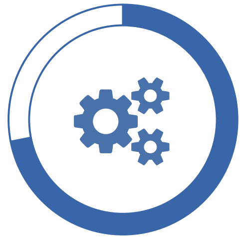
DRIE APPLICATIONS

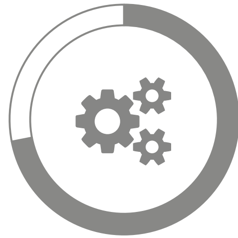
In Corial 210IL

CORIAL 210IL

ICP-RIE equipment for deep etching applications



Wide process range for silicon, silicon carbide, glass, sapphire, and quartz deep etch



Support time-multiplexed processes (Bosch) in conventional dry etch reactor

Smaller wafer pieces up to full 200 mm wafer

CORIAL
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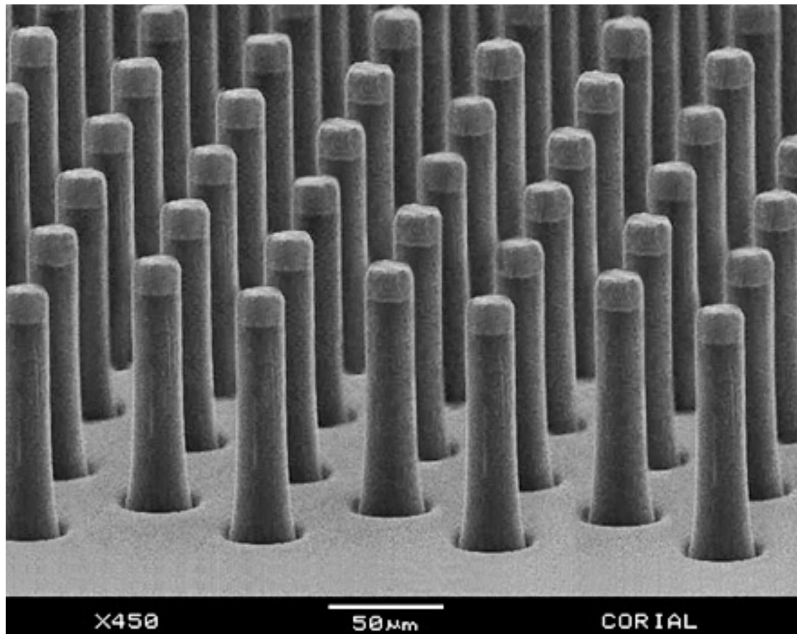
PERFORMANCES

GLASS DRIE PROCESS ON CORIAL 210IL

DRIE OF GLASS



> 800 NM/MIN
ETCH RATE

> 15
SELECTIVITY TO Ni MASK

+30% ETCH RATE
IMPROVEMENT OVER STANDARD PROCESS

> 100 µm ETCH DEPTH

CATHODE OPTIMIZED FOR Ni MASK CLAMPING

± 3 %
UNIFORMITY

NO ROUGHNESS

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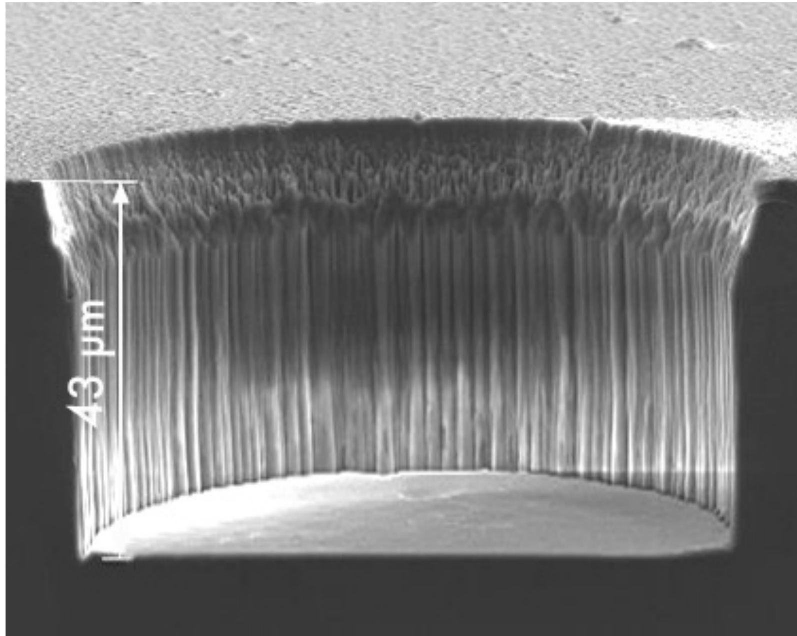
PERFORMANCES

