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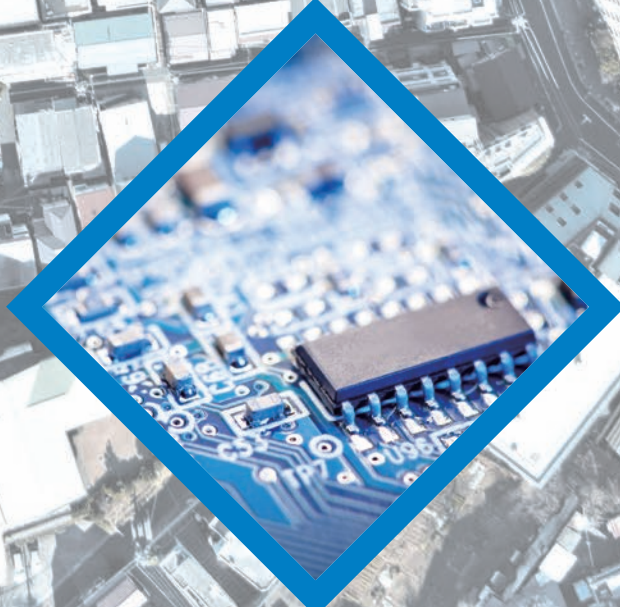
ELECTRONIC  
DEVICE

**ULVAC**



# ADVANCED ELECTRONICS EQUIPMENT APPLICATION

The Electronic Device Industry is a key contributor to the IoT society.  
The IoT industry makes life easier, more convenient  
and will change the way the world functions.  
ULVAC develops Vacuum Technology which is essential  
for the manufacturing of electronic components.  
These vacuum systems serve various industries  
and can be used for either R & D or high-volume manufacturing.



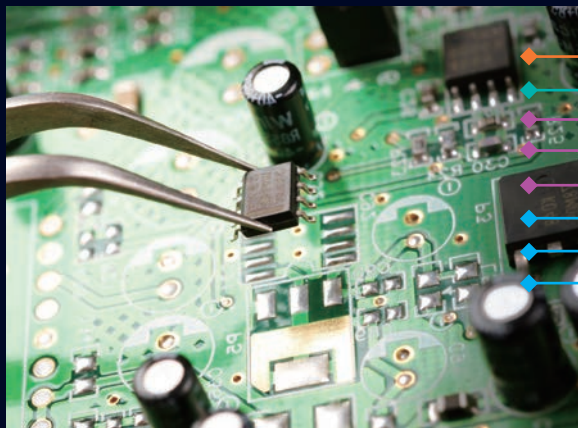


Electronic Device for Production



ULVAC Electronic Device  
Product Line-UP

Advanced Packaging Device



Sputtering	P.7-9
◆ SME Series, MLX-3000N ◆	
◆ SRH Series ◆	
◆ SIV, SIH Series ◆	
◆ ULDiS Series ◆	
MPS Series	
CS-200N	
SX Series	
◆ SV, SDH Series ◆	
◆ SMV Series ◆	
CS-S	
ACS-4000	

Ion Planter	P.11-12
◆ IH-860 ◆	
IMX-3500	
SOPHI-200/260	
SOPHI-400	
◆ SOPHI Series ◆	

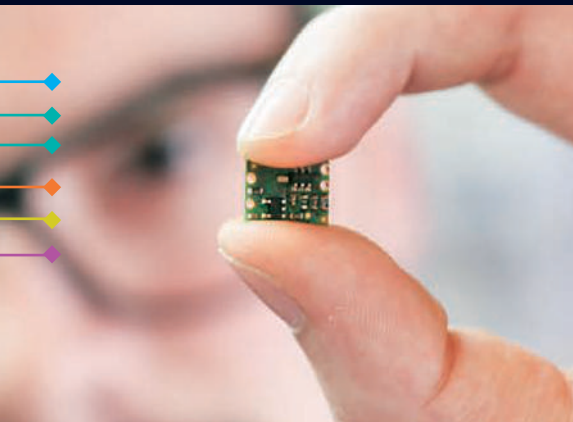
Vacuum Evaporation	P.10
◆ EI Series ◆	
EVD	

