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

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 SME-200E, up to 5 for SME-200J, and up to 7 for SME-200).

Wafer size: Up to 200mm

**Features**

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

SME-200E SME-200J SME-200 MLX-3000N

<table>
<thead>
<tr>
<th>Item SV-4540</th>
<th>SV-9040</th>
<th>SDH-4550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Load lock Chamber</td>
<td>Square Hexagon Octagon Hexagon</td>
</tr>
<tr>
<td>Max. Process Chamber</td>
<td>Max 3 chambers</td>
<td>Max 5 chambers</td>
</tr>
<tr>
<td>Auto loader</td>
<td>Cassette Chamber</td>
<td>Single hand</td>
</tr>
</tbody>
</table>

1: Replacing Cassette chamber to Degas Chamber is possible.

Load-lock Type Sputtering

**CS-200N**

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

**Features**

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

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

- 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.

Substrate size: 500mm standard, 650mm maximum

**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 series (Vertical transfer type)

SIV-500

Interback Vertical Sputtering System

SIH series (Horizontal transfer type)

SV series (Vertical transfer type)

SV-9040

Rotating Drum Type Sputtering System

**SV, SDH series**

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

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.

Compact Sputter Sputtering System

ACS-4000

**Features**
The ACS-4000 is designed for R&D applications. It is capable of depositing films, compound materials and other technologies. The system can handle up to 4 inch substrates and comes equipped with automatic process operation.

High Productivity Sputtering System

SRH Series

**Features**
The SRH Series is a high volume PVD system for the deposition of metallic films required in the power device, IGBT, LSI, or similar applications.

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.

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.

Sputtering System for Optical Filters and Coating

ULDiS Series

**Features**
The ULDiS sputtering system is capable of depositing high-quality optical filters and coatings.

Batch or Load Lock Type High Vacuum Evaporation System

ei Series

**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 (SR-Off, planetary, satellites, etc.)
- Touch Screen LCD for system operation.
- Superior PC-operating system and functions. (Recipe, Data logging, Maintenance assist)

Evaporation system

ULVAC has delivered more than 3000 evaporation systems.

Series List

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>SX Series</th>
<th>SX Series</th>
<th>SX Series</th>
<th>SX Series</th>
<th>SX Series</th>
<th>SX Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load-look</td>
<td>Load Lock Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load time</td>
<td>5 pc/hr</td>
<td>26 pc/hr</td>
<td>43 pc/hr</td>
<td>26 pc/hr</td>
<td>43 pc/hr</td>
<td>26 pc/hr</td>
<td>43 pc/hr</td>
</tr>
<tr>
<td>Capacity</td>
<td></td>
<td>100 pc/hr</td>
<td>167 pc/hr</td>
<td>100 pc/hr</td>
<td>167 pc/hr</td>
<td>100 pc/hr</td>
<td>167 pc/hr</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max.</td>
<td></td>
<td>350 °C</td>
<td>350 °C</td>
<td>350 °C</td>
<td>350 °C</td>
<td>350 °C</td>
<td></td>
</tr>
<tr>
<td>Max. pressure</td>
<td>Ultimate pressure: 3.0 × 10⁻⁵ Pa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substrate holder revolution</td>
<td></td>
<td>Lift-off (or planetary)</td>
<td>Lift-off (or planetary)</td>
<td>Lift-off (or planetary)</td>
<td>Lift-off (or planetary)</td>
<td>Lift-off (or planetary)</td>
<td>Lift-off (or planetary)</td>
</tr>
<tr>
<td>Item Description</td>
<td>Description</td>
<td>Planetary</td>
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</tbody>
</table>

Sputtering system

ULVAC offers a wide range of sputtering systems with a proven track record.
ULVAC has manufactured ion implanters for over 40 years, with over 700 systems in the field.

**SOPHI-30**
- Water size: Up to 200mm

**Features**
  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-200/260**
- Water size: Up to 200mm

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

**SOPHI-400**
- Water size: Up to 200mm

**Features**
- * Thin wafer transfer is available.
  * Parallel beam.
  * High energy: 2,400keV

**IH-860SIC**
- Water size: 150mm

**Features**
- * Widely used in the SiC market.
  * High-energy ion implanter.
    - 4,000keV (monovalent)
    - 8,000keV (divalent)
    - 12,000keV (trivalent)
  * Dual Platen: Two platens that wafer can be loaded enable high-temp cooling implantation.

**IH-860**

**IMX-3500**
- Water size: Up to φ 100mm (Option: φ 150mm wafer)

**Features**
- * Compact footprint of 8.5m².
  * 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.
**A ashing system**
ULVAC offers environmentally-friendly, high-productivity technologies for resist removal, which is essential in production processes for electronic and semiconductor devices.

