Corial PS200

4-sided multi-module platform

Single wafer platform equipped with 200 mm modules

Integration of ICP-CVD or PECVD process chambers

Fully automated platform with cassette-to-cassette handler

Accommodates up to 3 process modules. Platform availability for 4”, 6”, or 8” wafers
PLATFORM DESCRIPTION

Corial PS200
PLATFORM DESCRIPTION

General View

FULLY AUTOMATIC

1 MODULE
PLATFORM DESCRIPTION

General View

FULLY AUTOMATIC

UP TO 3 MODULES

CORIAL PS200
PLATFORM DESCRIPTION

General View

FULLY AUTOMATIC

TURNKEY PROJECTS
PLATFORM DESCRIPTION

Top View

- Dry pump
- Chiller
- Load lock for cassette
- Transfer module

Floor loading requirement: 11.3 m² for 3PM system including maintenance area.
PLATFORM DESCRIPTION

Loading

Transfer module based on BROOKS MAG7 with vacuum robot & elevator

FULLY AUTOMATIC

HIGH VOLUME PRODUCTION SOLUTION
Mechanical chuck

Vacuum vessel

Wafer

Cathode

Clamping ring

Pins

After retraction of the loading fork back to the Transfer Module:

Cathode position DOWN
Wafer sits on the pins

Etching position:

Cathode position UP
Pins are down
Wafer is clamped by the dielectric clamping ring against the chuck
PLATFORM DESCRIPTION

Shuttle for 6”

- Uniform temperature field for high uniformity of etching over all the substrate (He backside cooling)
- High stability and reproducibility of dielectric wafer clamping
- Wafer is covered by only 6 fingers for higher process yield (1 mm wafer overlapping)

Uniform temperature field for high uniformity of etching over all the substrate (He backside cooling)
ICP-CVD PROCESS MODULE

Corial 210D
MODULE DESCRIPTION

Detailed View

Pumping system
(TMP 1600 l/s and dry pump 110 m³/h)

ICP reactor

Transfer module

2000 W ICP generator

1000 W RF generator

HV and LV power supplies

Process controller
ICP SOURCE

CORIAL’s latest generation of reactor

Wide range of applications

1. Ideal chamber for R&D centers that accommodates a wide range of customer applications in RIE, ICP-RIE, and ICP-CVD modes

2. RF match box with wide operating range (from 100 W to 2000 W)

3. Wide working pressure range (1 to 50 mT)

4. Separate gas injection for SiH4 and dopants, to deposit high quality SiO2, Si3N4, SiOCH, SiOF, SiC and aSi-H films at low temperature (<150°C)

5. Removable quartz liner to decrease particle contamination

6. Hot walls (>250°C) to support short plasma cleaning times and low added particles
THE LINER FOR HARSH ICP-RIE PROCESSES

- **5 min** Liner replacement
- **1 min** Reactor Venting
- **4 min** Pumping down to $10^{-4}$ Tor
- **5 min** Plasma cleaning

EASY LINER replacement by a single person

ZERO CROSS CONTAMINATION
ETCHING OF VARIED MATERIALS

- **PSS:** Sapphire etching
- **Optoelectronics:** InP etching
- **Power semiconductors:** SiC etching, no trenching
- **Micromachining:** Glass etching
- **MEMS:** Quartz etching
- **Passive optics:** InP etching
- **Optoelectronics:** GaAs etching
- **LED, RF, Power electronics:** GaN etching
HIGH ETCH RATES
Excellent uniformities

<table>
<thead>
<tr>
<th>Process</th>
<th>Mask</th>
<th>Etch rate (nm/min)</th>
<th>Selectivity (vs mask)</th>
<th>Uniformity (across wafer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond</td>
<td>SiO2</td>
<td>500</td>
<td>&gt; 25</td>
<td>±3%</td>
</tr>
<tr>
<td>InP</td>
<td>SiO2</td>
<td>1200</td>
<td>&gt; 25</td>
<td>±3%</td>
</tr>
<tr>
<td>GaN (Iso)</td>
<td>PR</td>
<td>1200</td>
<td>&gt; 1</td>
<td>±3%</td>
</tr>
<tr>
<td>Quartz</td>
<td>PR</td>
<td>&gt; 1200</td>
<td>2</td>
<td>±3%</td>
</tr>
<tr>
<td>SiC</td>
<td>Ni</td>
<td>&gt; 1500</td>
<td>&gt; 20</td>
<td>±3%</td>
</tr>
<tr>
<td>Sapphire</td>
<td>Ni</td>
<td>&gt; 500</td>
<td>&gt; 6</td>
<td>±3%</td>
</tr>
<tr>
<td>Glass</td>
<td>Ni</td>
<td>&gt; 800</td>
<td>&gt; 15</td>
<td>±3%</td>
</tr>
<tr>
<td>LiNbO3 / LiTaO3</td>
<td>Ni</td>
<td>300</td>
<td>&gt; 5</td>
<td>±3%</td>
</tr>
</tbody>
</table>
DEPOSITION OF VARIED MATERIALS

