
CORIAL
A Plasma-Therm Company

CORIAL 200R

Simplicity, performance, and upgradability in a system designed for R&D environments

RIE capabilities over a variety of materials including silicon-based compounds, metals, and polymers

Modular design approach supporting tiered upgrades (ICP source, load lock, additional gas lines…)

Smaller wafer pieces up to full 200 mm wafer 1x2'' to 7x2'' ; 1x3'' to 3x3'' ; 1x4'' ; 1x6'' ; 1x8''

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SYSTEM DESCRIPTION
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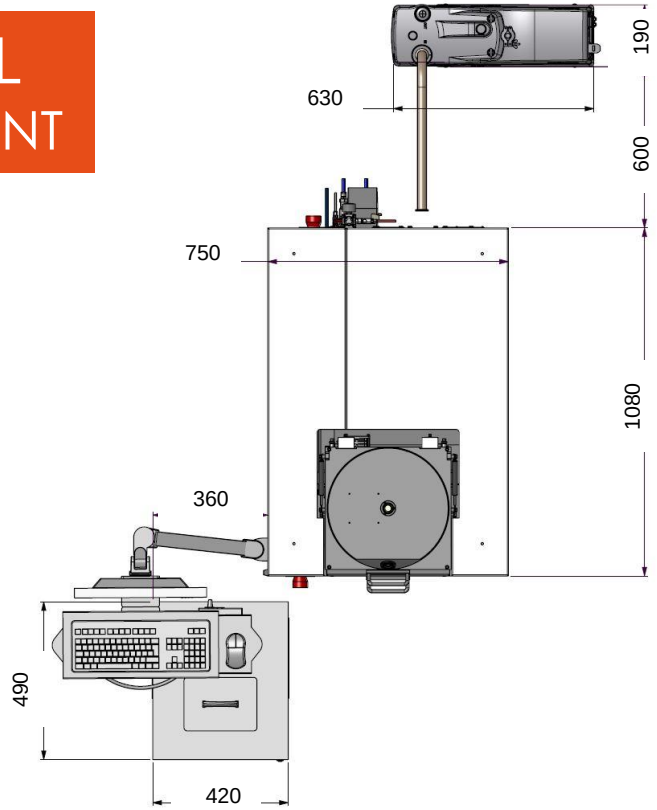
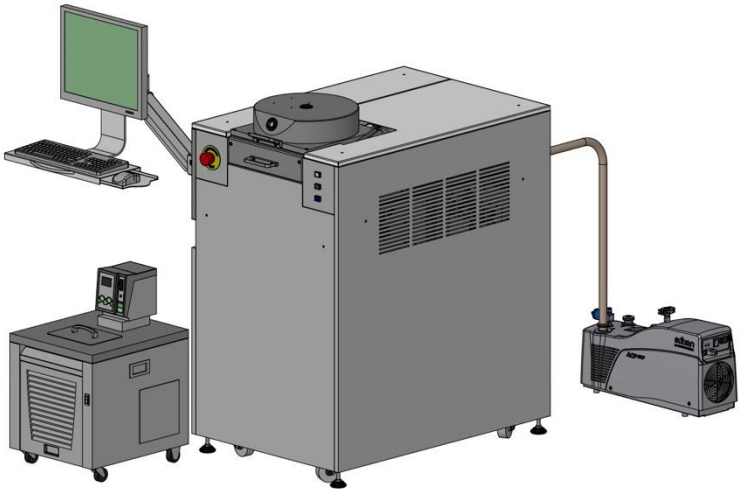
SYSTEM DESCRIPTION

