
CORIAL
A Plasma-Therm Company

CORIAL 210RL

Anisotropic RIE etching supported by a wide range of processes

RIE capabilities over a variety of materials including Silicon compounds, metals, polymers, III-V and II-VI compounds

Modular design approach supporting tiered upgrades

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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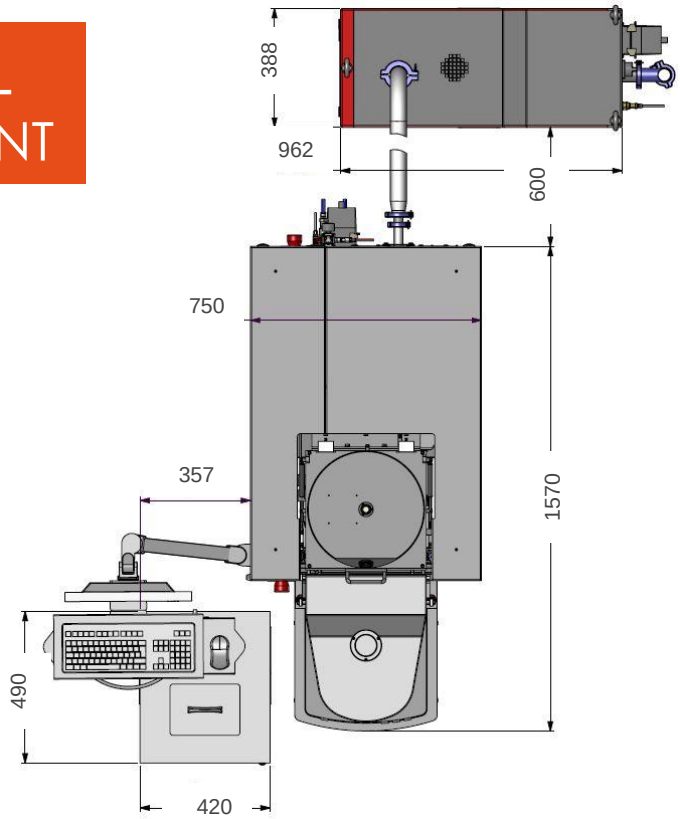
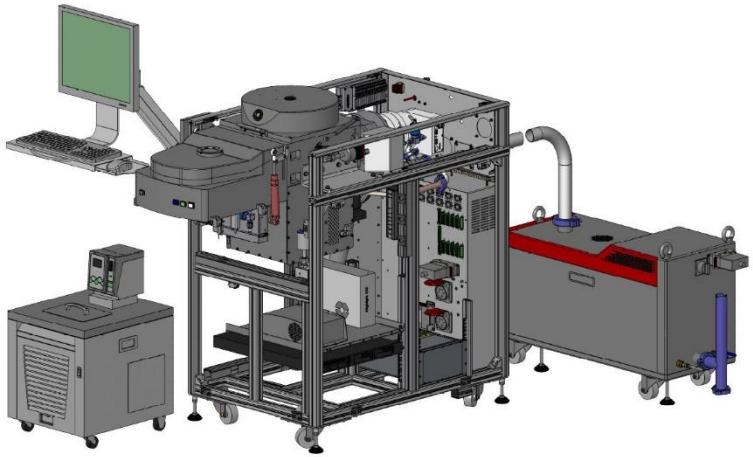
SYSTEM DESCRIPTION