SIC DRIE PROCESS ON CORIAL 210IL

SIC VIA ETCH PROCESS WITH NI MASK



> 1400 NM/MIN
ETCH RATE

> 20
SELECTIVITY TO Ni MASK

SMOOTH
SIDEWALLS

> 100
µm ETCH DEPTH

ANISOTROPIC ETCH PROFILE

± 3 %
UNIFORMITY

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PERFORMANCES

SI DRIE PROCESS ON CORIAL 210IL WITH COSMA PULSE SOFTWARE

COSMA PULSE IS A CONTROL SOFTWARE THAT BROADENS CONVENTIONAL TOOLS’ PROCESS CAPABILITIES TO ENABLE TIME-MULTIPLEXED PROCESSES

COSMA PULSE DESCRIPTION

Advanced Process Control

EASY

RECIPE PROGRAMATION

ALL PARAMETERS

CAN BE CONTROLLED AND PULSED

10 ms

DATA AQUISITION

+/-0,1%

ACCURACY

ON BIAS FINE TUNING

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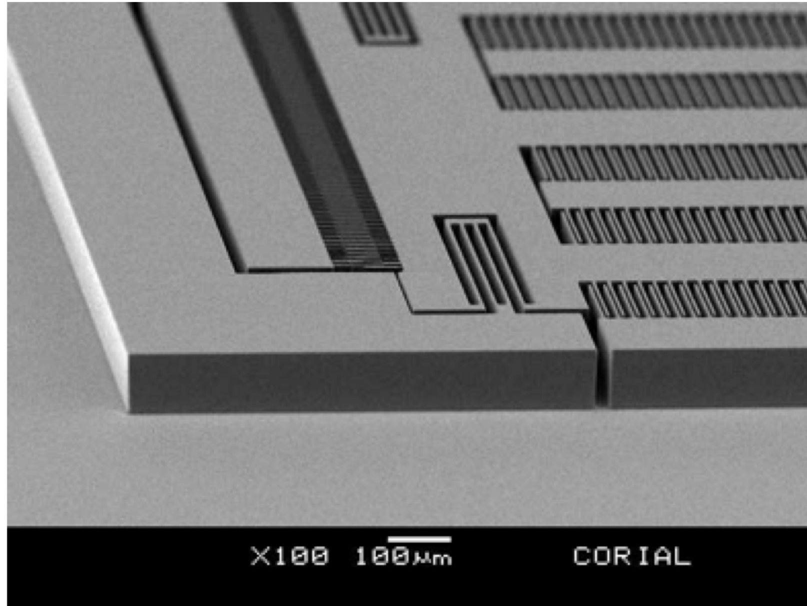
SI DRIE ON CORIAL 210IL



CORIAL Bosch-like process has 3 steps

step 1 - Polymer deposition by C4F8 plasma

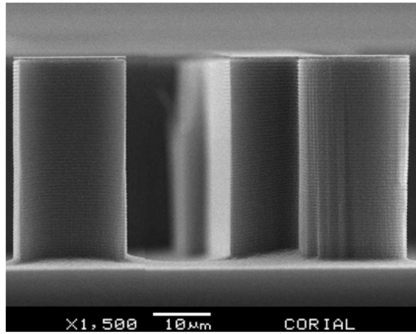
step 2 - Polymer etching by SF6 plasma

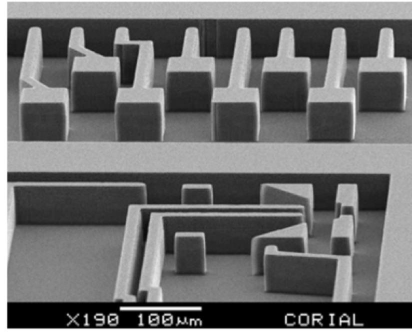
step 3 - Silicon etching with 20W of RF power, which was used to increase the silicon etching rate

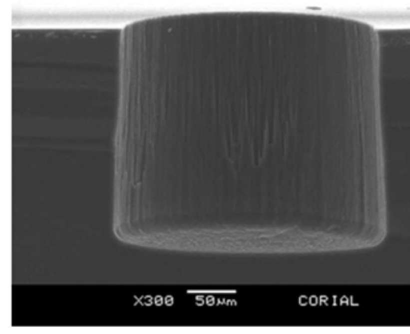
To alternate between each step, **COSMA pulse software** is required for pulsing consecutively C4F8 gas flow, SF6 gas flow, LF and RF power