General View

SMALL FOOTPRINT



LOW MAINTENANCE REQUIREMENTS



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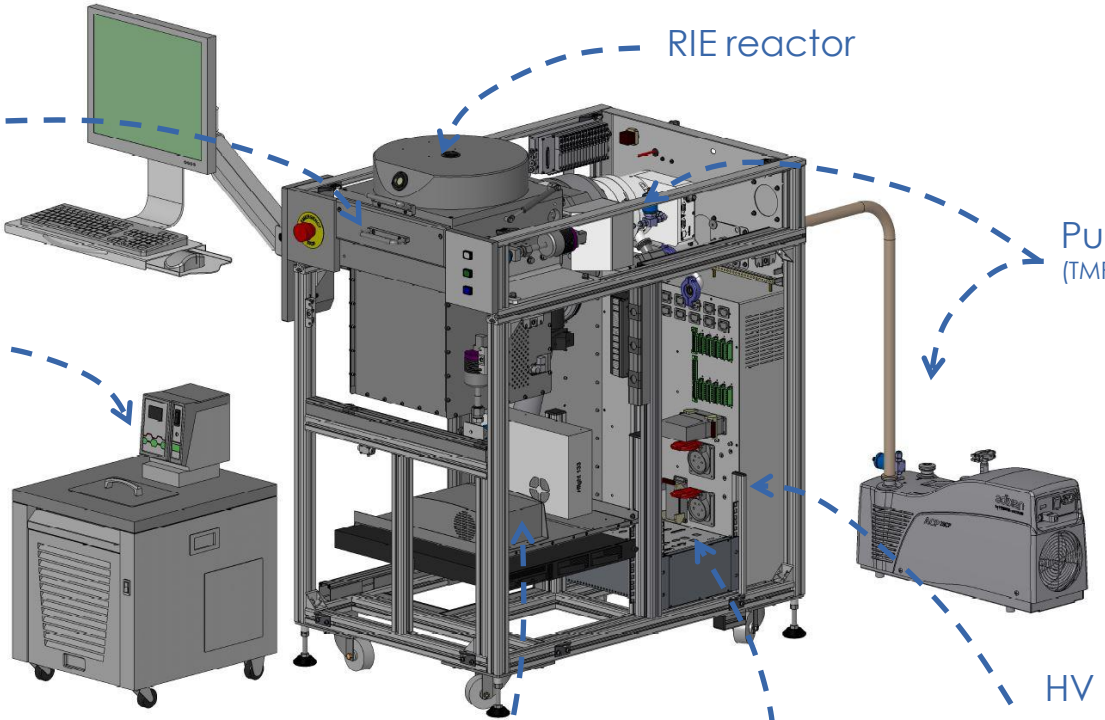
SYSTEM DESCRIPTION

Detailed View



Direct loading

RIE reactor

Pumping system
(TMP 500l/s and dry pump 28 m^3/h)

Chiller / Heater

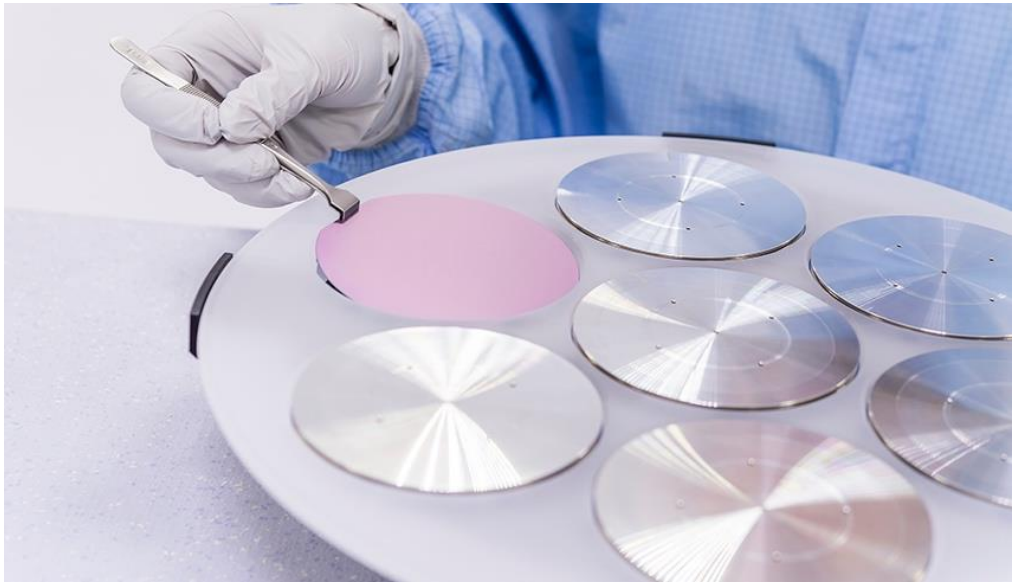
HV and LV power supplies

300 W RF generator
(13,56 Mhz)

Process controller

SYSTEM DESCRIPTION

Loading



< 210 s
LOADING TIME

Direct loading
FAST LOAD AND UNLOAD

Shuttle
EASY EXCHANGE BETWEEN SUBSTRATE SHAPE AND SIZE

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STANDARD RIE SOURCE
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RIE SOURCE

Anisotropic RIE etching

Flexible solution for RIE

1. Optimized helium backside cooling of the wafer offers excellent process and wafer temperature control, and greater flexibility for processing a wide range of materials
2. Retractable liner for sputter etch increases time between cleans and reduce clean time
3. Shuttle (carrier) design, combined with a standard cathode, for a cost-effective and fast reactor adaptation, suitable for multiple applications and substrate types
4. System can be upgraded from a basic RIE tool to an advanced ICP-RIE system