Ashing	P.13
◆ NA Series ◆	
◆ NA-1500 ◆	
◆ NA-1300 ◆	

Etching	P.14
◆ NE Series ◆	
◆ NLD Series ◆	
◆ NE-950EX/INE-3085 ◆	
NE-550EX	

CVD	P.15
◆ CME Series ◆	
CC-200/400	

MEMS Device



Optical Device





## Power Device



## LED Device



# ULVAC Electronic Device Product Line-UP

## Electronic Device for R&D



Sputtering	P.7-9
SME Series	
SRH Series	
SIV Series	
ULDiS Series	
MPS Series	
CS-200N	
SX Series	
SV, SDH Series	
SMV Series	
CS-S	
ACS-4000	

Ion Planter	P.11-12
IH-860	
IMX-3500	
SOPHI-200/260	
SOPHI-400	
SOPHI Series	

Vacuum Evaporation	P.10
EI Series	
EVD	

Ashing	P.13
NA Series	
NA-1500	
NA-1300	

Etching	P.14
NE Series	
NLD Series	
NE-950EX/INE-3085	
NE-550EX	

CVD	P.15
CME Series	
CC-200/400	

And More	P.16
CE-S	
NE-550EX	
CV-200	
CN-CVD-400	

## Thin-film Lithium Ion Secondary Battery





# Sputtering system

ULVAC offers a wide range of sputtering systems with a proven track record.



SME-200

## Multi-Chamber Sputtering System

### SME Series (For electronic device), MLX-3000N (For semiconductor)

Wafer size: Up to 200mm

#### Features

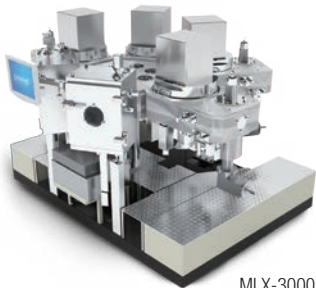
- Cluster type system which can be used for various types of deposition.(Metal, PZT,BST, ALN, SiNx,Al2O3)
- Multi-chamber type sputtering system capable of installing multiple process chambers (up to 3 for 200E, up to 5 for 200J, and up to 7 for 200).

	SME-200E	SME-200J	SME-200	MLX-3000N
Configuration				
Load lock Chamber	Square	Hexagon	Octagon	Hexagon
Process Chamber	Max 3 chambers	Max 5 chambers	Max 7 chambers	Max 4 chambers
Auto loader		✓	✓	✓
Cassette Chamber	✓	✓	✓	✓ *1
Transfer robot	Single hand	Double Pick	Double pick & hand	Double Pick

\*1:Replacing Cassette chamber to Degas Chamber is possible.



SME-200E



MLX-3000N

## Load-lock Type Sputtering

### CS-200N

Substrate transfer capability: Up to 300mm  
(Deposition performance: Up to  $\phi$ 200mm)

#### Features

- R & D Loadlock sputtering system.  
Suitable for R & D, and small volume production.
- Maximum 4 cathodes.
- Co-Sputtering and/or multilayer deposition.
- Preclean available in-situ with bias power supply.
- Adjustable T/S (Target & Substrate) distance between 60mm and 180mm.



CS-200N



SMV-650

## Vertical cluster Sputtering System

### SMV Series (Including SMV-500F, SMV-650)

Substrate size: 500mm□ standard, 650mm□ maximum

#### Features

- Pass-by deposition or static deposition.
- Low particle level by vertical deposition.
- Double-sided deposition increases productivity.
- Automatic production is available via a stocker chamber.
- High-speed and low-temperature deposition.

## Interback Vertical Sputtering System

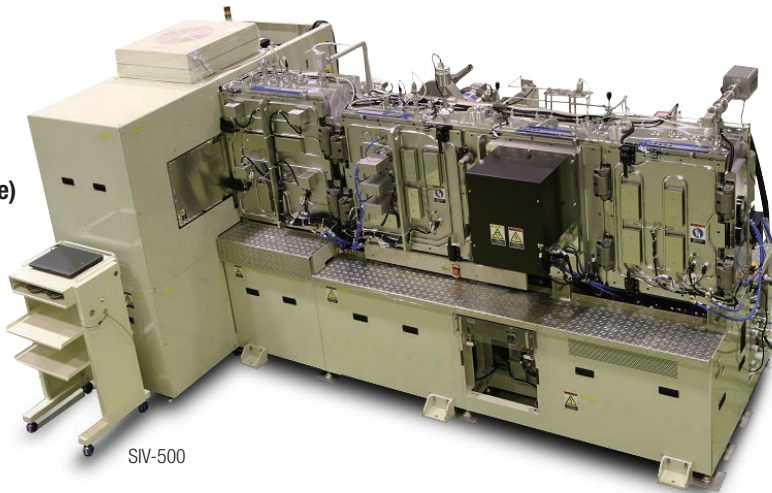
### SIV series (Vertical transfer type)

### SIH series (Horizontal transfer type)

Substrate size: 500mm□ standard  
minimum 200mm□~standard 500mm□

#### Features

- Low cost pass-by deposition.
- Low particle level by vertical deposition.
- Double-sided deposition increases productivity.
- Automatic production is available via a stocker chamber.



