



# MICROELECTRONICS & SEMICONDUCTORS APPLICATION





# AGENDA

- ▣ Company and technology
- ▣ Critical dimension
- ▣ Roughness measurement
- ▣ Defect mode analysis
- ▣ Quality control
- ▣ Why Sensofar



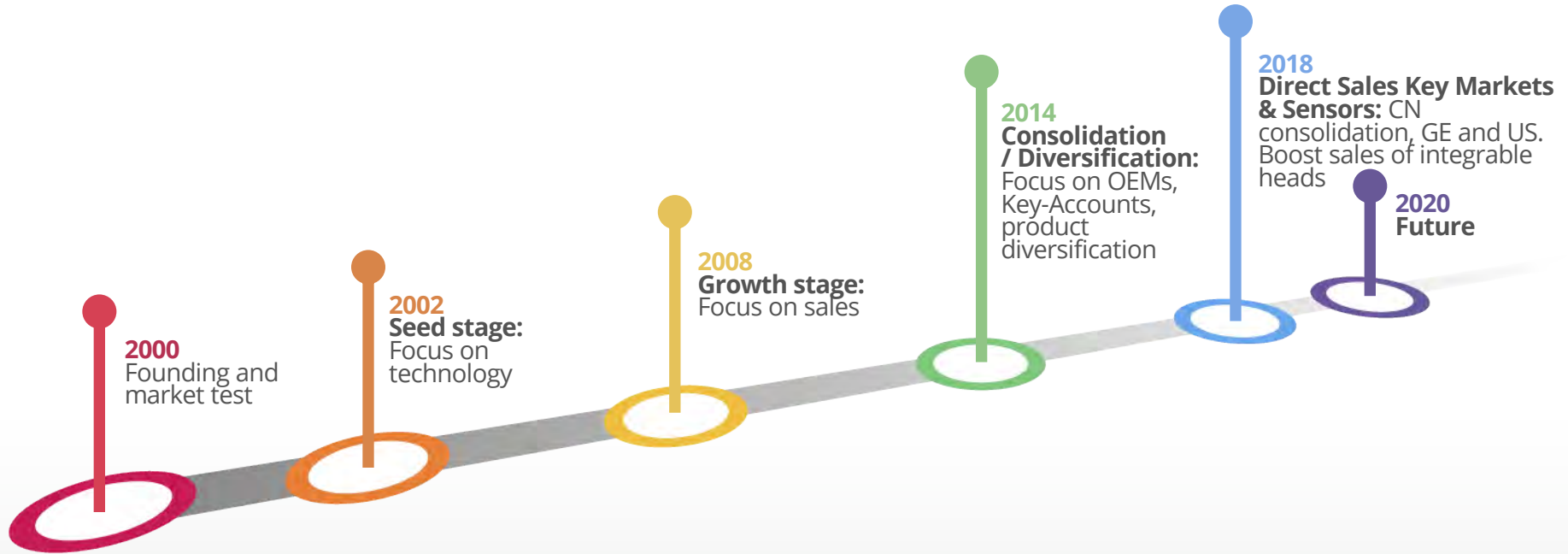
**Adam Platteis**  
USA – Sales Manager

A close-up, high-angle photograph of a microchip, showing a grid of square dies. The dies are arranged in a regular pattern, and each die has a complex, intricate pattern of circuitry and components. The lighting is dramatic, with a dark blue gradient on the left side and a lighter, more detailed view of the chip towards the right. The overall tone is professional and technological.

COMPANY  
TECHNOLOGY

# THE COMPANY

## History



# PARTNER CHANNELS



📍 HQ & Sales offices

📍 Distribution partners & Reps (+35)

MICRO&SEMIC. APPLICATIONS

# PARTNERS & CUSTOMER REFERENCES



# NEW S neox

5<sup>th</sup> Generation 3D Optical Profiler

SENSOFAR.  
METROLOGY



**5X FASTER  
THAN BEFORE**

- ▣ EASY TO USE
- ▣ FASTER THAN EVER

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# NEW S neox

5<sup>th</sup> Generation 3D Optical Profiler

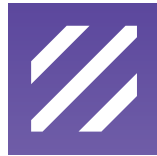
SENSOFAR.  
METROLOGY

## 4-IN-1 TECHNOLOGIES



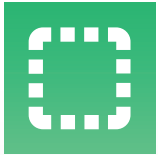
### Confocal

Confocal  
Continuous Confocal  
Confocal Fusion



### Interferometry

Phase Shifting Interferometry (PSI)  
Coherence Light Interferometry (CSI)



