Advanced Pulsed Laser Deposition System



- Target indexing, target rastering and target rotation are controlled by Lab-VIEW 2013 software, facilitating multilayers and superlattice depositions.
- Software controls external triggering of the laser-facilitates nano-scale thin film growth control.
- Software provides continuous composition spread of binary and ternary phase spreads (optional).

Multi-target Carousel

- Six 1-inch diameter targets or three 2-inch diameter targets.
- Target rotation, 360 degrees continuous (1-20 RPM).
- Target rastering (max 100 degrees/ sec) for uniform ablation over the entire target surface.
- Target indexing for multilayers.
- Target height is adjustable (manual adjustability
- Target shield protects targets from cross-contamination.
- Ideal for depositing epitaxial films, multilayers and superlattices.
- Unique target rastering protocol. Unique carousel design will facilitate Continuous Composition Spreads/ Combinatorial PLD.

Motor Has Been Home Home Target or Angle Specific Angle Desired Angle 0.0 Raster Type Specific Angle Start Angle 0.0 Raster Motor End Angle O	d 0.0 Rotate 0.0 Stop Motor rget AC Rotation Motor	
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Positive Raster 0.0 Rotation Motor		
Velocity (1) 10.0		
	Stop Rotation	
Manual Rotation 0 0 Engage Pushbutton Control		_
Spin Speed	Positional Offsets Save Change	es
Keep "Motor Has Been Homed" While Spinning at Constant Velocity	• () 60.0 60.0 • () 120.0 120.0	
Target Carousel Motor Feedback		
Position (deg) 0.0 Target Siz	Empty	
Malasily (destant)	der and Can 2 3	
Accept a T Empty Holo Cannot Acc		4
Target Carousel Home Offset	jet	
Home Offset -2.5 -2.5 Save Carousel (deg) 2 Inch Targ	et 6 5	
Reset Controller/ Motor Controller Enabled O Clear Error Motor Protection Program Activated	Done	

Vacuum Pumping Package

- All-dry vacuum pumps:Turbomolecular pump backed by dry mechanical pump.
- Minimum base pressure: 8 x 10⁻⁸ Torr in standard PLD systems, 5 x 10⁻⁹ Torr in UHV PLD systems.
- Turbo-speed is controlled by software.

Pressure Measurement and Control

- Wide range vacuum gauges for pressure measurement from atmosphere to $5 \ge 10^{-9}$ Torr.
- MKS Mass Flow Controllers are integrated with PLD System software. Flow rate~100 SCCM for Oxygen.
- Closed loop deposition-pressure control.

Vacuum Control						_ 0			
Turbopump Operations Contro	1			Additional Feedback					
Actual Rotation Speed (309)	0 Hz		Operating Hours (314)	0	Hours				
Final Rotation Speed - TMP (315)	0 Hz		Operating Hours - TMP (311)	0	Hours				
Percentage of Max. Speed (707)	50.0 %		Oil Deficiency (301)	No					
TMP Speed Control (026)	Final Rot. Speed	Final Rot. Speed	Update	Motor Current (310)	0.0	Amps			
Set Rotation Speed (308)	1000	0 Hz	Update	Software Version (312)	0				
Pumping Station Control (028)	Computer	Panel	Update	Cycle Counter (319)	0				
Pumping Station Status (010)	On	Off	Update	Error Reporting					
Op. Mode Backing Pump (025)	Intermittent	Non-Stop	Update	Acknowledge Error 🤇	Ack.				
Standby (002)	On	Off	Update	Error Code (303)					
T				Past Error Code 1 (360)					
Turbopump Vent Control Venting Mode (030)	Do Not Vent	Automatic		Past Error Code 2 (361)					
				Past Error Code 3 (362)					
Venting Frequency (720)	3 40	40 %	Update	Past Error Code 4 (363)					
Venting Time (721)	6	6 Sec	Update	Past Error Code 5 (364)					
				Past Error Code 6 (365)					
Run-Up Time / Switchpoint Co	Past Error Code 7 (366)								
Run-Up Time Monitoring (004)	On	Off	Update	Past Error Code 8 (367)					
Maximum Run-up Time (700)	3	1 Min	Update	Past Error Code 9 (368)					
Rotation Speed Switchpoint (701)	50	50 %	Update	Past Error Code 10 (369)					
Command Status Ready to accept command Communicating with Vacuum Controllier									



P120 Advanced PLD System with Laser heater



PLD System Software

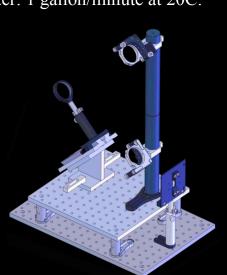
- Windows 7, LabVIEW 2013
- Controls substrate heating stage.
- Controls target carousel stage.
- Controls vacuum pumping stage.
- Controls Mass Flow Controllers.
- External laser triggering.
- Optional process automation.

PLD System Utilities:

- Power: 110/220V, 20A, 1 Phase.
- Water: 1 gallon/minute at 20C.

PLD Optics Package (KrF Excimer Laser)

- 45° and 22.5° degree Laser Mirrors for 248nm.
- Plano-convex Lens for 248nm. The focal length is approximately 50 cm.
- Adjustable Aperture.
- Anodized aluminum breadboard for mounting optics.
- Stable kinematic mounts for laser mirrors and lens with maximum clear aperture and wide angular range.
- A complete set of mounting rods, base plates.
- Light-tight enclosure to protect users from laser radiation.



For further information, please contact: sales@neocera.com or +1-301-210-1010, ext 104