General View

SMALL FOOTPRINT

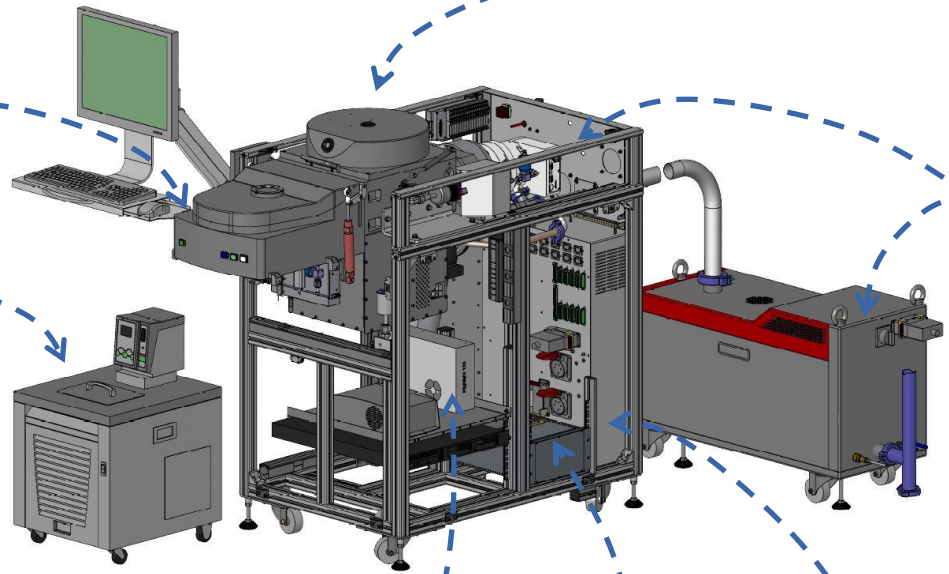


Low CoO



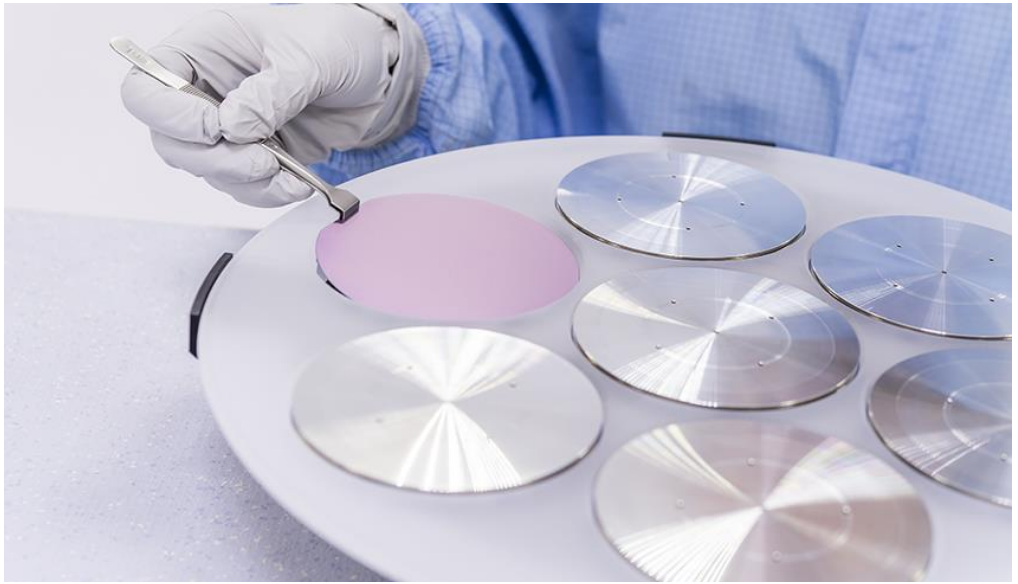
SYSTEM DESCRIPTION

Detailed View



SYSTEM DESCRIPTION

Loading



< 180 s
LOADING TIME

Vacuum robot
FAST AND REPEATABLE LOAD AND UNLOAD

Shuttle
EASY EXCHANGE BETWEEN SUBSTRATE SHAPE AND SIZE

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STANDARD RIE SOURCE
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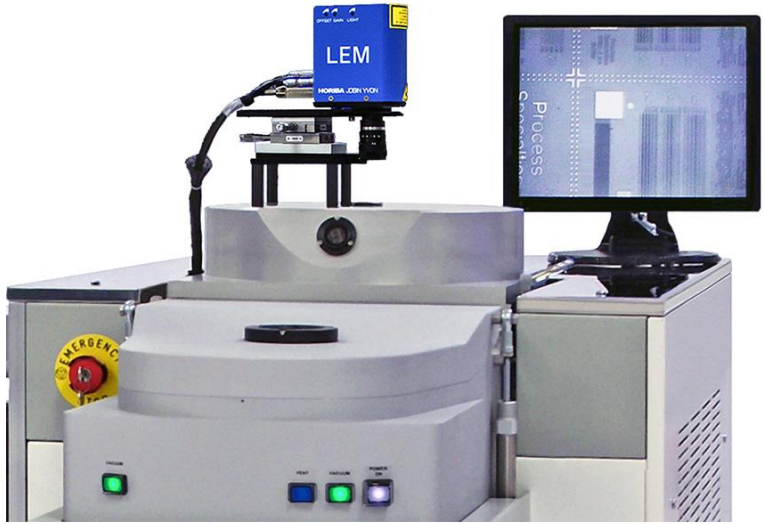
RIE SOURCE

Anisotropic RIE Etching

Flexible solution for RIE



1. Load lock enables using a combination of fluorinated and chlorinated chemistries in the same tool
2. Load lock for stable and repeatable process conditions
3. Uniform temperature control for best repeatability
4. Retractable liner for sputter etch increase time between cleans and reduce clean time
5. shuttle (carrier) design, combined with a standard cathode, for a cost-effective and fast reactor adaptation, suitable for multiple applications and substrate types
6. System can be upgraded from a basic RIE tool to an advanced ICP-RIE system