SiO_2 50 nm/min
Polymers 400 nm/min
Nb 100 nm/min
…

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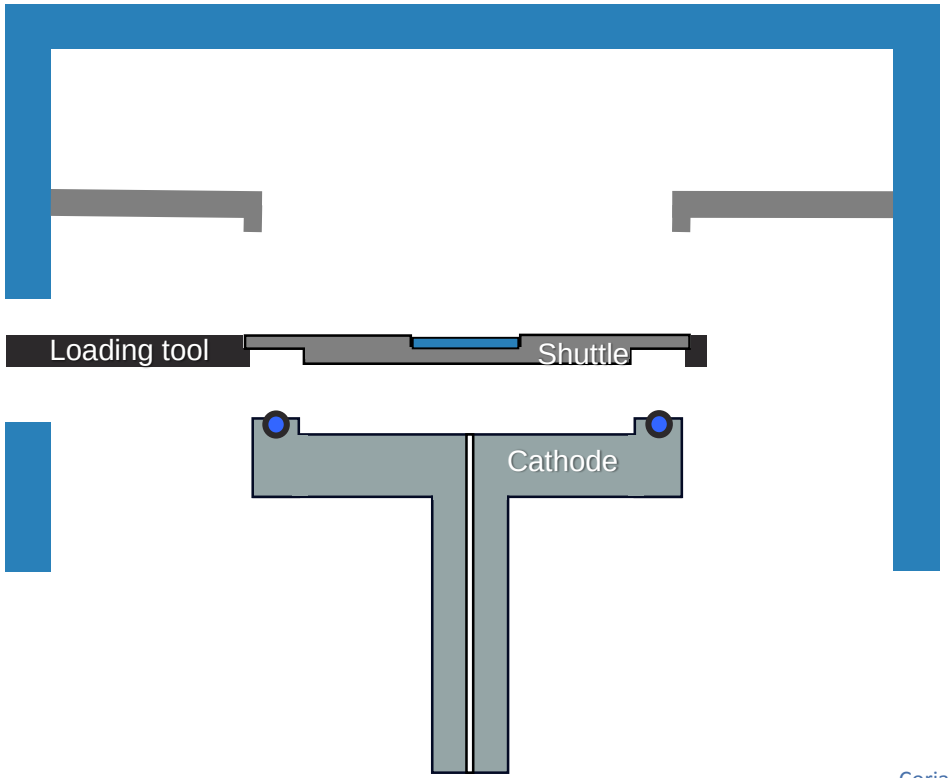
RIE SOURCE