SIV-500

## Rotating Drum Type Sputtering System

### SV, SDH series

<SV-4540>

Carousel size:  $\phi$ 450mm×H350mm

Deposition effective length: 300mm

<SV-9040>

Carousel size:  $\phi$ 900mm×H350mm

Deposition effective length: H300mm

<SDH-4550>

Carousel size:  $\phi$ 450mm×H465mm

Deposition effective length: H400mm

#### Features

- Rotating drum type sputtering system can produce various electronic devices.
- Small Foot Point → System Size (Model Name: SV-4540):3.3m × 4m.



SV-9040

Item	SV-4540	SV-9040	SDH-4550
Maintenance door	Top lid lifting	Side door	Side door
Carousel size (Deposition effective length)	$\phi$ 450 × H350 (H300)	$\phi$ 900 × H350 (H300)	$\phi$ 450 × H465 (H400)
Cathode size	5" × 18"	5" × 18"	5" × 23"
Number of mounted cathodes	Up to 3	Up to 6	Up to 3
Cathode type	Non-magnetic Magnetic ITO	Non-magnetic Magnetic ITO	Non-magnetic Magnetic ITO
Sputtering power supply	DC,RF	DC,RF,AC	DC
Substrate heating (Option)	150°C	150°C	150°C
Substrate pretreatment (Option)	LIS	LIS	LIS
Substrate bias (Option)	RF reverse Sputtering	RF reverse Sputtering	N/A
Substrate reverse (Option)	N/A	Available (Carousel size change)	N/A



# Sputtering system

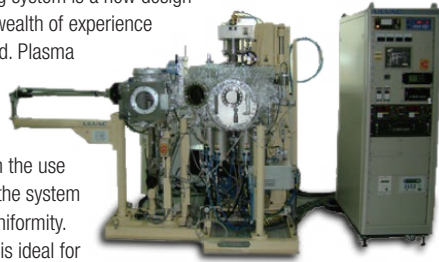
ULVAC offers a wide range of sputtering systems with a proven track record.

## Ultra-High Vacuum Sputtering System for R&D

### MPS Series

#### Features

The MPS series sputtering system is a new design developed based on our wealth of experience and extensive sales record. Plasma discharge pressure can be maintained lower than conventional sputtering, and along with the use of long throw sputtering, the system is capable of very good uniformity. The angle of the cathode is ideal for Co-sputtering and multilayer films.



MPS Series

## Compact Sputter Sputtering System

### ACS-4000

#### Features

The ACS-4000 is designed for the R & D industry and for the development of multi-layer thin films, compound materials and other technology. The system can handle up to 4 inch substrates and comes equipped with automatic process operation.



ACS-4000

## High Productivity Sputtering System

### SRH Series

#### Features

SRH Series is a high volume PVD system for the deposition of metallic films required in the power device, WL-CSP, UBM or similar applications.



SRH Series

## Batch-type Sputtering System

### SX Series

#### Features

Batch-type Sputtering System SX series is for batch type sputtering system for research & development and small production application.



SX Series

## Load Lock Type Compact Sputtering System

### CS-S

#### Features

Load lock type compact sputtering system CS-S supports various materials for R & D and Mass production equipment.



CS-S

## Sputteing System for Optical Filters and Coating

### ULDiS Series

#### Features

The ULDiS sputtering system is designed specifically for optical applications. ULVAC has signed a license agreement with JDS Uniphase Corporation in the U.S (license MetaMode®). This system is capable of depositing materials for high-quality optical filters and coatings.



ULDiS Series

# Evaporation system

ULVAC has delivered more than 3000 evaporation systems.

## Batch or Loard Lock Type High Vacuum Evaporation System

### ei Series

Substrate size:  $\phi 2$  to 6 inch Supports rectangular, Si, compounds, glass and ceramics substrates

#### Features

- Batch type system, available with loading chamber.
- 3000 delivered systems.
- Various evaporation sources can be loaded. (EB, RH, EB + RH)
- Substrate holders according to the process. (lift-off, planetary, satellite, etc.)
- Touch Screen LCD for system operation.
- Superior PC-operating system and functions. (Recipe, Data logging, Maintenance assist)



ei-7L (with loading chamber)



ei-5(Batch type)

## Batch type high Productivity evaporation System

### EVD

Substrate size:  $\phi 2$  to 8 inch

#### Features

- Batch type.
- Improved Lift-off function and increased number of loadable substrates.