SiO2 50 nm/min
Al 250 nm/min
GaAs 300 nm/min
…

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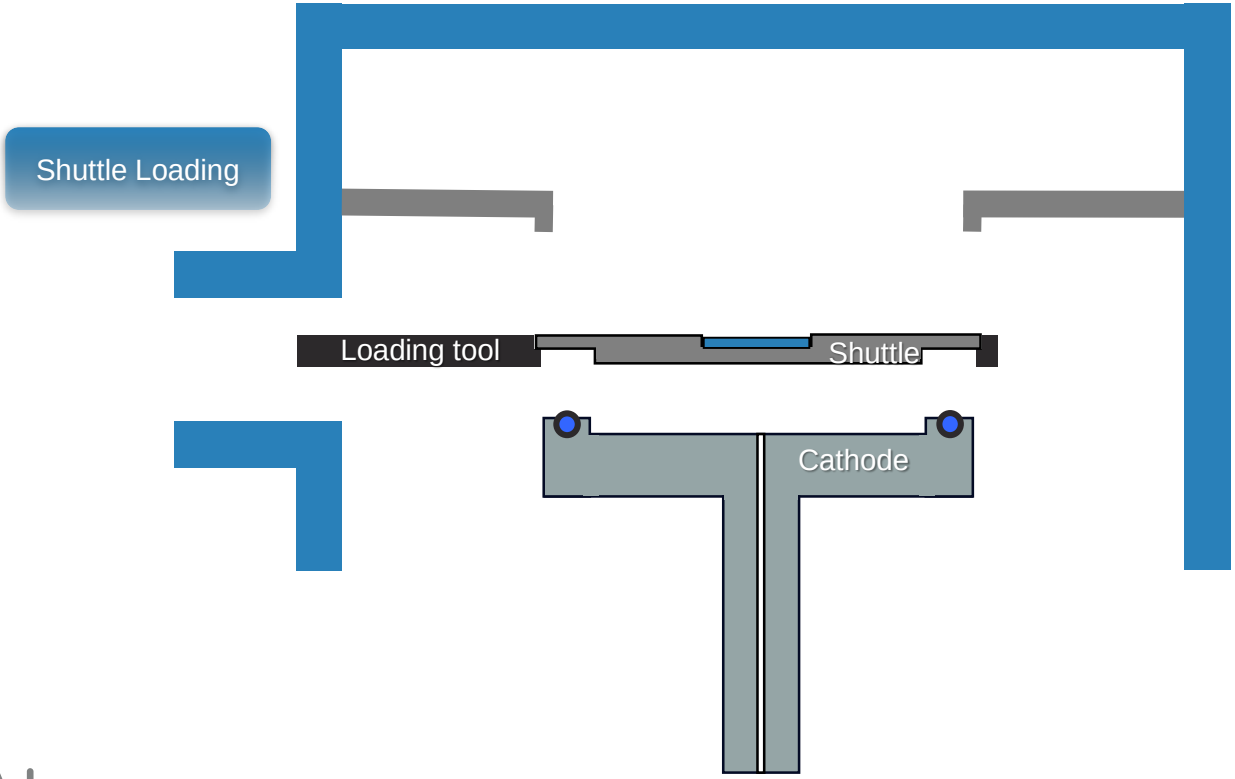
RIE SOURCE