### Focus Variation

Ai Focus Variation



### Reflectometry

Thick and thin films

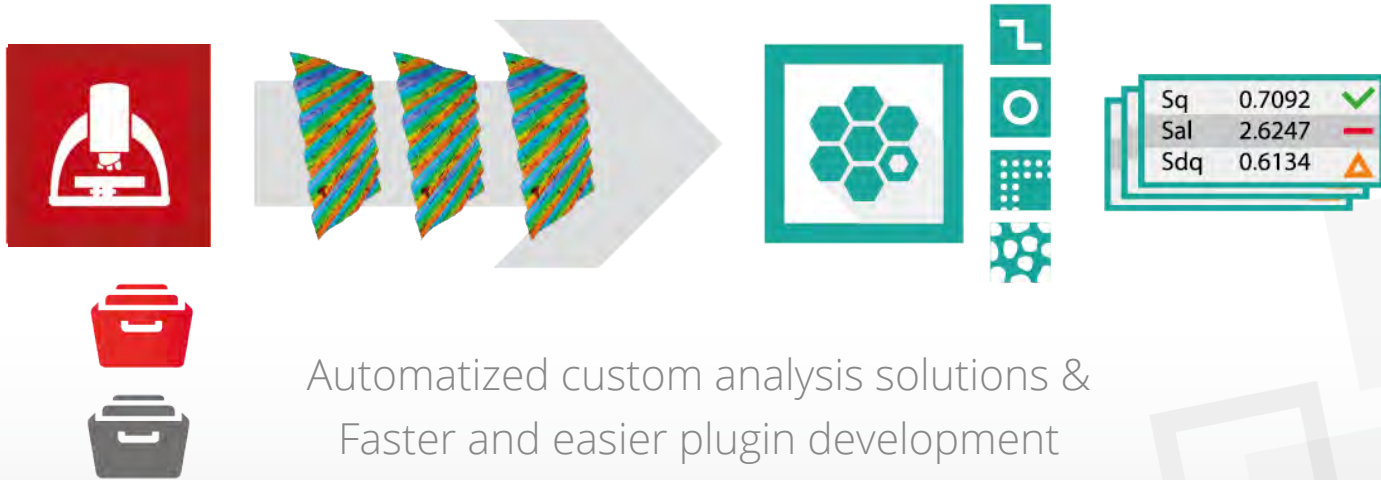




# SensoPRO 3

Automated solution

64-bits customized analysis software for quality control



An aerial photograph of a city grid, showing a dense pattern of streets and buildings. The image is semi-transparently darkened, creating a moody, high-tech atmosphere. The text 'CRITICAL DIMENSIONS' is overlaid in the bottom-left corner in a clean, white, sans-serif font.