#### Spec

Item	Description
Vacuum performance	Ultimate pressure: $3.0 \times 10^{-5}$ Pa or less Pumping speed: 20 min from atmospheric pressure to $3.0 \times 10^{-4}$ (Pa)
Sputtering performance	Film thickness uniformity: $\pm 5\%$ or less Incident angle: $< 10^\circ$ ( $\phi 4$ in)
Substrate heating performance	Max. temperature: $350^\circ\text{C}$ Temperature distribution: $\pm 10^\circ\text{C}$ or less
Capacity	282 pc/ $\phi 2$ in 87 pc/ $\phi 4$ in 36 pc/ $\phi 6$ in



EVD

#### Series List

	ei-5	ei-6	EVD	ei-7	ei-7L	ELX-2000
		batch type			Load-lock type	
Loaded number	24 pc/ $\phi 4$ in 8 pc/ $\phi 6$ in	24 pc/ $\phi 4$ in 8 pc/ $\phi 6$ in	87 pc/ $\phi 4$ in 36 pc/ $\phi 6$ in * Planetary only for this system	44 pc/ $\phi 4$ in 20 pc/ $\phi 6$ in	44 pc/ $\phi 4$ in 20 pc/ $\phi 6$ in	12 pc/ $\phi 4$ in 4 pc/ $\phi 6$ in
SS distance	680mm	1,000mm	730 to 750mm	900mm	900mm	600mm
Substrate holder	Revolution, Planetary or Satellite can be selected	Revolution, Planetary or Satellite can be selected	Planetary	Revolution, Planetary or Satellite can be selected	Revolution	Revolution
Incident angle (Lift-off)	$4.3^\circ \sim \phi 4$ in $6.4^\circ \sim \phi 6$ in	$3.0^\circ \sim \phi 4$ in $4.4^\circ \sim \phi 6$ in	$10^\circ \sim \phi 4$ in $15^\circ \sim \phi 6$ in	$3.3^\circ \sim \phi 4$ in $4.9^\circ \sim \phi 6$ in	$3.3^\circ \sim \phi 4$ in $4.9^\circ \sim \phi 6$ in	$4.9^\circ \sim \phi 4$ in $7.9^\circ \sim \phi 6$ in
Footprint	W2.0m* D3.0m* H2.0m	W3.0m* D3.0m* H2.5m	W2.3m* D3.0m* H2.0m	W2.3m* D3.0m* H2.0m	W5.5m* D4.0m* H2.7m	W3.2m* D3.0m* H2.3m
Features	• Both EB + RH evaporation types are available • Dual sensor (2 pieces) • Power supply and compressor are incorporated into the frame • Unified control on the operation panel • Logging function • large install base • Movable correction plate • Low power and high rate with W hearth liner	In addition to features of ei-5, • Improved lift-off with Long_SS • Low damage • Elevating dome	• Both EB + RH evaporation types are available • Dual sensor (2 pieces) • Lift-off type planetary style dome • Both Max. loading and lift-off are satisfied • Low damage • Unified control on the operation panel • Logging function • Movable correction plate • Low power and high rate with W hearth liner	• Increased number of loadable substrates • Low damage • Both EB + RH evaporation types are available • Multi-sensor (12 pieces) • Movable correction plate • Elevating dome • Unified control on the operation panel • Logging function • Low power and high rate with W hearth liner	In addition to features of ei-7, • Supports C to C (OP) • High Throughput (especially, heating process) • Material exchange (OP) • Unified control on the operation panel • Logging function • Movable correction plate • Low power and high rate with W hearth liner	• High Throughput (especially, heating process) • Both EB + RH evaporation types are available • Dual sensor (2 pieces) • Material exchange (OP) • Elevating dome • Unified control on the operation panel • Logging function • Movable correction plate • Low power and high rate with W hearth liner
Actual sales	499 From 2004	11 From 2005		27 From 2009	7 From 2009	3 From 2010
Processed number per hour	15 pc/hr/ $\phi 4$ in 5 pc/hr/ $\phi 6$ in	13 pc/hr/ $\phi 4$ in 4 pc/hr/ $\phi 6$ in	52 pc/hr/ $\phi 4$ in 21 pc/hr/ $\phi 6$ in	26 pc/hr/ $\phi 4$ in 12 pc/hr/ $\phi 6$ in	43 pc/hr/ $\phi 4$ in 19 pc/hr/ $\phi 6$ in	14 pc/hr/ $\phi 4$ in 4 pc/hr/ $\phi 6$ in

# Ion implanter

ULVAC has manufactured Ion Implanters for over 40 years, with over 700 systems in the field.