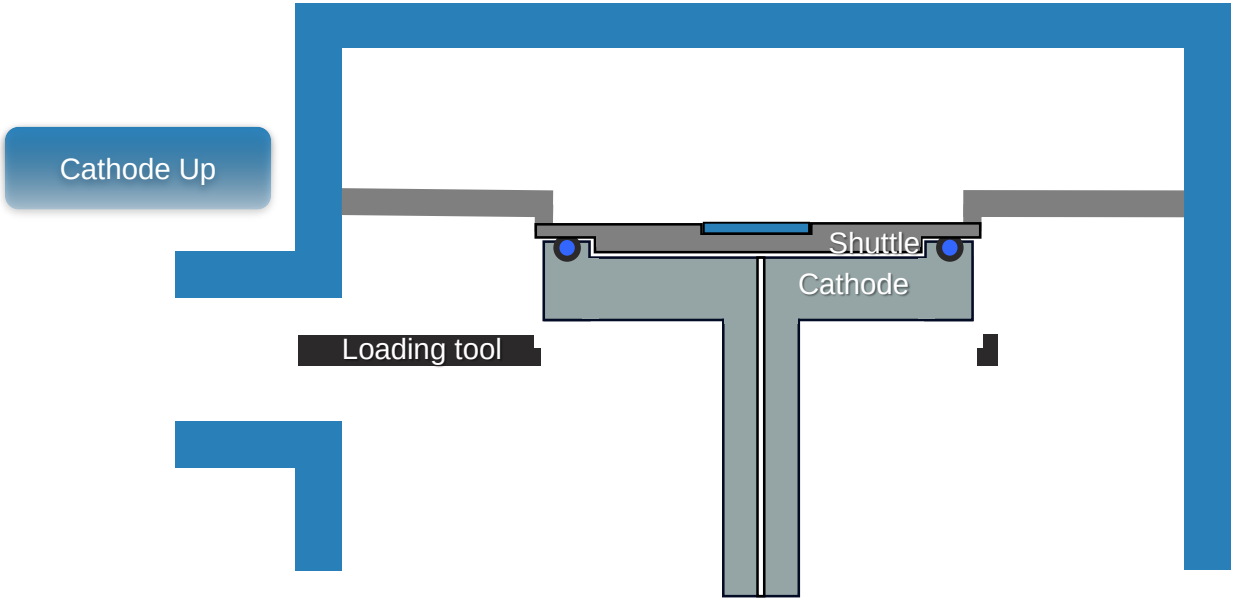
Operation Sequence

1



RIE SOURCE

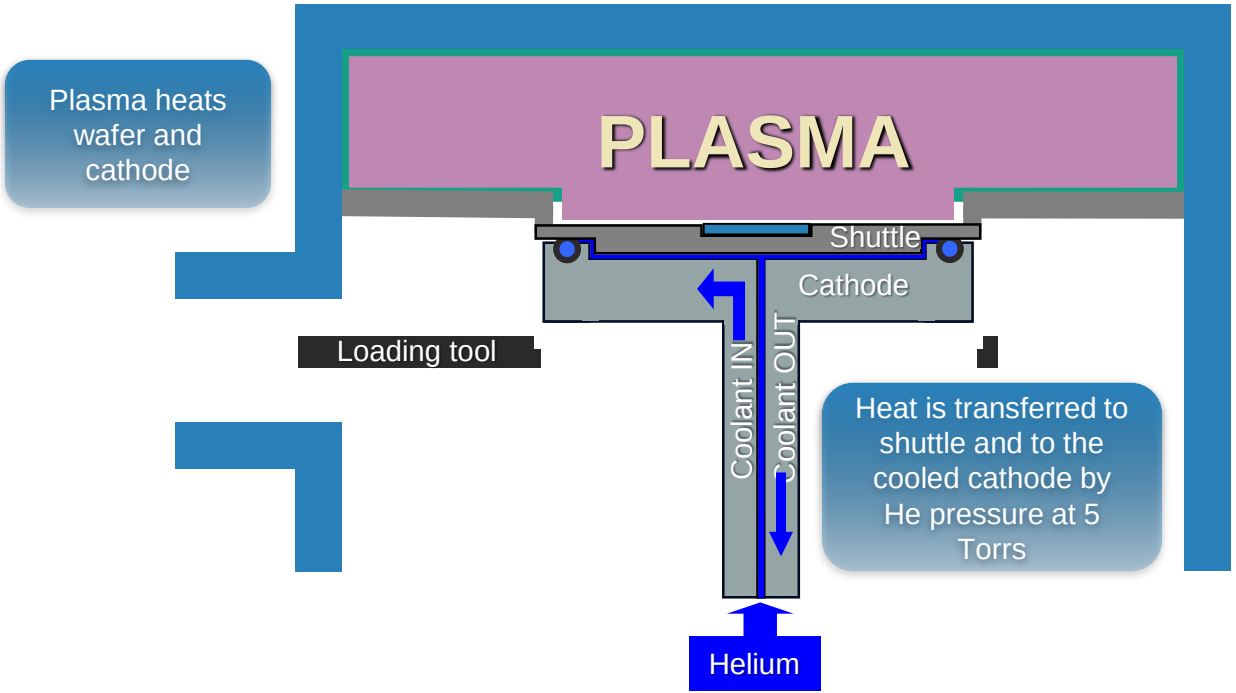
Operation Sequence



2

RIE SOURCE

Operation Sequence



3

PERFORMANCES RIE PROCESSES
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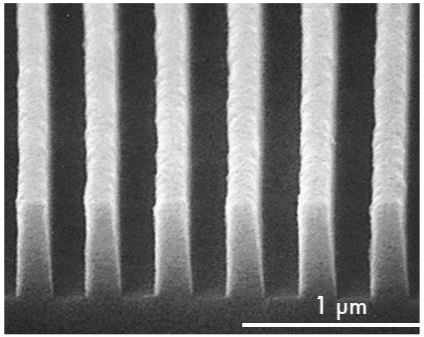
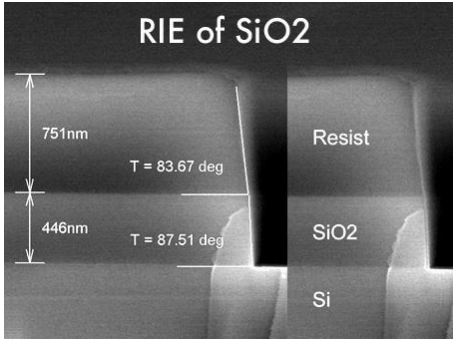
RIE OF SI, OXIDES AND NITRIDES