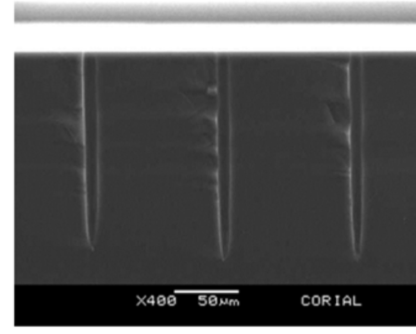
DRIE OF SILICON

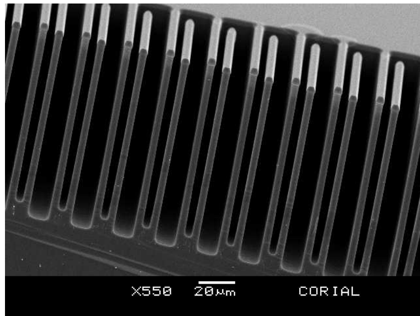
Precise control of the etch profile, fast etch rates, and excellent etch uniformity

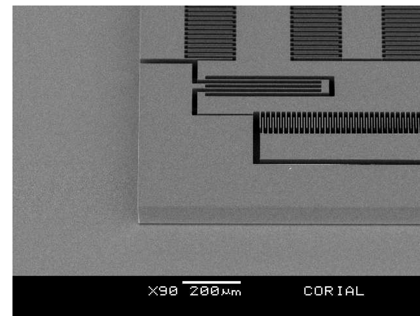












DRIE OF SILICON

Various Aspect Ratios

Feature size (µm)	Etched depth (µm)	Aspect ratio	Etch rate (µm/min)	Mask	Selectivity (vs. mask)
Ø250	Through wafer	1:2	> 3.0	SiO2	330
Ø100	515	1:5	> 2.9	PR	85
Ø20	280	1:14	> 1.5	SiO2	155
Ø5	180	1:35	> 1.0	SiO2	100

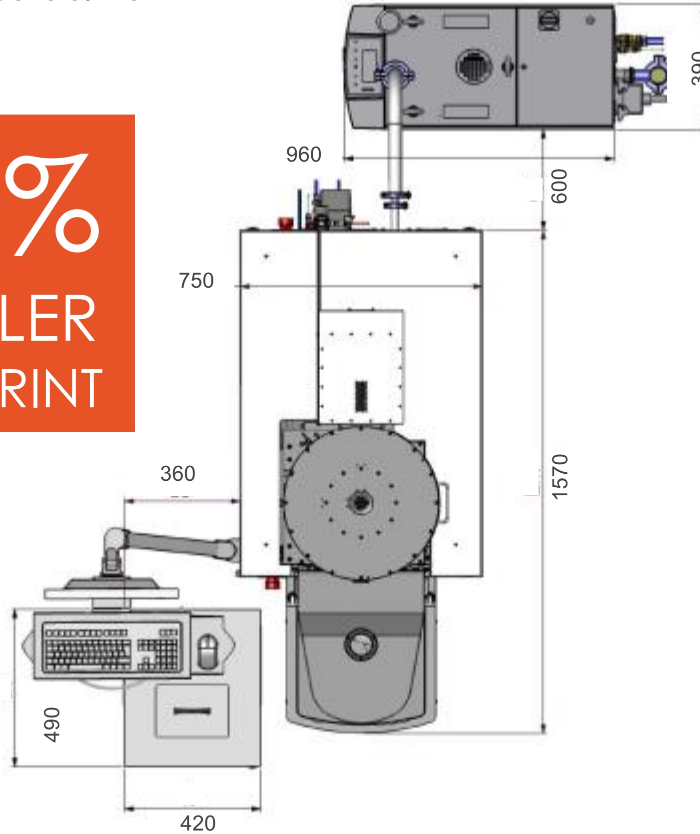
Results obtained with 100 mm wafer, 20% Si open area