Ion Implanter

## SOPHI-30

Wafer size: Up to 200mm

### Features

- \* Advantages of SOPHI-30.
  - 1) High throughput ion implanter with low acceleration and high density.
  - 2) Half price as compared to conventional implanter.
  - 3) 1/3 the footprint of conventional implanter.



SOPHI-30

High-temp Ion Implanter

## IH-860SIC

Wafer size: 150mm

### Features

- Widely used in the SiC market.
- High-energy ion implanter.
  - 400KeV (monovalent)
  - 800KeV (divalent)
  - 1200KeV (trivalent)
- Dual Platen: Two platens that wafer can be loaded enable high-temp cooling implantation.



IH-860



SOPHI-260

Ion Implanter

## SOPHI-200/260

Wafer size: Up to 200mm

### Features

- Thin wafer transfer is available.
- Parallel beam.
- Medium current ion implanter.



IMX-3500

Medium Current Ion Implanter for R&D

## IMX-3500

Wafer size: Up to  $\phi 100\text{mm}$ (Option:  $\phi 150\text{mm}$  wafer)

### Features

- Compact footprint of 8.5m<sup>2</sup>.
- Includes safe solid type evaporation source.
- Equipped with "Computer software support function".
- By adapting optional substrate transfer robot, small volume production is possible.
- Optional high temperature platen is available.

Ion Implanter

## SOPHI-400

Wafer size: Up to 200mm

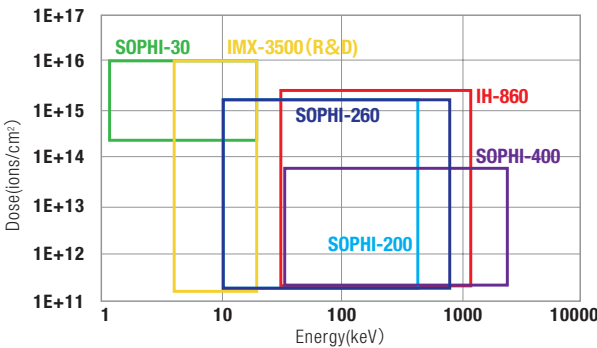
### Features

- Thin wafer transfer is available.
- Parallel beam.
- High energy: 2400keV



SOPHI-400

Application map





Ashing system

ULVAC offers environmentally-friendly, high-productivity technologies for resist removal, which is essential in production processes for electronic and semiconductor devices.



NA-8000

Ashing System

NA-1300  
NA-8000 (For wafer Level Packaging)

Wafer size: Up to 330mm

Features

- Low Temperature, Low Damage process.
- Micro wave down flow and/or RF bias.
- Able to handle warped as well as glass core and compound wafers.

Ashing System for Panel Lerel Packaging

NA-1500 Series (PLP)

Wafer size: Up to 600□

Features

- Cluster type.
- Micro wave down flow and/or RF bias.
- Can be used for Ti seed layer etching, descum as well as other processes for surface treatment.
- Supports new process other than ashing such as surface treatment or hydrophilic treatment.



NA-1500

	NA-8000	NA-1300	NA-1300S	NA-1300L	NA-1300D	NA-1500
Wafer	Φ2,3,4,5,6,8,12 inch & 330mm tray	Φ8,12 inch	Φ8,12 inch	Φ8,12 inch	Φ12 inch dicing frame	□500mm (available to □600mm)
Number of chambers	1 pc	2 pc	4 pc	Max 6 pc	2 pc	2 pc
Features	Low price system	Standard system for mass production	Low cost COO system	High throughput system for mass production	Treatment on dicing frame is available	Treatment on substrate size is available
Chamber type	① μ wave downflow method+Heater stage specification ② CCP plasma method ③ μ wave downflow+RF plasma method					
Process	① Descum process such as PR, PI, DFR, etc. ② Metal film/Organic film surface reforming ③ Metal film/Oxide film etching ④ Resist stripping after etching ⑤ Resist stripping after ion implantation					

Etching system

ULVAC has a large portfolio of etching systems.