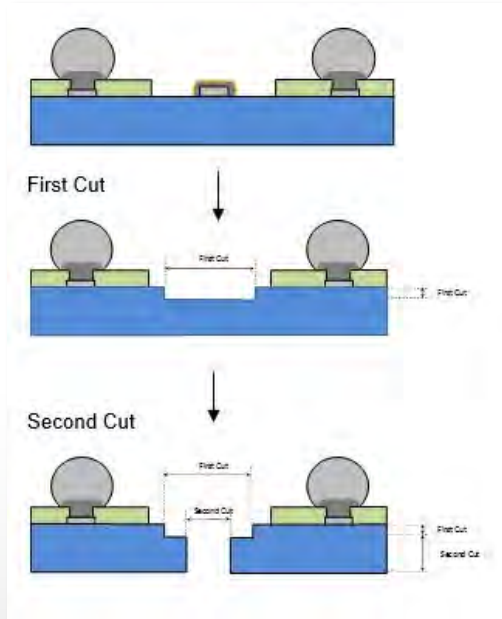
# CRITICAL DIMENSIONS

# WAFER PROCESSING

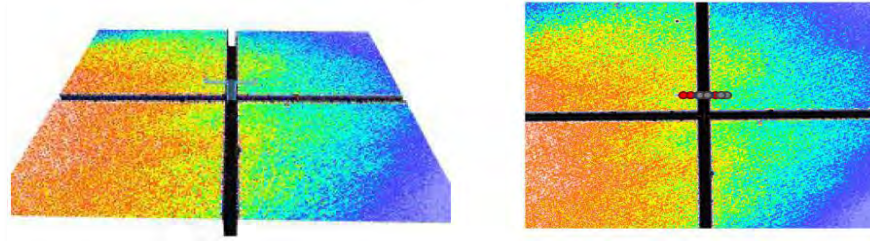
## WLCSP Back-end - Saw Measurements



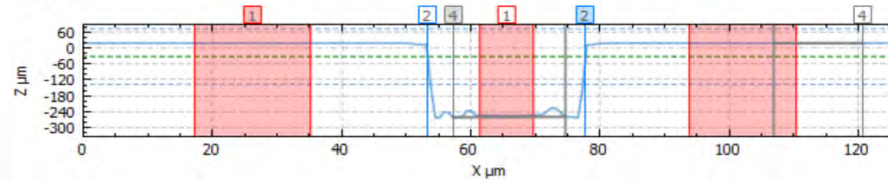
SENSOFAR  
METROLOGY



Results: Location 2b



Profile



Notes

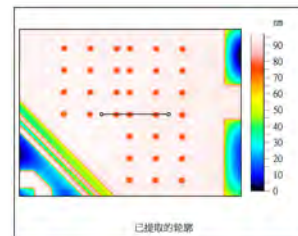
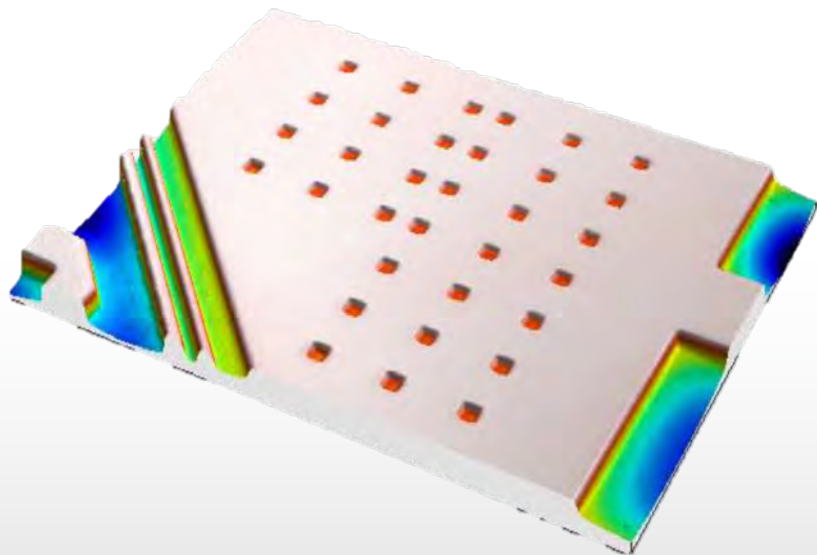
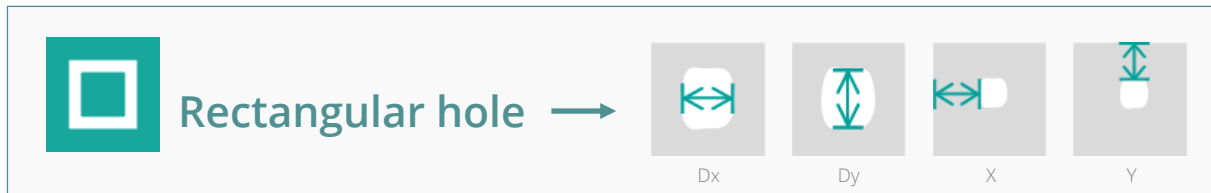
	1	Distance	$\Delta Z = -271.7 \mu\text{m}$
	2	Distance	$\Delta L = 24.84 \mu\text{m}$ $\Delta Z = 1.1789 \mu\text{m}$ $\angle = 2.72^\circ$
	4	Angle	$\angle = 174.2247^\circ$

# CHIP EDGE

PSI mode for 15.6 nm depth via



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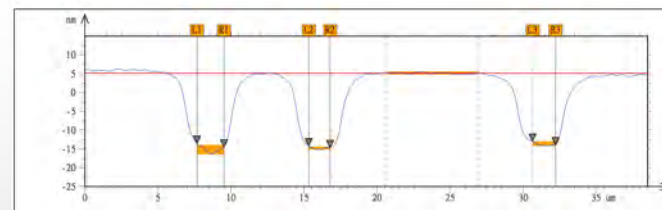
SENSOFAR NEOX

sample : 50 sec (up)