SYSTEM DESCRIPTION
CORIAL 210IL

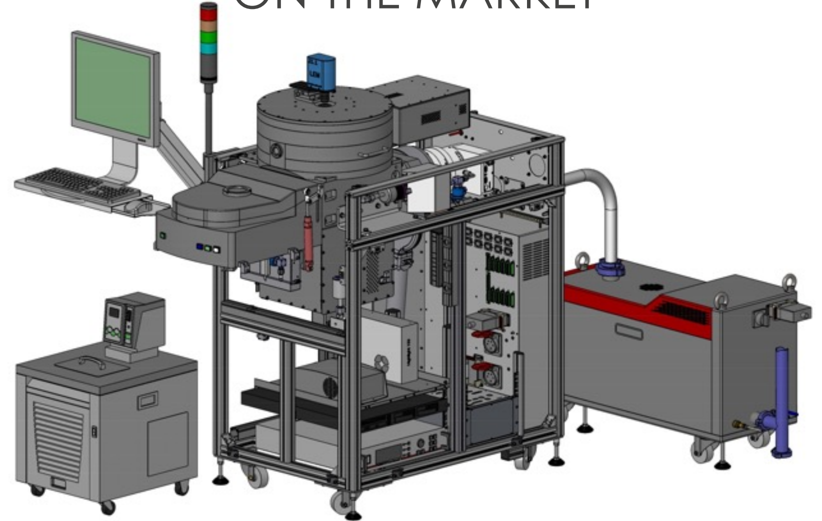
SYSTEM DESCRIPTION

General View

30 %
SMALLER FOOTPRINT



THE MOST COMPACT MACHINE ON THE MARKET



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SYSTEM DESCRIPTION

Detailed View

EPD with laser

ICP reactor

Load lock

Pumping system
(TMP 500l/s and dry pump 110 m^3/h)

Chiller / Heater

HV and LV power supplies

ICP generator
(2 Mhz)

RF generator
(13,56 Mhz)

Process controller

CORIAL
A Plasma-Therm Company

SYSTEM DESCRIPTION

Loading

< 180 s
LOADING TIME

Vacuum robot
FAST AND REPEATABLE LOAD AND UNLOAD

Shuttle
EASY EXCHANGE BETWEEN SUBSTRATE SHAPE AND SIZE

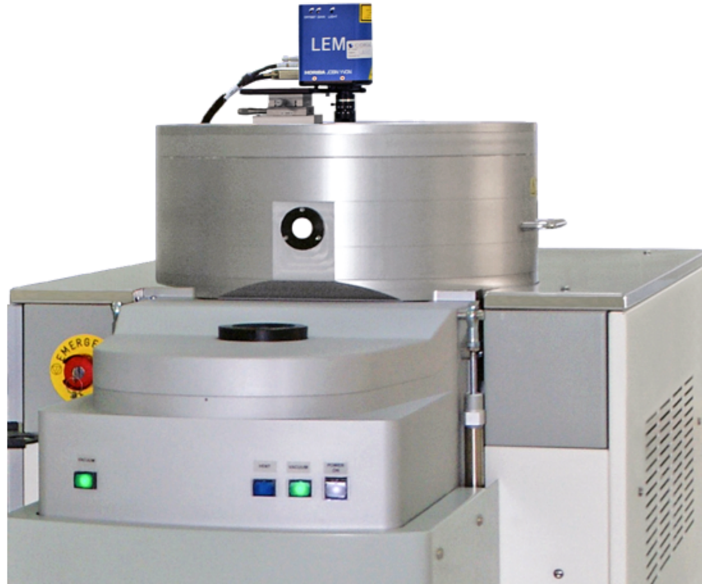
ICP SOURCE

CORIAL 210IL

ICP SOURCE

CORIAL's Latest Generation of Reactor

FAST AND UNIFORM ETCHING



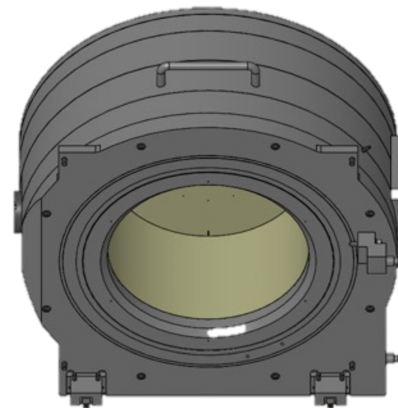
1. Load lock to run fluorinated and chlorinated chemistries in the same process recipe
2. Load lock for stable and repeatable process conditions
3. RF match box with matching range up to 2000 W
4. Uniform temperature control (from -50°C) for best repeatability
5. Hot walls (>250°C) minimize polymer condensation for selective processes
6. Hot walls and retractable liner reduce clean time
7. Retractable liner and shuttle holding to minimize process cross-contamination