Operation Sequence

Shuttle Loading

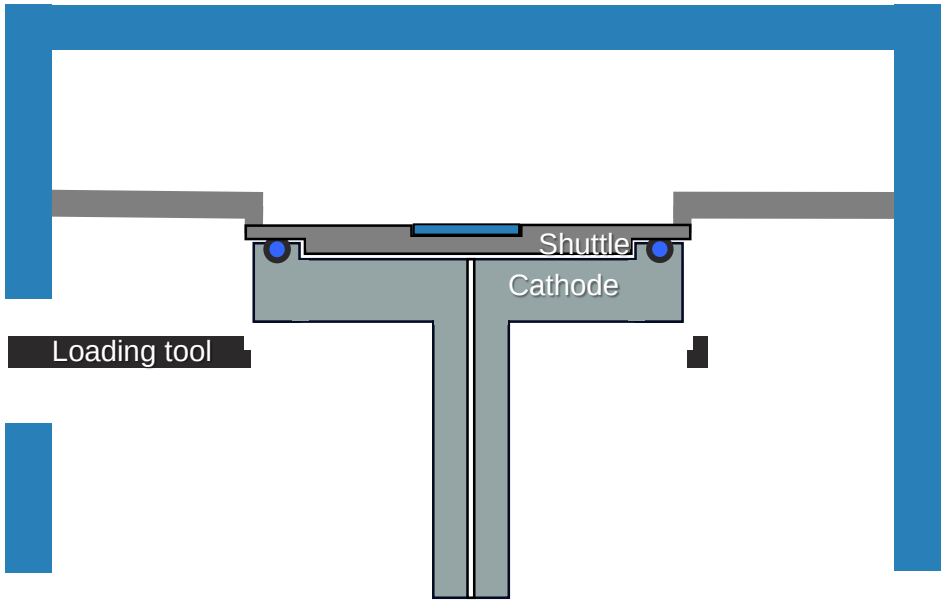


1

RIE SOURCE

Operation Sequence

Cathode Up

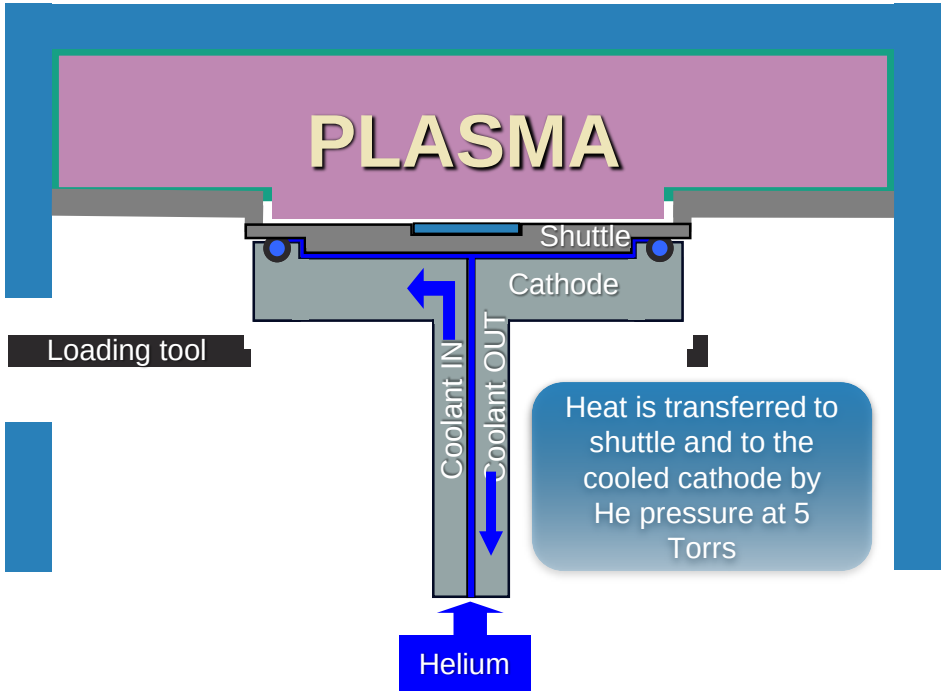


2

RIE SOURCE

Operation Sequence

Plasma heats wafer and cathode



Heat is transferred to shuttle and to the cooled cathode by He pressure at 5 Torrs

3

PERFORMANCES RIE PROCESSES
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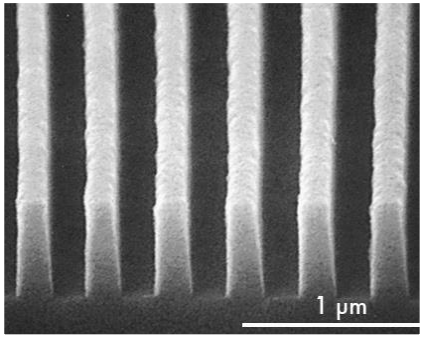
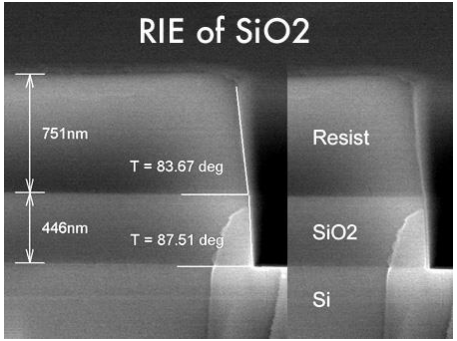
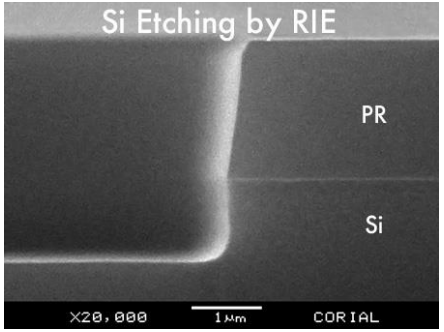
RIE OF SI, OXIDES AND NITRIDES



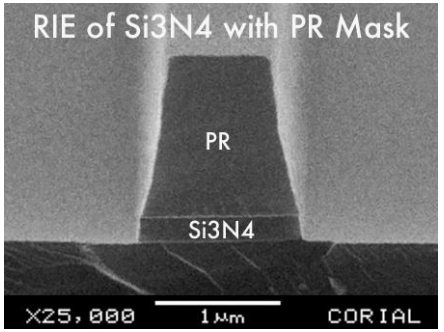
RIE of SiO2 with PR mask – Vertical profile – High etch uniformity



RIE of SiO2 with PR mask – 0.8 µm deep



RIE of Si – 0.8 µm deep - Anisotropic profile



RIE of Si3N4 - 0.8 µm deep

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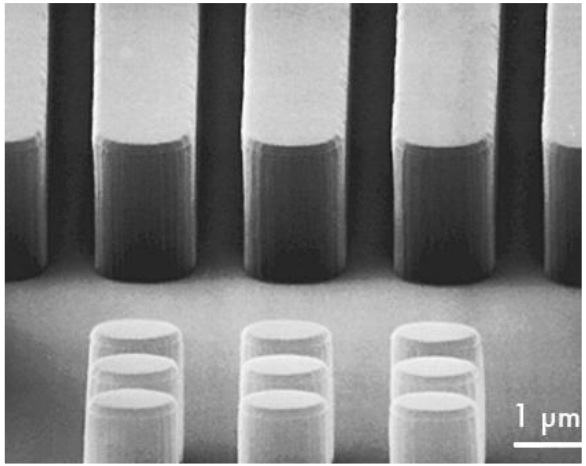
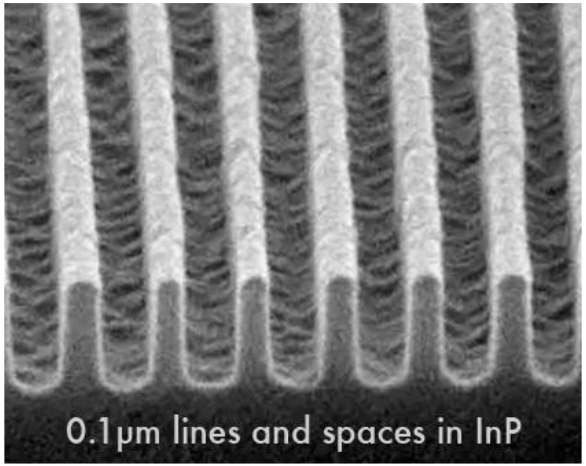
RIE OF POLYMERS, INP