Si$_x$N$_y$ with tunable stress

SiO$_2$ with tunable stress

SiO$_2$ with low BOE etch rate

SiO$_2$ with tunable stress

Step coverage by SiH$_4$ + N$_2$O deposition

Step coverage by HMDSO + O$_2$ deposition

Self-planarized Deposition of SiOF on Cu

CORIAL PS200
### LOW TEMPERATURE DEPOSITION

Excellent uniformities

<table>
<thead>
<tr>
<th>Process</th>
<th>Process Temperature</th>
<th>Deposition Rate (nm/min)</th>
<th>Refractive Index</th>
<th>Stress (MPa)</th>
<th>Uniformity on 4” Wafers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO$_2$</td>
<td>70°C to 100°C</td>
<td>40 to 160</td>
<td>1.46 ± 0.01</td>
<td>-300 to +50</td>
<td>&lt; ± 3%</td>
</tr>
<tr>
<td>Si$_x$N$_y$</td>
<td>70°C</td>
<td>100 to 300</td>
<td>1.80 ± 0.02</td>
<td>-300 to +100</td>
<td>&lt; ± 4%</td>
</tr>
<tr>
<td>SiOF</td>
<td>70°C</td>
<td>80 to 160</td>
<td>1.41 ± 0.01</td>
<td>-300 to 100</td>
<td>&lt; ± 5%</td>
</tr>
</tbody>
</table>

With 1 KW at 2 MHz ICP source and 300 W RF biasing at 13.56 MHz
Films deposited on 4” silicon wafers at a process temperature of 70°C
PECVD PROCESS MODULE

Corial D250
MODULE DESCRIPTION

Detailed View

- EPD with laser
- PECVD reactor
- Pumping system (TMP 350 l/s and dry pump 110 m³/h)
- TMP controller
- Heating controller
- 300 W RF generator
- Process controller
- HV and LV power supplies

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**PROCESS CONTROLLER**

**HEATING CONTROLLER**

**TMP CONTROLLER**

**300 W RF GENERATOR**

**HV AND LV POWER SUPPLIES**
PECVD REACTOR

CORIAL’s latest generation of reactor

RAPID AND UNIFORM DEPOSITION

1. Precise and uniform temperature control of the substrate and reactor walls delivers excellent deposition repeatability and uniformity

2. Pressurized reactor ensures high-quality films free of pinholes

3. Optimized gas showerhead and symmetrical pumping deliver excellent deposition uniformity

4. High temperature, dual pumped configuration enables efficient plasma cleaning at operating temperature, with no corrosion of mechanical parts

5. Optimizing film stress control is simple to accomplish thanks to the reactor’s symmetrical design

6. System can operate for years without the need for manual cleaning
PECVD REACTOR

Flexibility

20 TO 150°C TEMPERATURE RANGE

120 TO 325°C TEMPERATURE RANGE

0.2 TO 2 T PRESSURE RANGE

≤ 65°C VACUUM VESSEL WALLS
REACTOR CLEANING
HIGH UPTIME

In situ
Reactor plasma cleaning

Automatic
EPD of reactor plasma cleaning process

Pressurized
Reactor Design

NO MECHANICAL CLEANING
PECVD OF VARIED MATERIALS

Si$_3$N$_4$ with tunable stress

SiO$_2$ with tunable stress

SiO$_2$ with breakdown voltage $>10$ MV/cm

Si$_3$N$_4$ Step coverage at low RF power

Step coverage by HMDSO + O$_2$ deposition

Self-planarized Deposition of SiOF
### HIGH DEPOSITION RATES

Excellent uniformities

<table>
<thead>
<tr>
<th>Process</th>
<th>Deposition Rate (nm/min)</th>
<th>Refractive Index</th>
<th>Stress (MPa)</th>
<th>Uniformity on 8” Wafers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO$_x$</td>
<td>20 to 500</td>
<td>1.458 to 1.478</td>
<td>-300 to +50</td>
<td>&lt; ± 3%</td>
</tr>
<tr>
<td>Si$_x$N$_y$</td>
<td>20 to 250</td>
<td>1.8 to 2.1</td>
<td>-300 to +150</td>
<td>&lt; ± 3%</td>
</tr>
<tr>
<td>SiOF</td>
<td>&gt; 50</td>
<td>1.41 ± 0.02</td>
<td>-100 to -0</td>
<td>&lt; ± 3%</td>
</tr>
<tr>
<td>SiOCH</td>
<td>50 to 200</td>
<td>1.45 ± 0.02</td>
<td>-100 to -20</td>
<td>&lt; ± 3%</td>
</tr>
<tr>
<td>Si$_x$C</td>
<td>20 to 150</td>
<td>2.6 to 2.9</td>
<td>-100 to +100</td>
<td>&lt; ± 3%</td>
</tr>
</tbody>
</table>

*Measurement performed with 5 mm edge exclusion*
USABILITY

Corial PS200
COSMA
CORIAL OPERATING SYSTEM FOR MACHINE

The simplest, most efficient software to develop processes, operate, and maintain CORIAL systems

DESKTOP APPLICATION
Process Editing | Process Adjustment | Process Operation | Process Tracability | System Maintenance

MOBILE APPLICATION
Module & Process Follow-Up | Alarms & Warnings | Connected Users

REMOTE CONTROL
**REPROCESSING SOFTWARE**

**COSMA RS**

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**DISPLAY UP TO 4 PARAMETERS FROM A RUN**

Simple and efficient software to analyze process runs and accelerate process development

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**REMOTE ANALYSIS OF RUNS**

**DRAG AND DROP CURVES TO CHECK PROCESS REPEATABILITY**
Corial PS200
4-sided multi-module platform

Single wafer platform equipped with 200 mm modules

- Integration of ICP-CVD or PECVD process chambers
- Fully automated platform with cassette-to-cassette handler
- Accommodates up to 3 process modules. Platform availability for 4'', 6'', or 8'' wafers