**Etching system**
ULVAC has a large portfolio of etching systems.

*Plasma Density (cm³)*

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**Ashing System for Panel Level Packaging**

<table>
<thead>
<tr>
<th>Model</th>
<th>NA-1500 Series (PLP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wafer size</td>
<td>Up to 600mm</td>
</tr>
</tbody>
</table>

**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.

**Dry Etching System for Production**

<table>
<thead>
<tr>
<th>Model</th>
<th>NE-3085</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tray size</td>
<td>400</td>
</tr>
</tbody>
</table>

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

**Ashing System for Wafer Level Packaging**

<table>
<thead>
<tr>
<th>Model</th>
<th>NA-1300</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA-8000 (For Wafer Level Packaging)</td>
<td></td>
</tr>
<tr>
<td>Wafer size</td>
<td>Up to 300mm</td>
</tr>
</tbody>
</table>

**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.

**Dry Etching System for R&D and Production**

<table>
<thead>
<tr>
<th>Model</th>
<th>NLD Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wafer size</td>
<td>Up to 200mm</td>
</tr>
</tbody>
</table>

**Features**
- 100 systems are sold.
- 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.

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**Dry Etching System for Panel Level Packaging**

<table>
<thead>
<tr>
<th>Model</th>
<th>NE-5700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tray size</td>
<td>400mm 10 sheets</td>
</tr>
</tbody>
</table>

**Features**
- Operative system: PLC
- Chuck type: ESC or Mechanical
- Substrate cooling mechanism: chuck + He cooling
- Substrate temperature (heating / cooling): 0 to +40°C
- High conductance exhaust structure
- Low Pressure with High density plasma.
- Suitable market: Corporate R&D
- Plasma source: ISM (ICP with magnetic field) or RIE
- Plasma Density: 5E10 ~ 1E11 cm⁻³

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**Dry Etching System for Production**

<table>
<thead>
<tr>
<th>Model</th>
<th>NE Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wafer size</td>
<td>Up to 200mm</td>
</tr>
</tbody>
</table>

**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.
- With micro-wave down flow / low + RF plasma method.
- Cluster type.
- Supports new process other than ashing such as surface treatment or hydrophilic treatment.
- Equipment for 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.

<table>
<thead>
<tr>
<th>Model</th>
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**Features**
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- By adopting large size TMP, wider process margin possible.
CVD system
ULVAC’s CVD systems support a wide variety of applications as well as R & D to mass production.

Load Lock Type Compact Etching System
CE-S

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

CV-200

Features
- Supports SiH4, TEOS and HMDSO gases.
- 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 water 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 Ø310mmx110mm.

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.

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.

And More

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

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 gases.
- 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 water 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 Ø310mmx110mm.

Load-lock Type Evaporation System
CC-200

Features
- Cassette Atmospheric cassette: 5 slots
- Vacuum cassette: 12 or 25 slots
- Vacuum transfer robot
- Number of process chambers: 1 to 2
- Process chamber pumping: Standard: Dry pump+Mechanical booster pump/High vacuum evacuation option: Turbo pump
- Substrate temp.: Max. 350°
- 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

CX-400, 500

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

Batch Type PE-CVD System
CX-400, 500

Features
- 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

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.

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.
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

Material solutions

- Various silicide Powder metallurgy method
- W Powder metallurgy method
- Co Melting method
- Ni Melting method
- Ni-V Melting method
- Ti Melting method

Electrode Materials

- BST, STO Powder metallurgy method
- PLZT Powder metallurgy method
- SRO, LNO Powder metallurgy method

Capacitor Application Materials

- SiO₂ Synthetic/Natural quartz

Sputtering Targets for VLSI Applications

- WSI Powder metallurgy method (Electrode)
- SiO₂ Synthetic/Natural quartz

Barrier Materials

- Ti Melting method
- Ta Melting method
- TiW Powder metallurgy method

Compounds Materials for Semiconductor

- Various silicide Powder metallurgy method
- W Powder metallurgy method
- Co Melting method
- Ni Melting method
- Ni-V Melting method
- Ti Melting method

Interconnects Materials

- Al alloys Vacuum melting method
- Cu Melting method

Interconnects Materials for packaging

- Al alloys Vacuum melting method
- Cu Melting method
- Ni Melting method

Sputtering target materials for 300mm Wafer

<table>
<thead>
<tr>
<th>Target material</th>
<th>Al alloy</th>
<th>Ti</th>
<th>Cu</th>
<th>Ta</th>
<th>W, Wai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purity</td>
<td>5N/1up</td>
<td>4N5/1up</td>
<td>6Nup</td>
<td>4N5/1up</td>
<td>5N</td>
</tr>
<tr>
<td>Manufacturing method</td>
<td>Induction melting method (vacuum)</td>
<td>Arc melting/EB melting method</td>
<td>Melting method (atmosphere)</td>
<td>EB melting</td>
<td>Powder metallurgy method</td>
</tr>
<tr>
<td>Backing plate material</td>
<td>Al alloys or Cu alloys</td>
<td>Al alloys</td>
<td>Al alloys</td>
<td>Al alloys or Cu alloys</td>
<td>Al alloys or Cu alloys</td>
</tr>
<tr>
<td>Bonding method</td>
<td>EB welding, monolithic structure, Solder bonding</td>
<td>Diffusion bonding</td>
<td>Diffusion bonding</td>
<td>Diffusion bonding</td>
<td>Solder bonding, Nanofil bonding</td>
</tr>
</tbody>
</table>