ICP SOURCE

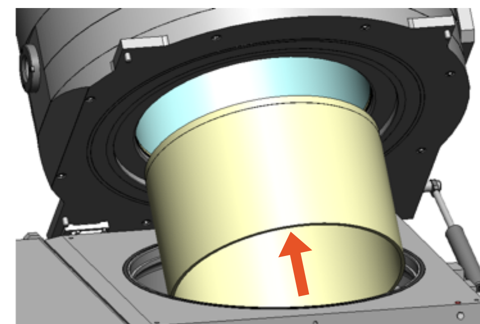
Retractable Quartz Liner

THE LINER FOR HARSH ICP-RIE PROCESSES

EASY LINER replacement by a single person



ZERO CROSS CONTAMINATION



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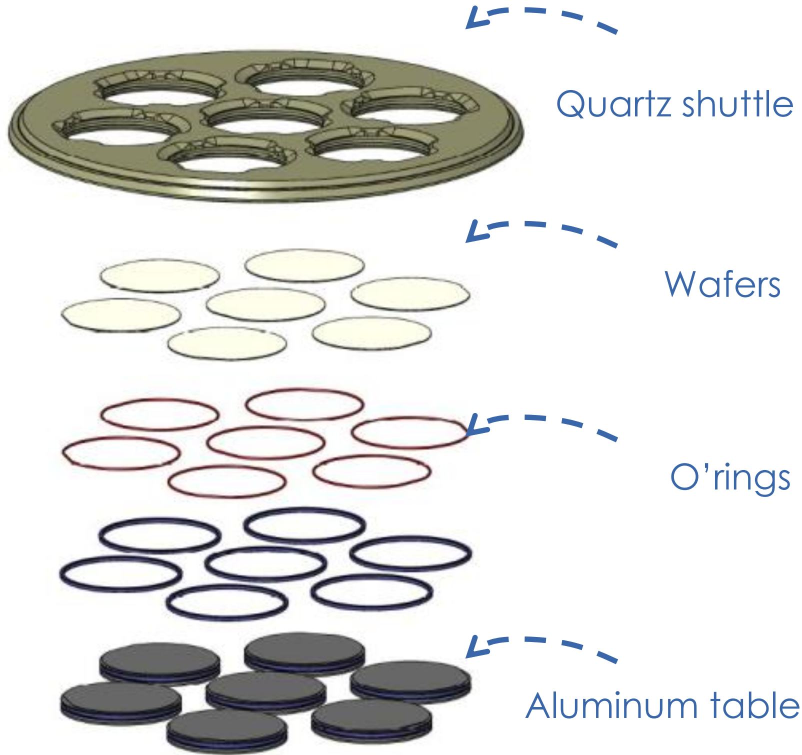
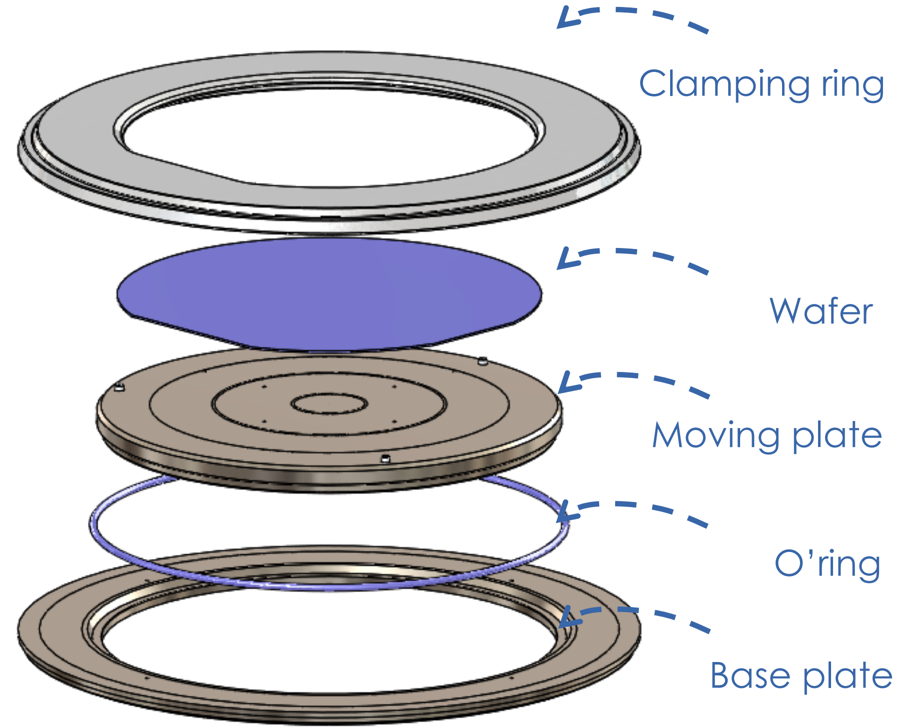
SHUTTLE HOLDING APPROACH
CORIAL 210IL

