

OPTIvap

STAND ALONE OR GLOVEBOX INTEGRATED PVD PLATFORM



- Flexible, modular system
- Stand-alone (S) or glovebox integrated (G)
- Building block for cluster tool
- Multi-substrate & multi-mask processes
- Standard uniformity: +/- 3 % (with specific geometry design up to +/- 1 %)
- Substrate size up to 100x100 mm or diam. 100 mm (4") for OPTIvap 4
- Substrate size up to 150x150 mm or diam. 150 mm (6") for OPTIvap 4 and 6
- Substrate size up to 200x200 mm or diam. 280 mm (8") for OPTIvap 6
- Applications:
 - Complex multilayer devices (OLED, OPV)
 - Optical layers
 - Semiconductor, PV

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VACUUM CHAMBER AND PUMP STACK

VACUUM CHAMBER	OPTIvap 4S (G)	OPTIvap 6S (G)
Type	Rectangular design Replaceable bottom and rear flange for easy customization	Rectangular design Replaceable bottom and rear flange for easy customization
Chamber material	Stainless steel	Stainless steel
Size (inner Dimensions, WxDxH)	400x414x500 mm	600x600x600 mm
Front Door (Outer with Glovebox)	Hinged door with interlock switch	Hinged door with interlock switch
Back Door, only present when glovebox integrated (Inner with Glovebox)	Horizontally opening sliding door	Horizontally opening sliding door
Viewing port	Incl. disposable transparent cover	Incl. disposable transparent cover
Max. size substrate	<150x150 mm *	<200x200 mm *
Max. size wafer	D=150 mm *	D=280 mm *
Max. source number	8	14
Protection	Liner and shielding available	Liner and shielding available
Chamber illumination	Available	Available
Glovebox integration	Available	Available

* Technical note: may vary upon wedge shutter configuration

Pump Stack	OPTIvap 4S (G)	OPTIvap 6S (G)
Basic Pre-vacuum pump	Dry pump 11,4 m ³ /h (6,7 cfm)	Dry pump 28 m ³ /h (16,5 cfm)
Pre-vacuum upgrade	Dry pumps up to 35 m ³ /h	Dry pumps up to 35 m ³ /h
Basic High-Vacuum pump	Turbo-molecular pump up to 400 l/s	Turbo-molecular pump up to 800 l/s
High-Vacuum upgrade	Turbo-molecular pump up to 1200 l/s or Cryo-pump	Turbo-molecular pump up to 1200 l/s or Cryo-pump
Vacuum Bypass	With or without gate valve	With or without gate valve
Cool Trap	LN2 based w/ or w/o level control and reservoir	LN2 based w/ or w/o level control and reservoir
High-vacuum measurement	PIRANI and PENNING vacuum gauge head	PIRANI and PENNING vacuum gauge head
Control	PLC-controlled	PLC-controlled



SOURCES SHUTTER	SUBSTRATE SHUTTER
Dedicated source shutter for each source	Standard single rotational shutter, pneumatic operated. Standard configuration for cut-off of material flux for well-defined layer thicknesses
Rotational shutter, electro-magnetic operated. Shutter plate outside material flux during deposition: reduced coating, easy to remove & clean	Split type rotational shutter, pneumatic operated. Required for large substrates and special configurations
-	Wedge shutter available
Shutter PLC operated	Shutter are PLC operated