NE-5700

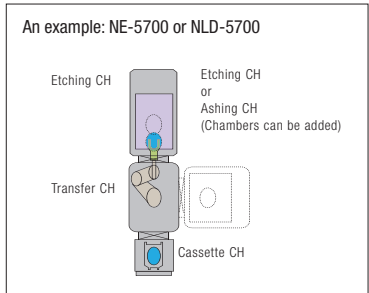
Dry Etching System for Production

NE Series

Wafer size: Up to 200mm

Features

- 600 systems are sold.
- Low Pressure with High density plasma.
- Standard STAR Electrode (ULVAC Patent), can avoid re-deposition to the top lid which extends the lifetime of the shields.



Plasma Source	Inductively Super Magnetron	Conventional ICP
Uniformity	Optimized Magnet Layout	Determined by Chamber Structure
Plasma Density (cm <sup>-3</sup> ) @0.1Pa/Ar	5E10~1E11	5E10
Te(eV)	3~5	5~10
Operating Pressure (Pa)	0.07 < Pa < 13.3	0.5 < Pa < 50
Prevent Re-deposition to Top Plate	Star Electrode (ULVAC's Patent)	No

Plasma type	Low pressure · High density		
Plasma source	ISM(ICP with magnetic field) or RIE		
Model	NE-550EX	NE-5700 <sup>②</sup>	NE-7800
Config.		1C/LL / 1E ~ 2E	max ~ 2C2E1A
Wafer size	~φ 230mm	~φ 200mm	~φ 200mm
Chuck type	ESC or Mechanical chuck	ESC or Mechanical chuck	ESC or Mechanical chuck
Suitable market	Small production and sampling for corporate R&D	Medium volume production	High volume production
Etching materials	Compounds, dielectrics, resin (polymer), metal (Al Al alloy, Mo, Ti, Ta, W, Cr, precious metal (Pt, Ir, Au), ferroelectrics (STO, PZT, BST etc.), ITO, Alumina (sapphire), SiC, Diamond		

① Cassette chamber is available as option (25 wafers, tray transfer is available).

② Max. 2 chambers can be equipped to NE-5700.

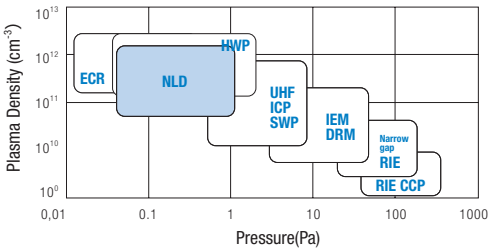
Dry Etching System for R&D and Production

NLD Series

Wafer size: Up to 200mm

Features

- 100 systems are sold.
- A wide range of etch process applications are possible. (Quartz, Pyrex, Crystal, LN/LT and more.)
- Equipped with NLD (magnetic neutral loop discharge) plasma source.
- With a low temperature, high density plasma, the NLD system is capable of etching quartz and other glass types in a high-speed precise manner.
- For the deep silicon etching process.



NLD-5700

Dry Etching System

INE-3085

Tray size: φ400

Features

- Electrostatic chuck tray (ULVAC patented) adopted board cooling improvement, productivity 30% higher than previous machines excellent substrate temperature controllability and workability improvement (screwless, just placing) consumables cost significantly improved compared to special trays
- By adopting large size TMP, wider process margin possible



INE-3085

Device configuration	1C + 1LL (transport room) + 1E room
Tray size	φ400mm
Tray mounting board number φ 50mm	42sheets · 37sheets
φ 100mm	10sheets · 9sheets
φ 150mm	4sheets · 4sheets
RF Power Supply	Antenna 2 kW / Bias 1 kW *Supply Capacity Various, Low Frequency Power Supply Acceptable
Substrate cooling	mechanism chuck + He cooling *electrostatic attachment tray compatible
top window stain prevention	star electrode *ULVAC patent
Process Reproduction Stability	Surface Treatment + Various Temperature Control Functions + Process know-how
Etching operation pressure	0.07Pa ~ 13.3Pa
TMP displacement capacity	2500 L / s High conductance exhaust structure
Substrate temperature (heating / cooling)	0°C ~ +40°C * -20 °C ~ +70 °C compatible with Option
Gas introduction system	4 lines (1 line with internal bypass) * Max 8 lines (3 lines with internal bypass)
Operating system	PLC + PC (Windows7)
Device body size	W1000 × D3050 × H1720



# CVD system

ULVAC's CVD systems support a wide variety of applications as well as R & D to mass production.