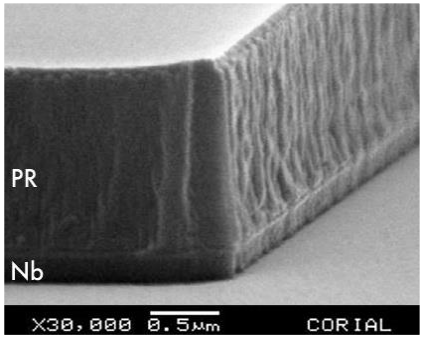


RIE of PR – High etch uniformity

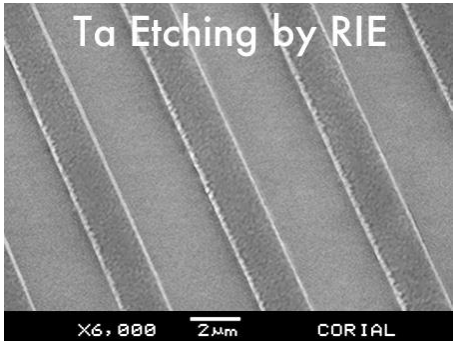


RIE of InP – Carbon-hydrogen chemistry

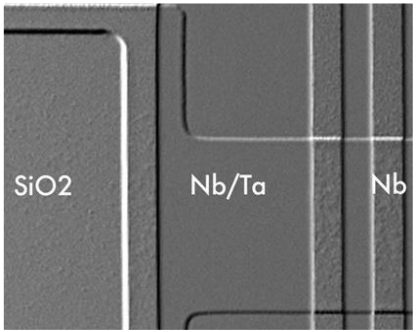
RIE OF METALS



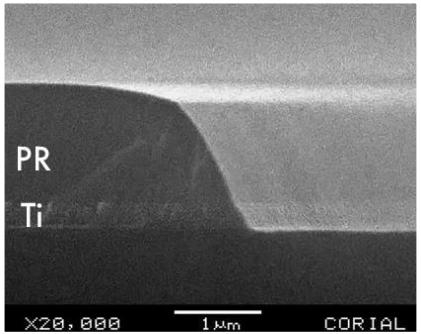
Nb etching with PR mask – Anisotropic profile



Ta etching with PR mask – Anisotropic profile



RIE of Nb / Ta



Ti etching with PR mask - Anisotropic profile

HIGH ETCH RATES

Excellent Uniformities

Process	Mask	Etch rate (nm/min)	Selectivity (vs mask)	Uniformity (across wafer)
Polymers	PR	400	1	±5%
SiO_2	PR	45	> 2	±3%
Si_3N_4	PR	60	> 2	±3%
InP	SiO2	80	> 50	±3%
Al	PR	180	1	±5%
Ta	PR	90	> 0.5	±5%
Ti	PR	25	0.3	±5%
Nb	PR	110	> 0.5	±5%

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RIE SOURCE FOR SPUTTER-ETCH
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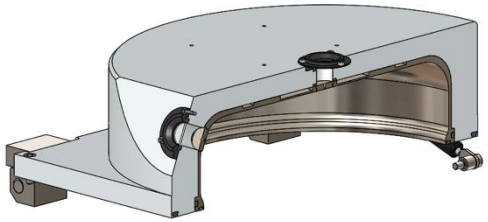
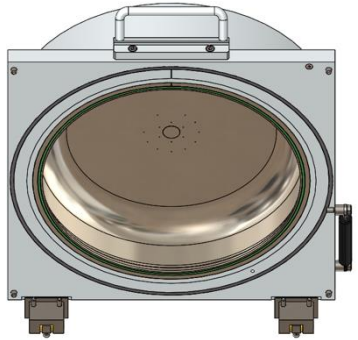
SPUTTER ETCH