PROCESS CONTROL



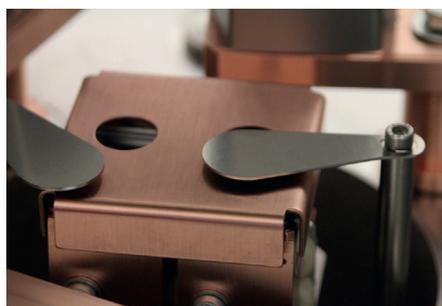
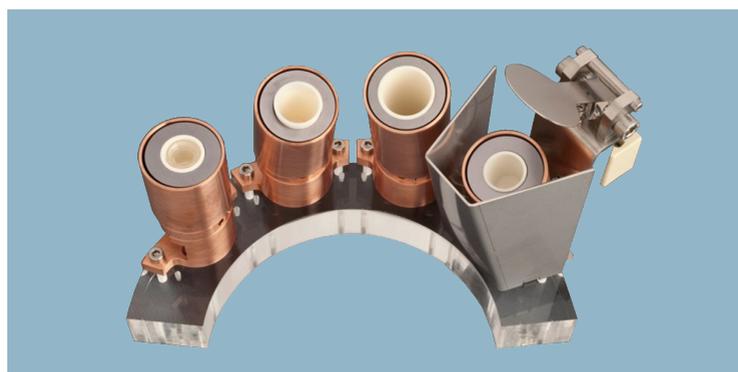
QUARTZ CONTROL MONITOR	RATE MONITOR	RATE CONTROLLER	PC-CONTROL
Incl. feedthrough and installation adapter, the quartz sensor stays always at the same position, fixed position then fixed "tooling"	SQM-160 (2 channels or 4 channels)	SQC-310 (4 channels)	4 channels (standard) + 4 channels (upgrade)
Water-cooled	For manual control	Incl. co-deposition	Full integrated process control with recipe control software management
Up to 2 sources are operated by one QCM	Budget solution for manual rate control and total thickness control	In combination with temperature and/or power control of sources	User friendly visualization, Windows based PC Control
Fast installation and process start	-	Required for co-deposition process, in combination with PLC controller, allows predefined single layer processes	Full user friendly process control of rate and thickness incl. simple recipe-based deposition processes
Reproducible tooling	-	Max. 2x SQC-310 (4+4 Channels)	Incl. data acquisition, visualization and storage in csv-file
-	-	-	Allow simple recipe-based deposition processes

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SOURCES

	THERMAL EVAPORATORS	E-BEAM	SPUTTER	LOW TEMPERATURE EFFUSION CELLS	HIGH TEMPERATURE EFFUSION CELLS
Source description	Boat-type THE * Special ceramic boat for CTHE *, gives a longer life time of the boats	Direct heating of material to be evaporated	Sputter process generating high energy particles by a ion bombardment of a target	Fast cool down and excellent temperature stability at low temperatures	Fast cool down and excellent temperature stability
Max. source number for OPTIvap 4	4	1 single or multi-pocket source	4 magnetrons	8	8
Max. source number for OPTIvap 6	6	2 single or multi-pocket source	4 magnetrons	12	12
Power	Temp. range up to 1800°C (depending on boat-type)	3 KW	RF Sputtering (up to 750W) or DC and pulsed DC (HV up to 1000 VDC, up 1500 W)	Temperature range: 50°C- 800°C	Temperature range: 300° - 1400°C
Cooling	On Water-cooled feed-throughs	Water cooling	Integrated and indirectly water cooling	Water cooling	Water cooling
Capacity	High flexibility: boats, baskets, boxes	Up to 4 cc with OPTIvap 4 and 8 cc with OPTIvap 6	Up to 4x2" magnetrons with OPTIvap 4 and 4x3" with OPTIvap 6	Capacity: 2 cc, 4 cc or 8 cc	Capacity: 4 cc, 8 cc
Materials	For metals (e.g. Al, Au, Ag, Cu ...) and high temperature compounds (e.g. LiF)	High temperature materials (Ti, W, SiO ₂ , TiO ₂ , Si, etc.)	For metals, alloys and compounds (e.g. Al, Ti, ITO, ... many others)	For low temperature (organic) compounds (e.g. Alq ₃ , C60, MoOx ...)	For metals (e.g. Al, Au, Ag, Cu, ...) and high temperature compounds (e.g. LiF)
Shielding	Individual shielding for each source: low cross-talk	-	-	Individual shielding for each source: no cross-talk	Individual shielding for each source: no cross-talk
Control	SCR power control	Incl. E-Beam evaporation controller (sweep control, filament current, pocket indexer)	Incl. supply and controller, use a switch device to combine 2 sputter sources using same power supply, Up and down stream control as supply gases	Precise temperature control, resolution +/- 0.1 K	Precise temperature control, resolution +/- 0.1 K
Additional features	Combined with source shutter	E-Beam requires special view port to block generated UV-light	Sputter process requires low source-substrate-distance, uniformity on substrate up to +/-5 %	Standard crucible: alumina	Standard crucible: alumina
Additional features	For CTHE, processes with low source capacities 1 or 2 cc (thin layers)	High deposition rates	Limited combination with thermal sources	Optional: crucibles with various materials and shapes	Optional: crucibles with various materials and shapes
Additional features	Dual configuration available incl. combination of THE and CTHE	Limited combination with Thermal sources	Parallel option only on request (co-sputtering)	True measurement of crucible temperature (low offset)	True measurement of crucible temperature (low offset)