Objective : 100X DI

Mode : PSI

FOV : 127.32 X 95.45  $\mu\text{m}^2$

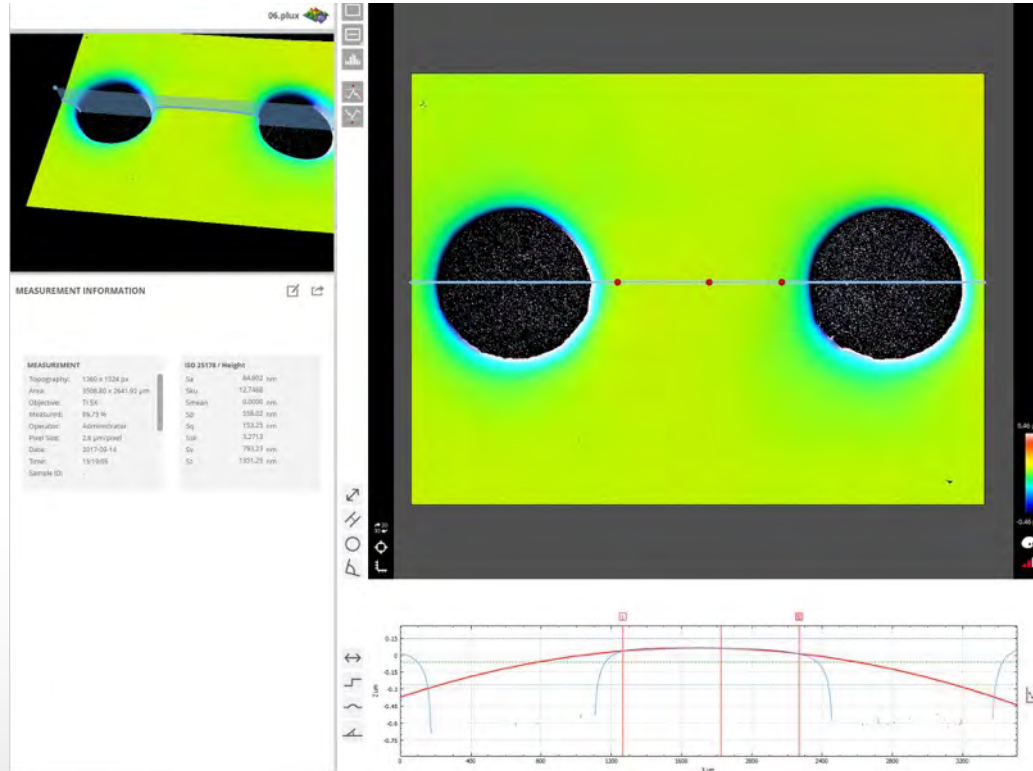


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# RADIUS SURFACE



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METROLOGY

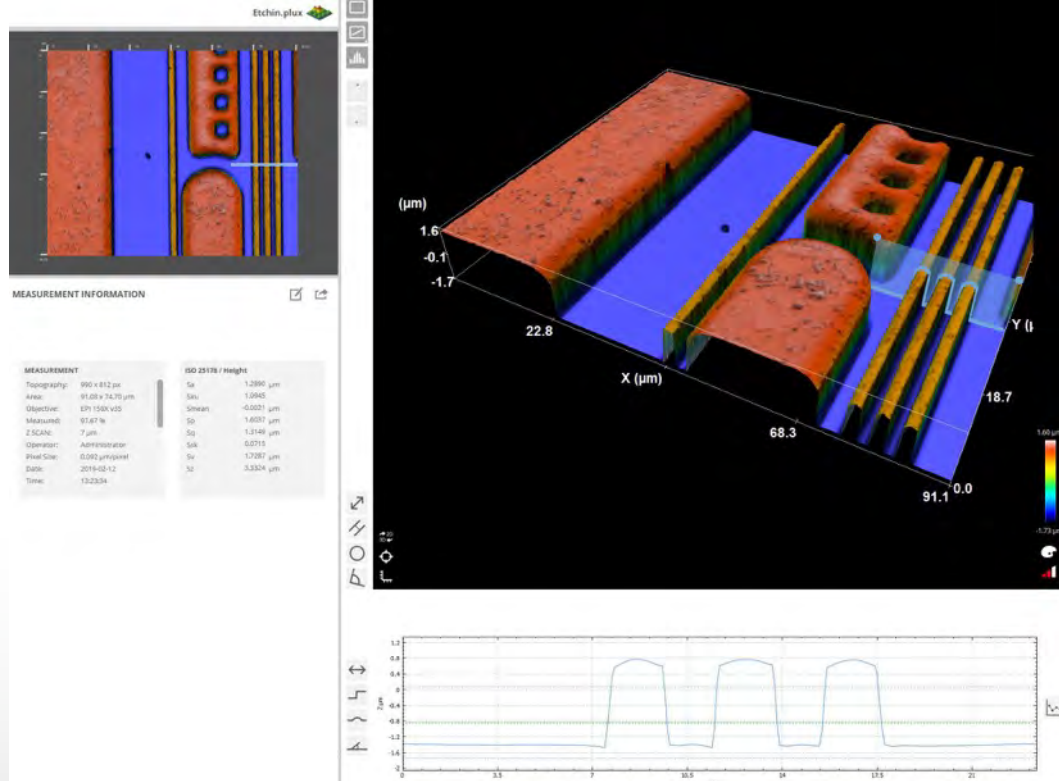


MICRO&SEMIC. APPLICATIONS

# DIMENSION FOR WLCSP



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METROLOGY