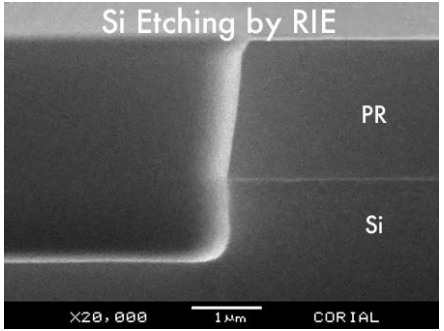
Fluorinated chemistry



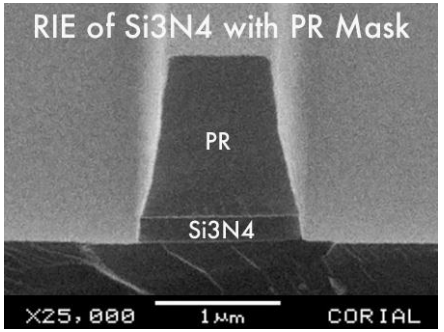
RIE of SiO2 with PR mask – Vertical profile – High etch uniformity



RIE of SiO2 with PR mask – 0.8 µm deep



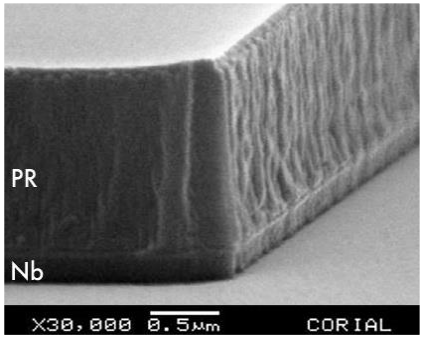
RIE of Si – 0.8 µm deep - Anisotropic profile



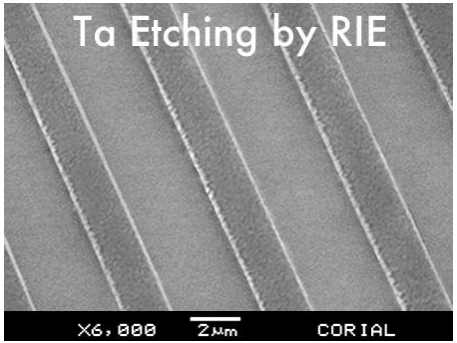
RIE of Si3N4 - 0.8 µm deep

RIE OF METALS

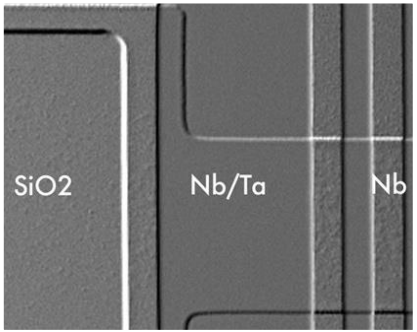
Fluorinated chemistry



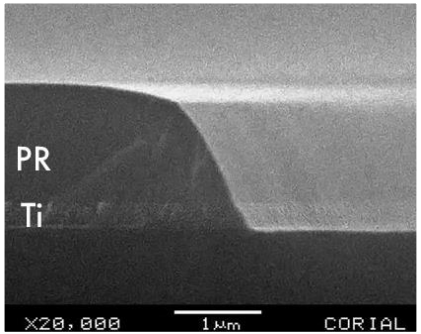
Nb etching with PR mask – Anisotropic profile



Ta etching with PR mask – Anisotropic profile



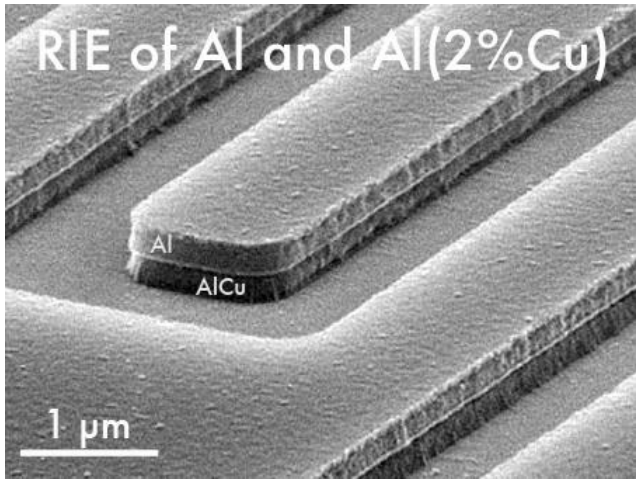
RIE of Nb / Ta



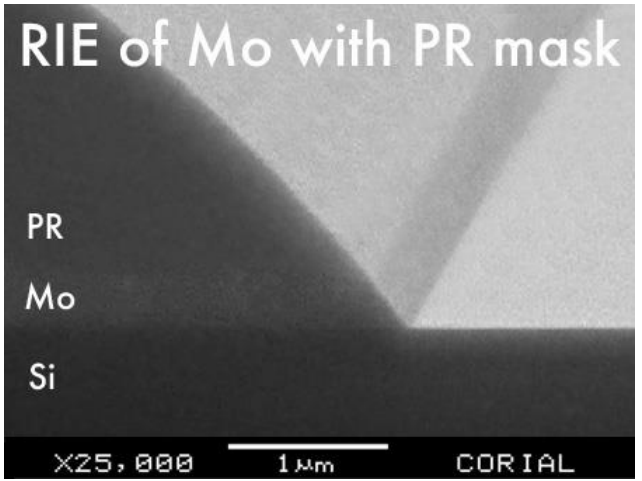
Ti etching with PR mask - Anisotropic profile