# And More



CME-200E



CC-200

## Load-lock Type Plasma - CVD System

### CME Series CC Series

Wafer size: Up to 200mm square aluminum tray or 6 to 8 inch wafer

#### Features

- Supports SiH4, TEOS and HMDSO gasses.
- Chamber configuration can be selected according to production volume or film type.
- Sputtering chamber can be added to CME200J.
- Maximum substrate size of 500mm square (largest in the industry). Also capable of various wafer shapes and sizes.
- Small footprint instead of space-saving design.
- Chamber cleaning with CF4 or NF3.
- Tray cleaning and P-Q auto measurement.
- High density plasma process with high-frequency (27.12MHz) power supply- Substrate holder □310mmx410mm.

	CC-200	CME-200E	CME-200J	CME-500
Cassette	Atmospheric cassette: 5 slots	Vacuum cassette: 12 or 25 slots		Vacuum cassette: 6 slots
Transfer	250mm square aluminum tray	200mm square aluminum tray or 6 to 8 inch wafer		520mm square aluminum tray
Transfer unit	Pneumatic-drive transfer mechanism	Motor-drive transfer mechanism	Vacuum transfer robot	Vacuum transfer robot
Number of process chambers	1	1 to 2 3 (Control panel is separated)	1 to 5	1 to 2 3 (Control panel is separated)
Process chamber pumping	Standard: Dry pump+Mechanical booster pump/High vacuum evacuation option: Turbo pump			
Substrate temp.	Max. 350°C			
RF power supply	13.56MHz or 27.12MHz			
Distance between electrodes	Variable: 9 to 40mm			
Gas type	Standard: Up to 6 lines (Lines can be added as an option)			
Substrate bias	Option: 1.6MHz			

## Batch Type PE-CVD System

### CX400, 500

<CX-400>  
Process Area: 300mm×400mm  
<CX-500>  
Process Area: 500mm×500mm

#### Features

- High Frequency Discharge
- Chamber self Cleaning is available
- High productivity
- Large Effective deposition area
- Small Foot Print
- Low temperature process (under 100 dec. C) applicable
- Good stress control ability and good step coverage

	CX-400	CX-500
System	Batch type process Chamber × 1	Batch type process Chamber × 1
Process area	300mm × 400mm	500mm × 500mm
Substrate capacity	2" x 42pcs, 2.5" x 28pcs, 4" x 10pcs	2" x 100pcs, 4" x 25pcs, 6" x 9pcs
Substrate Temp.	Max : 350°C± 10°C	
Film Material	SiNx, SiO2, TEOS-SiO2(option)	
Film Thickness Uniformity	± 5%	
Discharge	Parallel Plate Discharge	
Discharge Frequency	27.12MHz or 13.56MHz(1KW)	27.12MHz or 13.56MHz(0.6KW)
	Auto Matching	



CX-500

## Load Lock type Compact Etching System

### CE-S

#### Features

Load Lock Type Compact Etching system CE-S provides cutting costs down.



CE-S

## Load-lock type Evaporation System

### CV-200

#### Features

The CV-200 systems consists of a loadlock and evaporation chamber. The loadlock chamber allows the system to remain in a constantly clean environment and provide superior film repeatability. System is suitable for R&D to small volume production.



CV-200

## High-Density Plasma Etching System for R&D

### NE-550EX

#### Features

The NE-550 system is a multilayer high-density plasma etching system especially suited for universities, government agencies, and low volume production facilities.



NE-550EX

## Carbon Nanotube Growth Experimenting System

### CN-CVD-100

#### Features

ULVAC has developed a unique process for the growth of vertical carbon nanotubes. For the first time ever carbon nanotubes can be grown selectively on a substrate with High purity. This process provides a drastic improvement in performance and will help many fields, including cells and hydrogen storage.



CN-CVD-100



Creating Vacuum

Features

- Dry Vacuum Pump
- Oil Rotary Vacuum Pump
- Cryo Pump
- Diffusion Pump
- Turbo Molecular Pump
- Roots Pump
- Vacuum Valve