* Technical note: THE= Thermal Evaporator, CTHE= Ceramic Thermal Evaporator



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MASK/SUBSTRATE TOOLS

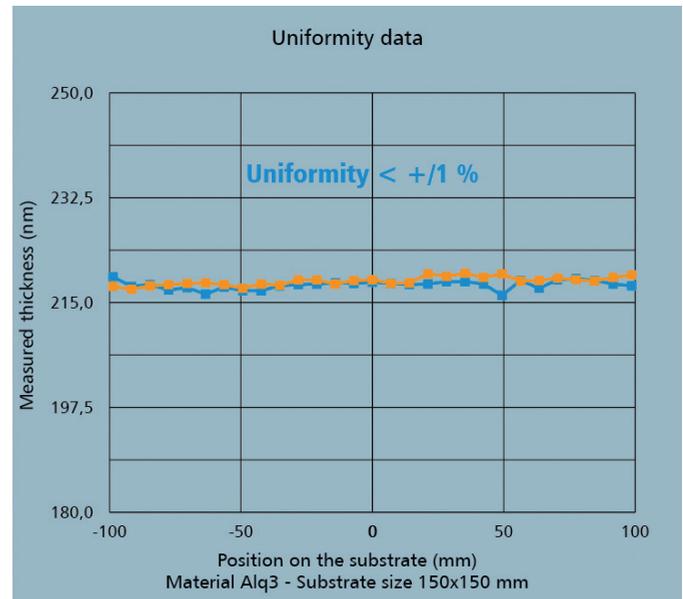
SUBSTRATE ROTATION	SUBSTRATE AND MASK CARRIERS		SUBSTRATE HEATING
	TYPE I	TYPE II	
0-30 rpm, PLC-controlled	Basic substrate carrier	Advanced substrate carrier	Back side heating
Uniformity: +/-3 %	Budget solution if no requirement for alignment and feature size	Fixture between mask and substrate carrier, pin-pin alignment (up to +/- 100 µm)	Type I: Quartz lamp heater up to 200°C
Uniformity on request: +/-1 %	Easy to handle, manual loading/unloading	Easy to handle, manual loading/unloading	Type II: IR ceramic heater up to 500°C
Substrate size for OPTIvap 4: ≤100x100 mm or Ø≤100 mm (4")	Mask carrier: metal sheet	Thin metal mask (100 µm up to 200 µm)	Type III: HEAT/COOL LOW from -10°C to 100°C, with heat exchange fluid (Chiller), requires heat spreader
Substrate size for OPTIvap 4 and 5: ≤150x150 mm or Ø≤150 mm (6")	Masks can easily be made on customer request	Contact or non-contact mask	Type IV: HEAT/COOL HIGH from room temperature to 300°C, with water cooling, fast cool down, local heating, requires heat spreader
Substrate size for 5S: ≤200x200 mm or Ø≤200 mm (8")	May be used in combination with many heating stations	Accepts heat spreader	Heat spreader allows high temperature uniformity < +/- 3%

STORAGE/TRANSFER OF MASK AND/OR SUBSTRATES

Automated storage and transfer of mask and/or substrate carriers	5 level storage for single carrier stack (mask or substrate)
Multi-substrate and multi-mask processes without breaking vacuum (allows complex multi-layer devices)	

WEDGE TOOL

Movable shutter to address stripes on substrate	1D-single / 1D-dual / Sequential 2D (by 90° shift of substrate/mask stack vs. wedge tool (software option))
All in combination with other components (rotation, z-lift, heater options etc.)	Allows to optimized composition and layer thickness for complex multi-layer devices



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