RIE OF METALS

Chlorinated chemistry

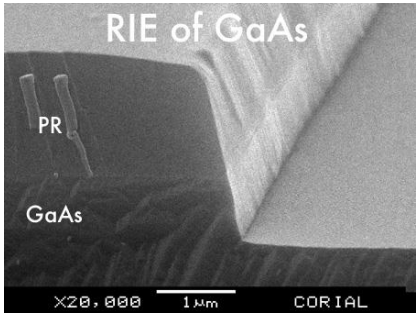


AlCu Etching with PR mask – Selective process

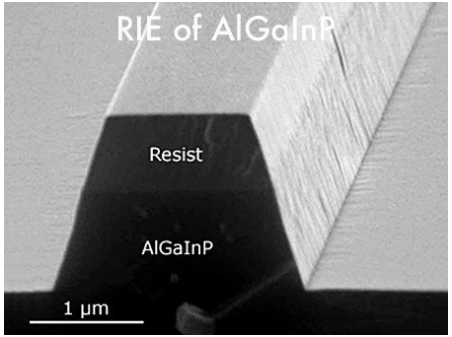


Mo Etching with PR mask

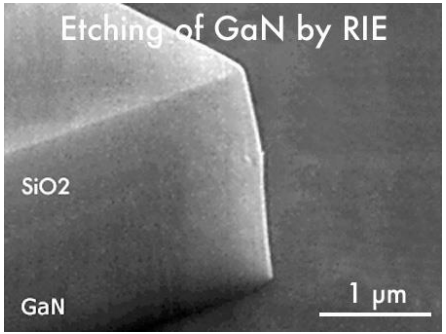
RIE OF III-V COMPOUNDS



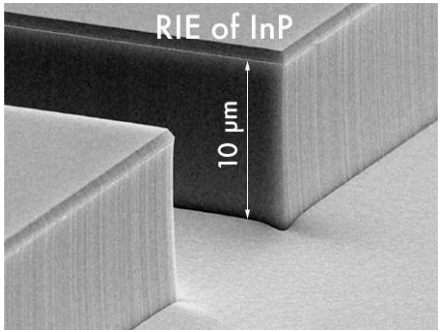
RIE of GaAs – High etch rate – High selectivity



RIE of AlGaInP – PR mask



RIE of GaN – SiO2 mask



RIE of InP – High etch rate

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%
GaN	SiO2	200	5	±5%
GaAs	PR	300	6	±5%
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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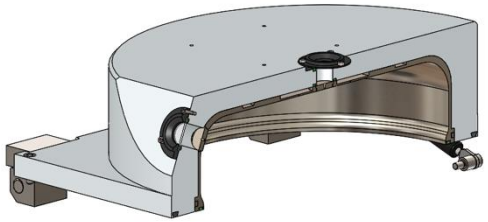
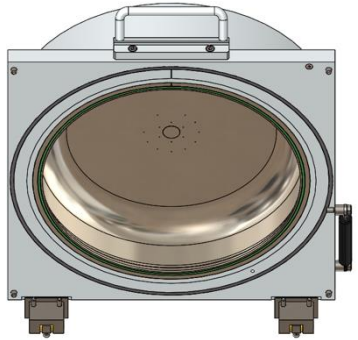
SPUTTER ETCH