SHUTTLE HOLDING APPROACH

Portfolio

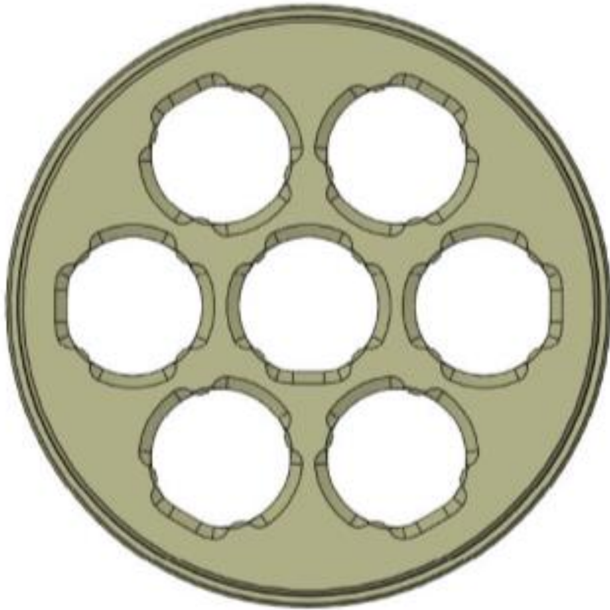




Guaranteed no wafer damage due to SOFT wafer clamping

SHUTTLE HOLDING APPROACH

Benefits



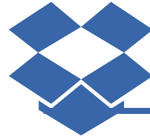
1. Quick adaptation to sample shape and size
2. Optimum process conditions with NO modification of process chamber
3. Limited cross contamination between processes by using dedicated shuttles
4. Shuttles for single wafer treatment: 1 x 2'', 1 x 3'', 1 x 4'', 1 x 6'', 1 x 8''
5. Shuttles for batch processing : 7 x 2'', 3 x 3''
6. Customized shuttles are available (4'' x 4'', 5'' x 5'', etc)

USABILITY
CORIAL 210IL

PROCESS CONTROL SOFTWARE

COSMA

REMOTE CONTROL



COSMA

CORIAL OPERATING SYSTEM FOR MACHINE

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

MOBILE APPLICATION

Module & Process Follow-Up I Alarms & Warnings
Connected Users

REPROCESSING SOFTWARE

COSMA RS

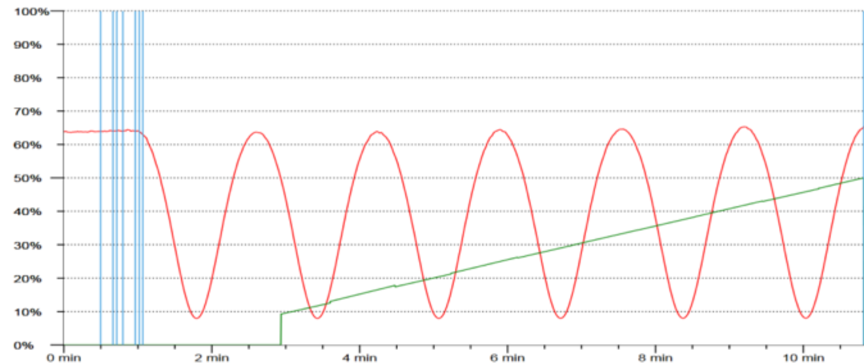
DISPLAY UP TO
4
PARAMETERS FROM A RUN

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

REMOTE
ANALYSIS OF RUNS

DRAG AND DROP
CURVES TO CHECK PROCESS REPEATABILITY

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

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CORIAL 210IL

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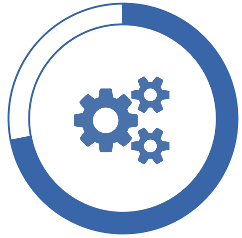

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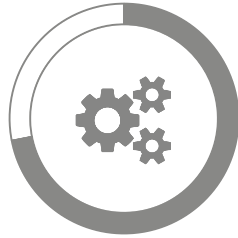

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