RIE process chamber for etching and sputtering



LINER TO COLLECT ETCH-BY-PRODUCTS AND SPUTTERED MATERIALS

EASY LINER replacement by a single person



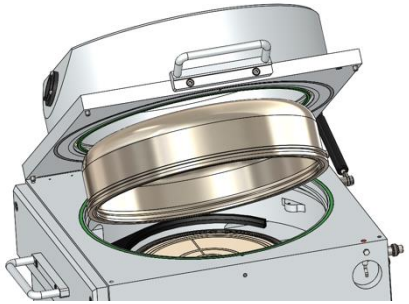
5 min
Liner replacement

1 min
Reactor Venting

4 min
Pumping down to 10^{-4} Tor

5 min
Plasma cleaning

Dedicated process chamber for Au, Ag, Ni, Fe, Co, Pt, PZT… SPUTTERING



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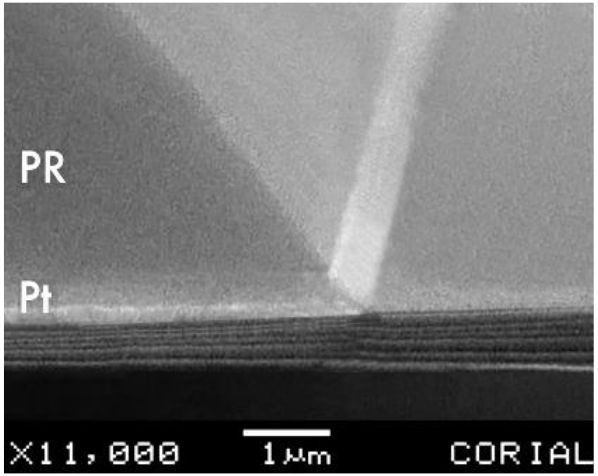
SPUTTER ETCH

Ar chemistry



Back sputtering of Pt with PR mask

Process	Mask	Etch rate (nm/min)	Selectivity (vs mask)	Uniformity (across wafer)
Au, Pt, PZT, Fe, Co	PR	45	> 1	±5%