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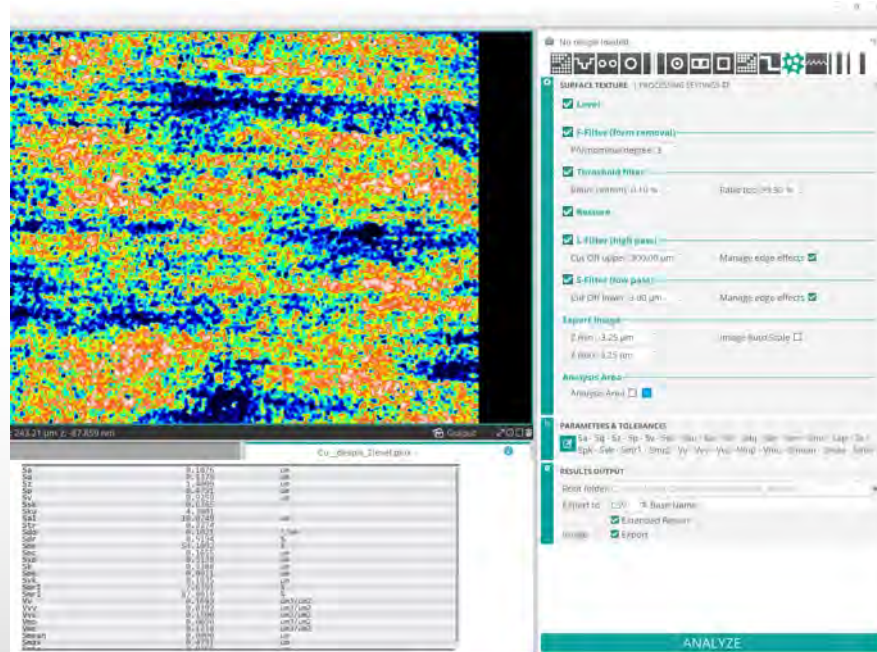
A high-magnification, grayscale image of a silicon wafer. The wafer is divided into a regular grid of square dies. Each die contains intricate patterns of circuitry, including various rectangular blocks, lines, and small circular features. The perspective is slightly angled, showing the curvature of the wafer. The overall tone is dark and technical.