Analyzing Vacuum

Features

- Vacuum Gauges
- Helium Leak Detector
- Residual Gas Analyzer



Evaluating Vacuum

Features

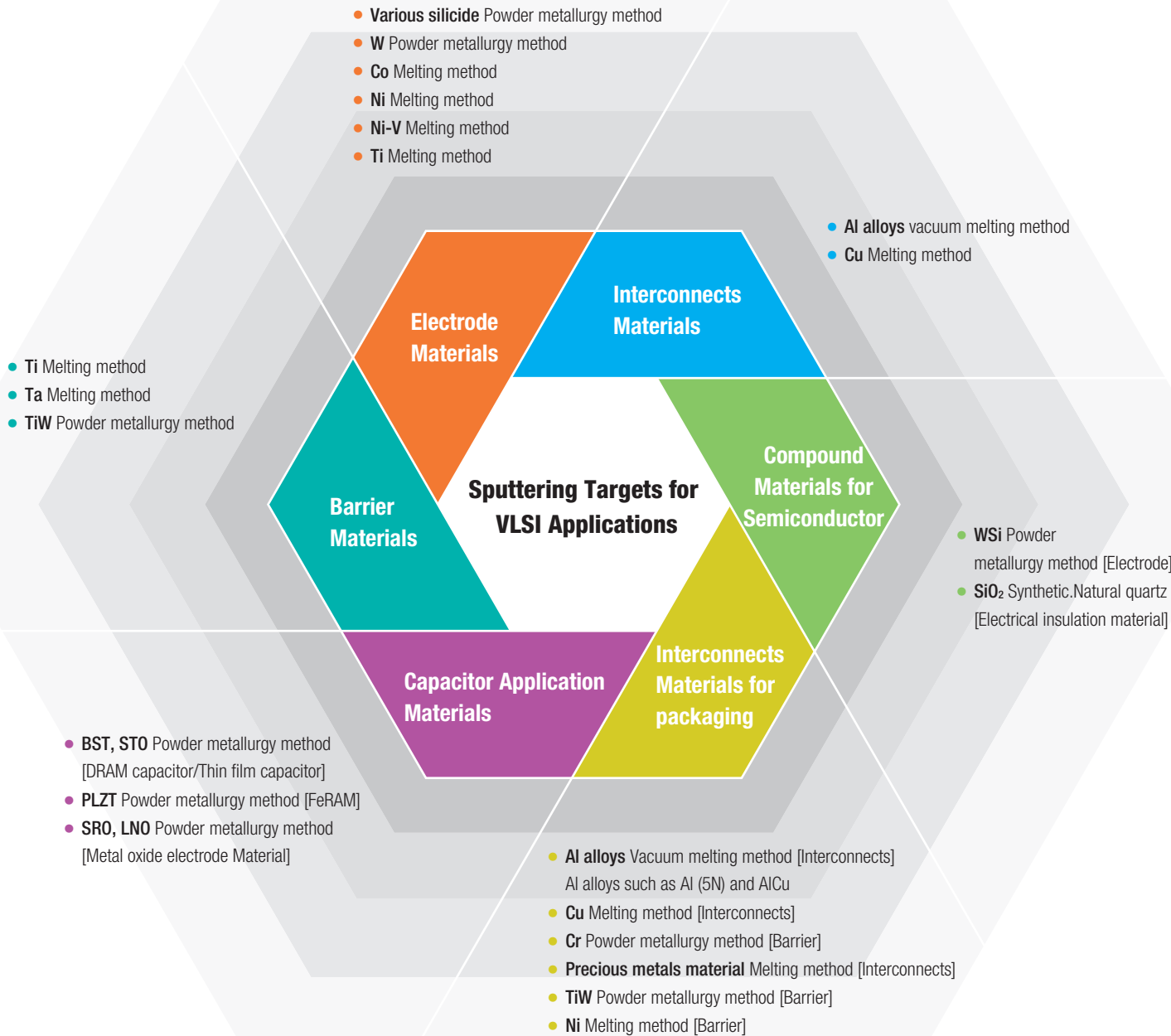
- Quartz crystal deposition controller
- Spectroscopic Ellipsometer
- Optical Monitor



Other Vacuum Solutions

Features

- Power Supply
- Transfer Robot
- Molecular Interaction Analyzer



Sputtering target materials for 300mm Wafer

Target material	Al alloy	Ti	Cu	Ta	W, Wsi
Purity	5N5up	4N5up	6Nup	4N5up	5N
Manufacturing method	Induction melting method (vacuum)	Arc melting/ EB melting method	Melting method (Atmosphere)	EB melting	Powder metallurgy method
Backing plate material	Al alloys or Cu alloys	Al alloys	Al alloys	Al alloys or Cu alloys	Al alloys ro Cu alloys
Bonding method	EB welding, monolithic structure, Solder bonding	Diffusion bonding	Diffusion bonding	Diffusion bonding	Solder bonding, Nanofoil bonding