SHUTTLE HOLDING APPROACH
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SHUTTLE HOLDING APPROACH

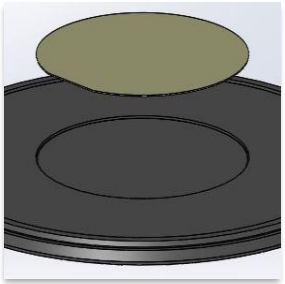
Portfolio

NG20 wafer carrier

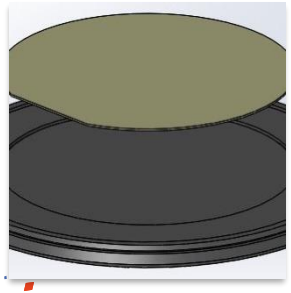
50 mm wafer

75 mm wafer

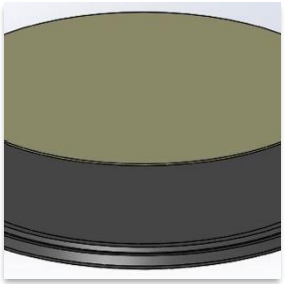
100 mm wafer



150 mm wafer

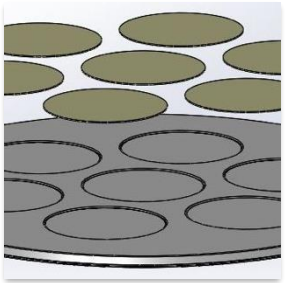


200 mm wafer

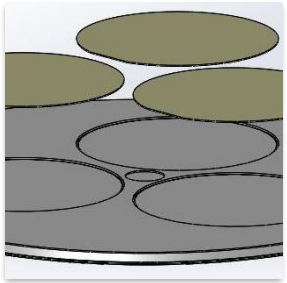


NQ200 wafer carrier

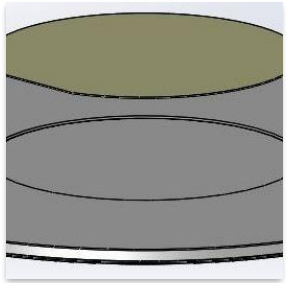
50 mm wafer



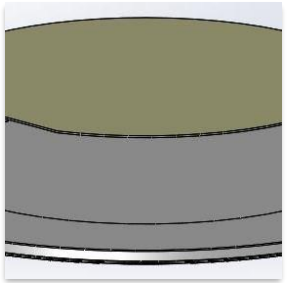
75 mm wafer



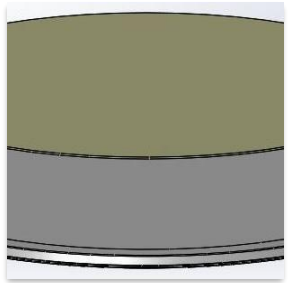
100 mm wafer



150 mm wafer



200 mm wafer



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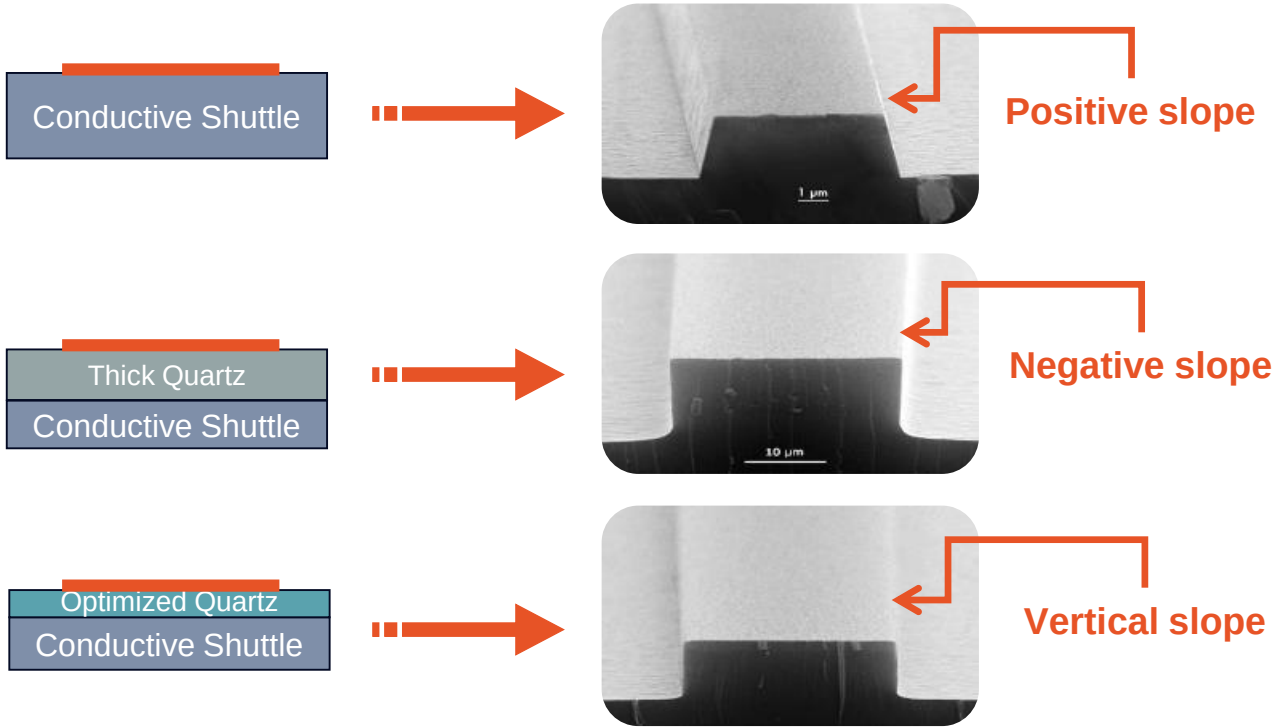
SHUTTLE HOLDING APPROACH

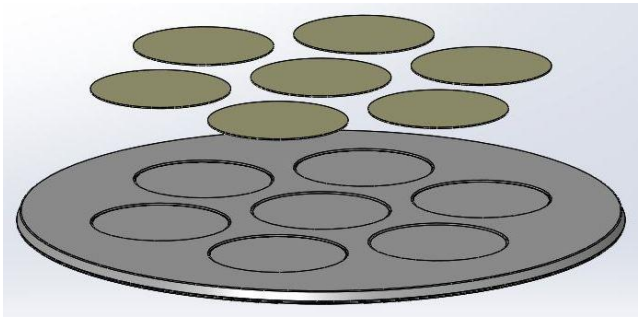
Impact on Performances

SiO2 etching with aSi-H mask



SHUTTLE HOLDING APPROACH

Benefits



1. Quick adaptation to sample shape and size
2. Optimum process conditions with NO modification of process chamber
3. Limited cross contamination between processes by using dedicated shuttles

2''

Wafer carrier

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MODULARITY
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SYSTEM UPGRADABILITY

Detailed View

Configurations	Reference configuration Corial 200R	Load-lock upgrade	ICP upgrade	ICP & load-lock upgrades	ICP, CVD & load-lock upgrades
Process mode	RIE	RIE	ICP RIE	ICP RIE	ICP RIE ICP-CVD
Capacity	Wafer pieces – 7 x 2'' – 3 x 3'' – 1 x 4'' – 1 x 6'' - 1 x 8''				Wafer pieces – 7 x 2'' – 3 x 3'' – 1 x 4'' – 1 x 6''
Substrate handling	Direct loading	Load lock	Direct loading	Load lock	Load lock
Process gas lines	Additional gas inputs up to 8	Additional gas inputs up to 8	Additional gas inputs up to 8	Additional gas inputs up to 8	Separate gas injection for SiH4, C2H4, and dopants
Power supplies	Higher output power supplies up to 1000W	Higher output power supplies up to 1000W	Higher output power supplies up to 2000W	Higher output power supplies up to 2000W	Higher output power supplies up to 1000W
Chemistries	Fluorinated Carbon-hydrogen	Fluorinated Chlorinated	Fluorinated	Fluorinated Chlorinated	Fluorinated Chlorinated
Si & Si-compounds etching	■	■	■	■	■
Polymers etching	■	■	■	■	■
Chamber for sputter-etch	■	■	■	■	■
Metals etching (Cl_2)		■		■	■
InP etching	■	■	■	■	■
II-VI compounds etching	■	■	■	■	■
III-V compounds etching		■		■	■
Hard materials deep etching (glass, sapphire, SiC…) & Si deep etching				■	
Low temp. Deposition (SiO_2, Si_3N_4, SiC)					■