# ROUGHNESS MEASUREMENTS

# COPPER



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METROLOGY



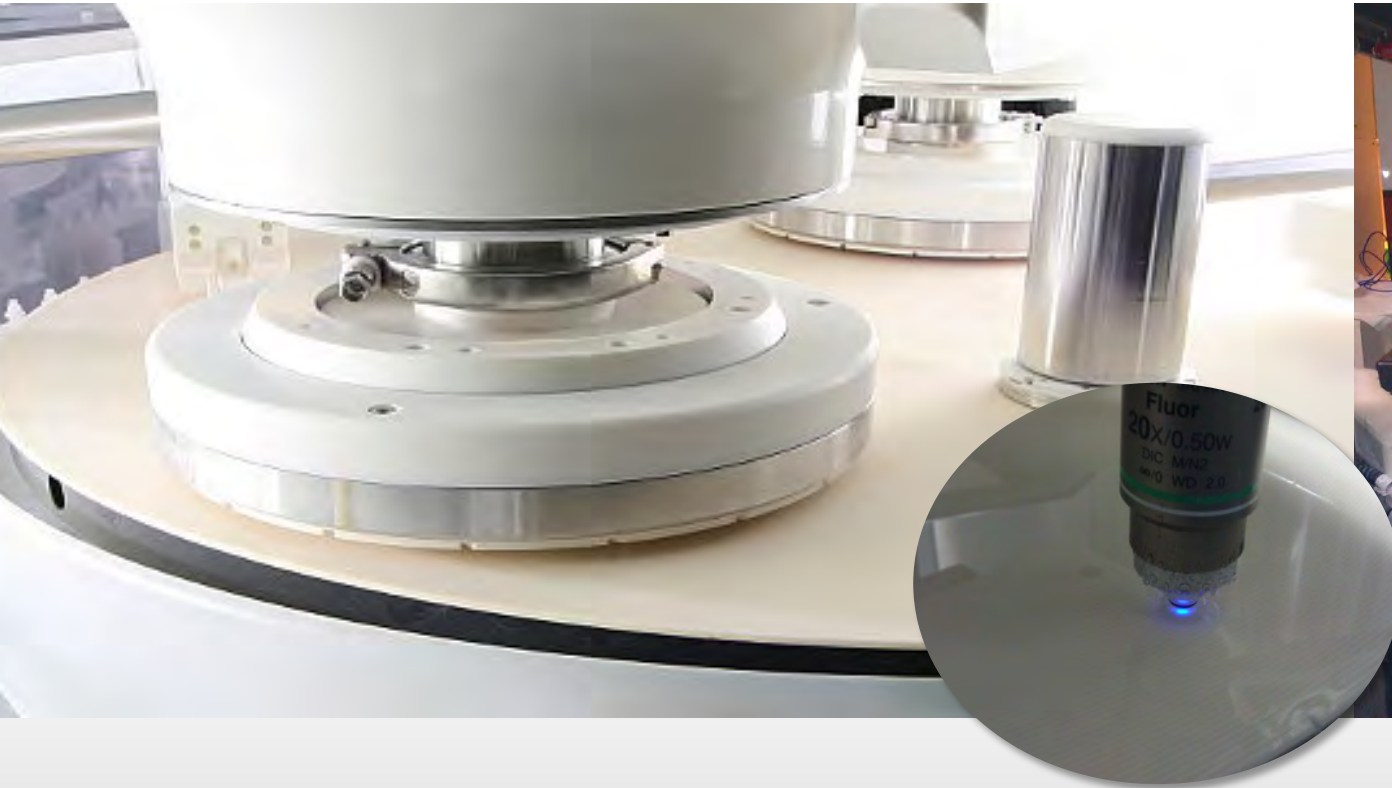
MICRO&SEMIC. APPLICATIONS



# CMP APPLICATION



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METROLOGY



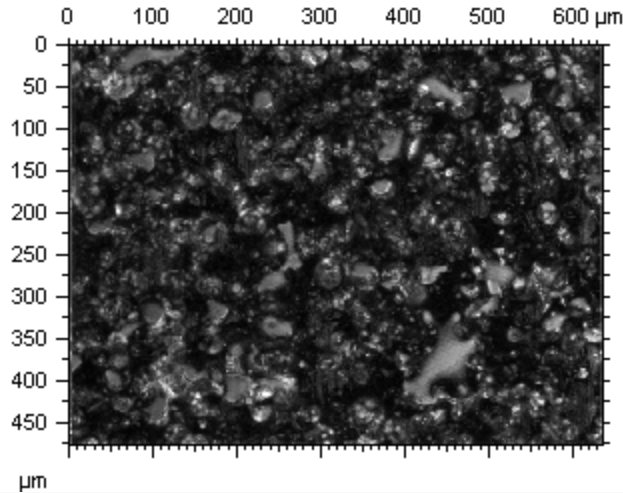
MICRO&SEMIC. APPLICATIONS

# CMP APPLICATION

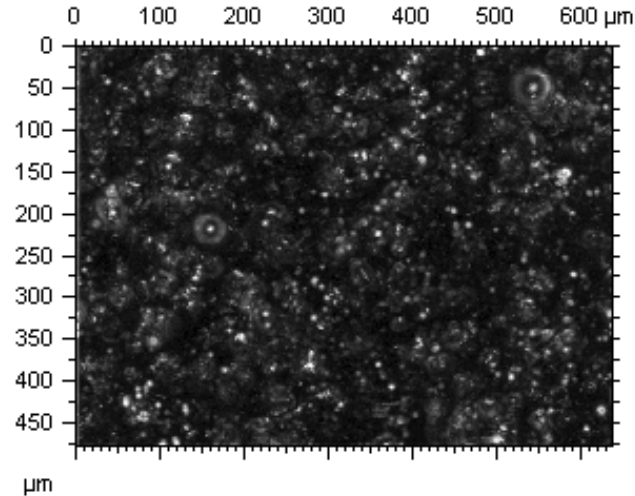


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METROLOGY