RIE process chamber for etching and sputtering



LINER TO COLLECT ETCH-BY-PRODUCTS AND SPUTTERED MATERIALS

EASY LINER replacement by a single person



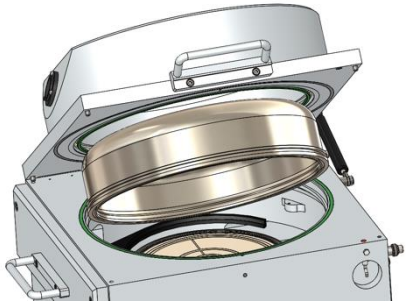
5 min
Liner replacement

1 min
Reactor Venting

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

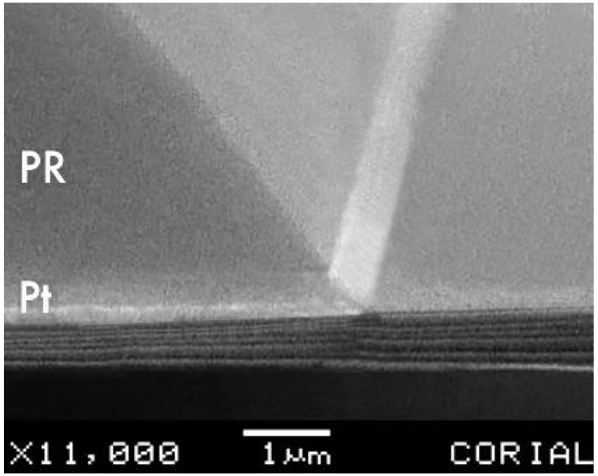
5 min
Plasma cleaning

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



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

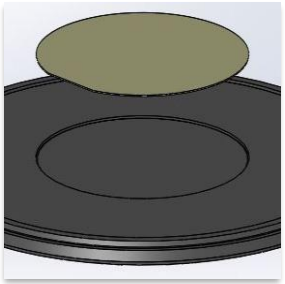
Portfolio

NG20 wafer carrier

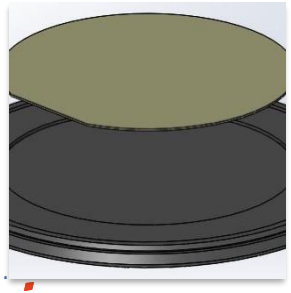
50 mm wafer

75 mm wafer

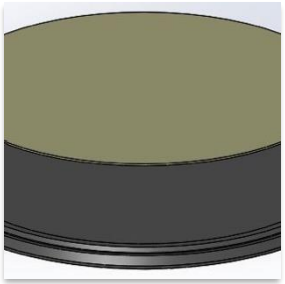
100 mm wafer



150 mm wafer

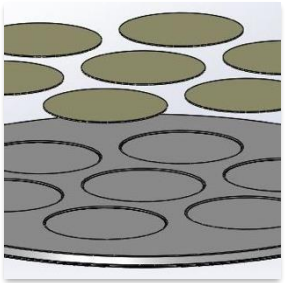


200 mm wafer

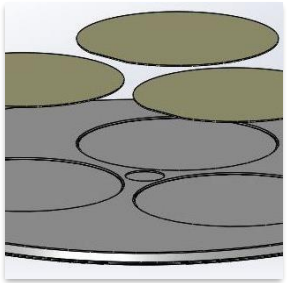


NQ200 wafer carrier

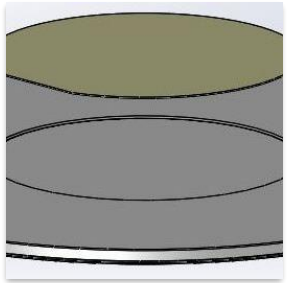
50 mm wafer



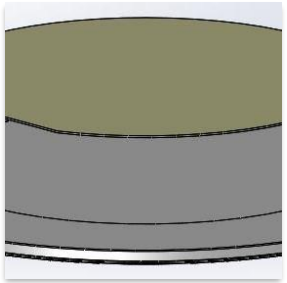
75 mm wafer



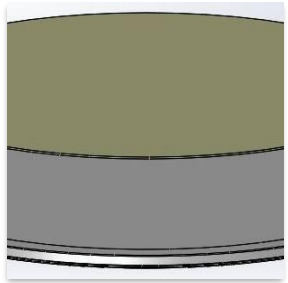
100 mm wafer



150 mm wafer



200 mm wafer



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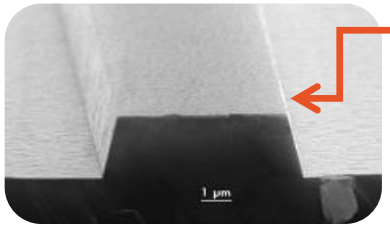
SHUTTLE HOLDING APPROACH