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USABILITY
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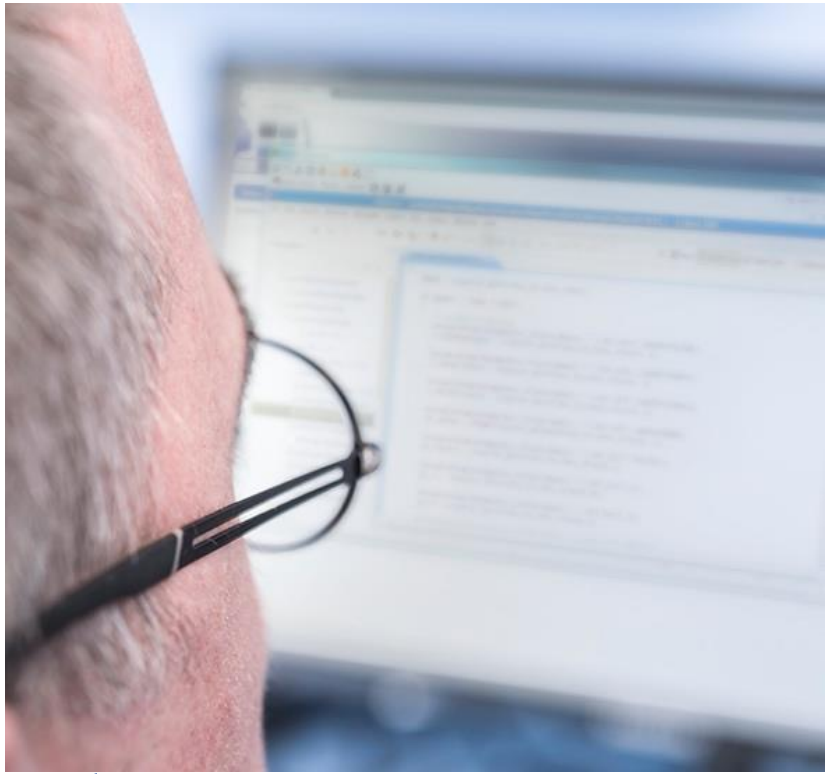
PROCESS CONTROL SOFTWARE

COSMA



COSMA

CORIAL **O**PERATING **S**YSTEM FOR **MA**CHINE

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

DESKTOP APPLICATION

Process Editing I Process Adjustment I Process Operation I Process Tracability I System Maintenance

REMOTE CONTROL

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DEPROCESSING SOFTWARE

COSMA RS

DISPLAY UP TO

4

PARAMETERS FROM A RUN

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

REMOTE

ANALYSIS OF RUNS

DRAG AND DROP

CURVES TO CHECK PROCESS REPEATABILITY

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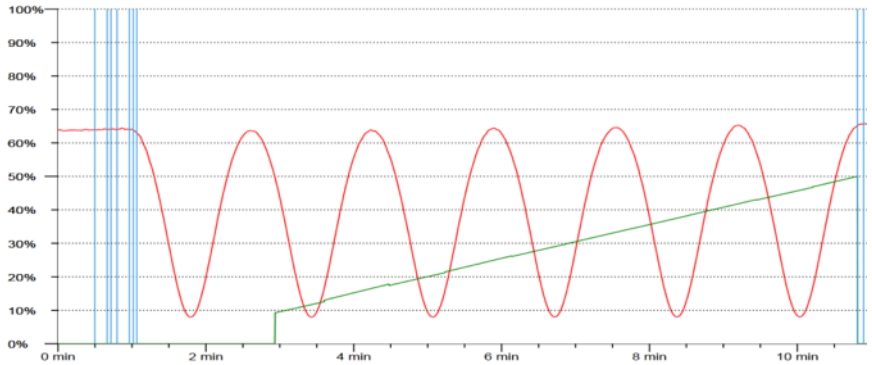
END POINT DETECTION

EPD with laser



A CCD camera and laser diode, in the same measuring head, enables simultaneous visualization of the wafer surface and the laser beam impact on it. A 20 µm diameter laser spot facilitates the record of interference signals.

Real-Time etch rate measurement
Real-Time etched depth measurement

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Simplicity, performance, and upgradability in a system designed for R&D environments

RIE capabilities over a variety of materials including silicon-based compounds, metals, and polymers

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Smaller wafer pieces up to full 200 mm wafer 1x2'' to 7x2'' ; 1x3'' to 3x3'' ; 1x4'' ; 1x6'' ; 1x8''

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