## CONFOCAL STACK IMAGE



NEW

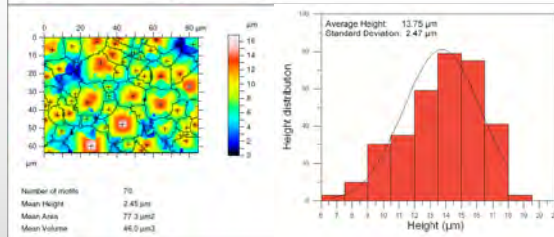
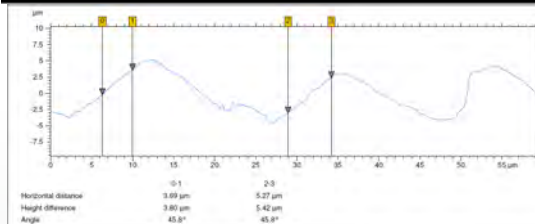
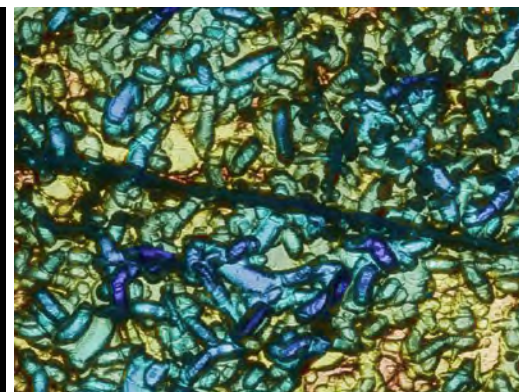
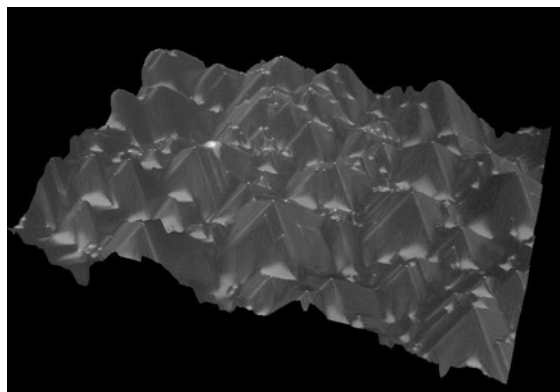


USED

# SOLAR CELL SURFACE TEXTURE



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**ISO 25178**

Hybrid Parameters

Sdr	156.325	%
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Surface area seen from top=  $84.8 \times 63.5 = 5384.8 \mu\text{m}^2$