Impact on Performances

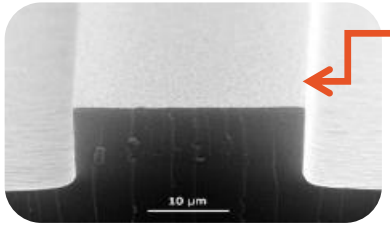
SiO2 etching with aSi-H mask

Conductive Shuttle



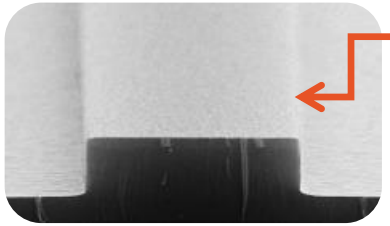
Positive slope

Thick Quartz
Conductive Shuttle



Negative slope

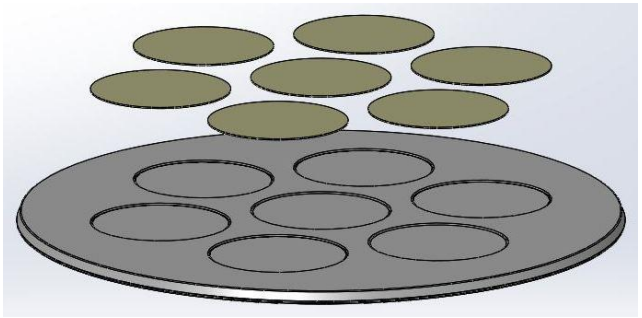
Optimized Quartz
Conductive Shuttle



Vertical slope

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

USABILITY
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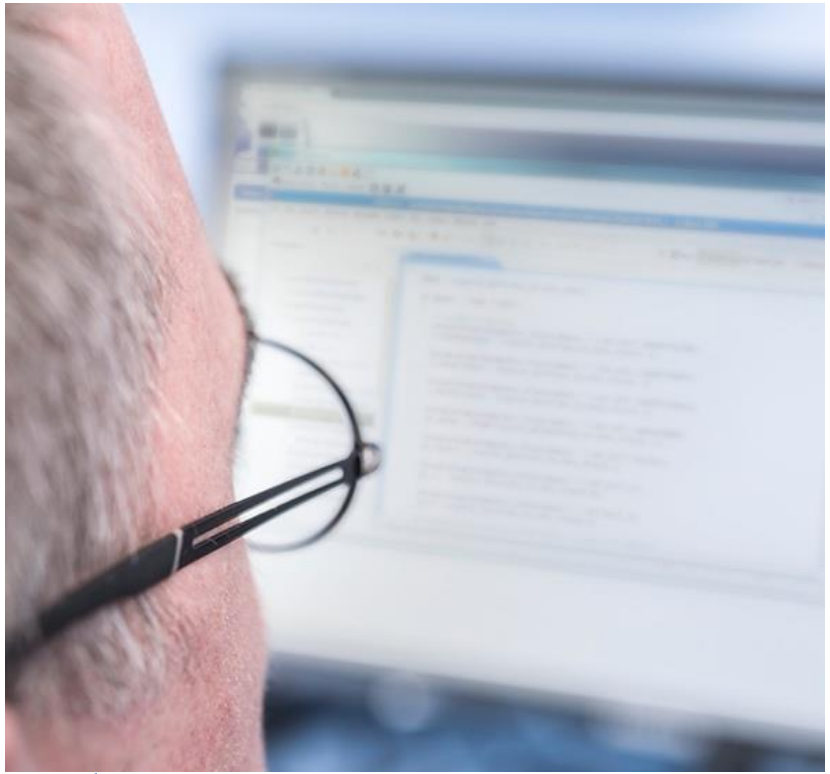
PROCESS CONTROL SOFTWARE

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

REPROCESSING 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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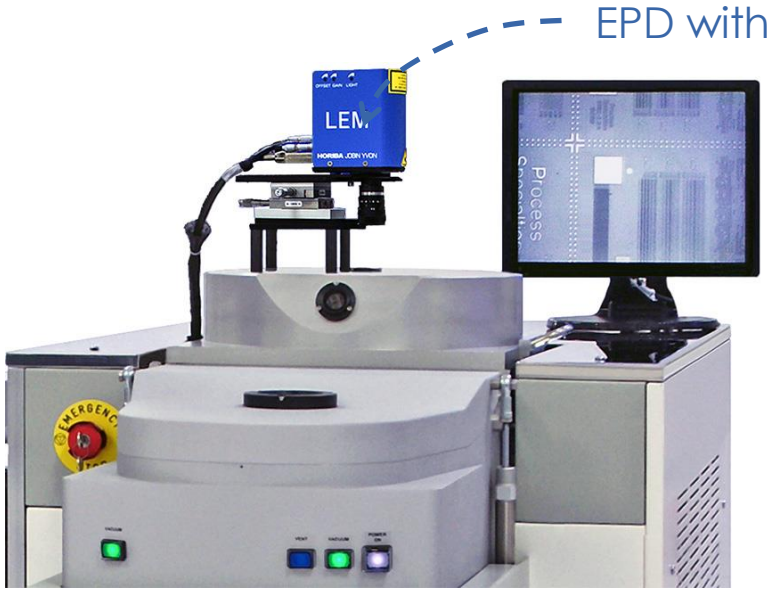
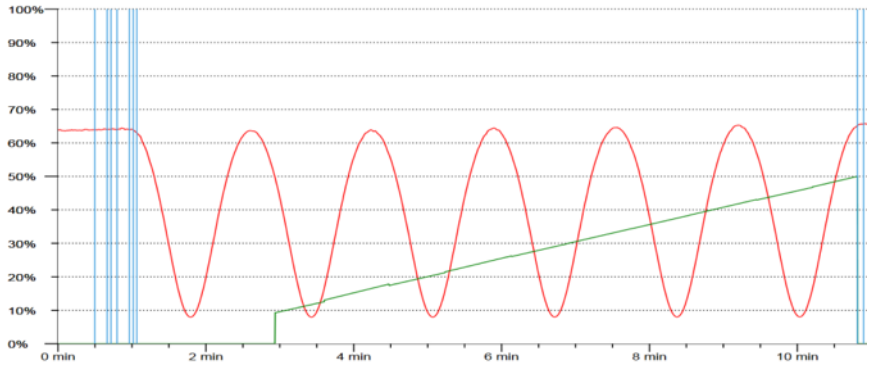
END POINT DETECTION





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

CORIAL 210RL

Anisotropic RIE etching supported by a wide range of processes

RIE capabilities over a variety of materials including Silicon compounds, metals, polymers, III-V and II-VI compounds

Modular design approach supporting tiered upgrades

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

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