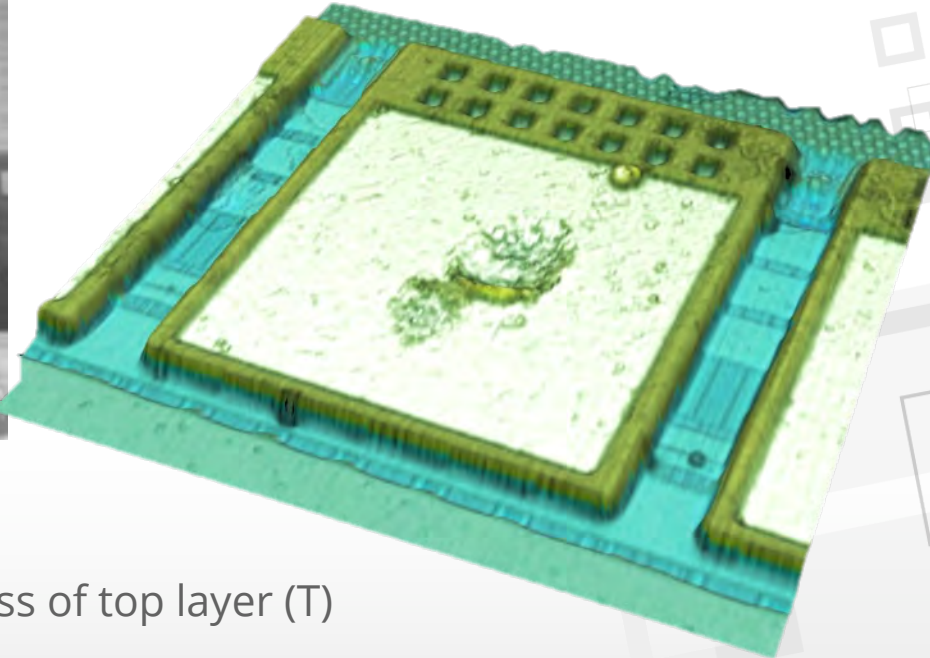
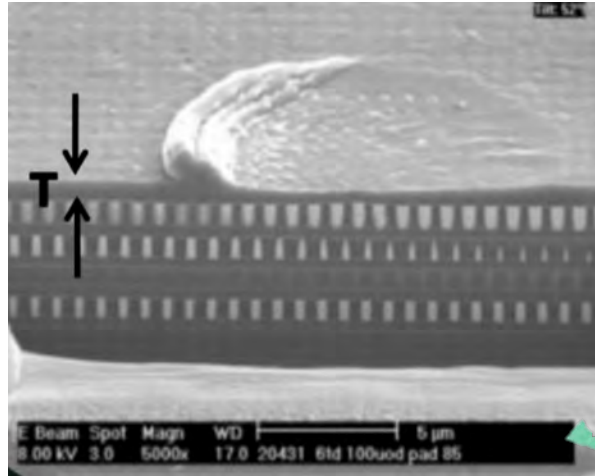
Real 3D surface =  $5384.8 \times 2.56325 = 13802.6 \mu\text{m}^2$

MICRO&SEMIC. APPLICATIONS

A high-magnification, grayscale image of a silicon wafer. The wafer is divided into a regular grid of square dies. Each die contains intricate circuitry, including various patterns, lines, and small rectangular features. The overall appearance is that of a complex, repeating micro-structure. The lighting is slightly uneven, with the center of the wafer appearing brighter than the edges.

# DEFECT MODE ANALYSIS

# BOND PAD DEFECT MODE



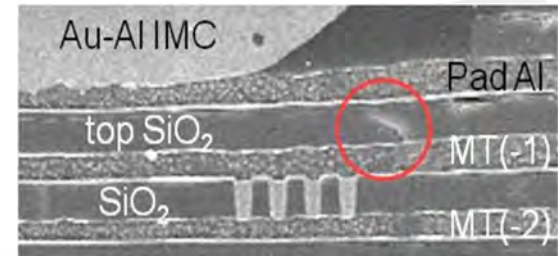
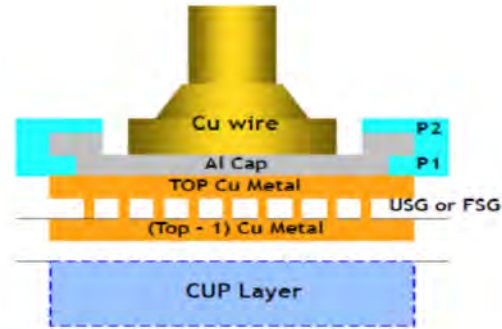
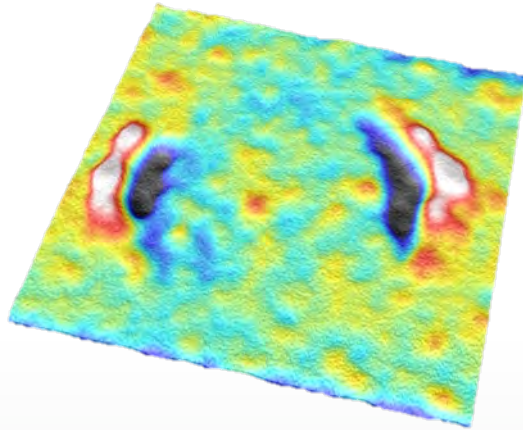
- ❑ Probe depth
  - ❑ Maximum half of the thickness of top layer (T) of pad metallization
  - ❑ Maximum 500 nm

# BOND PAD DEFECT MODE

Infineon



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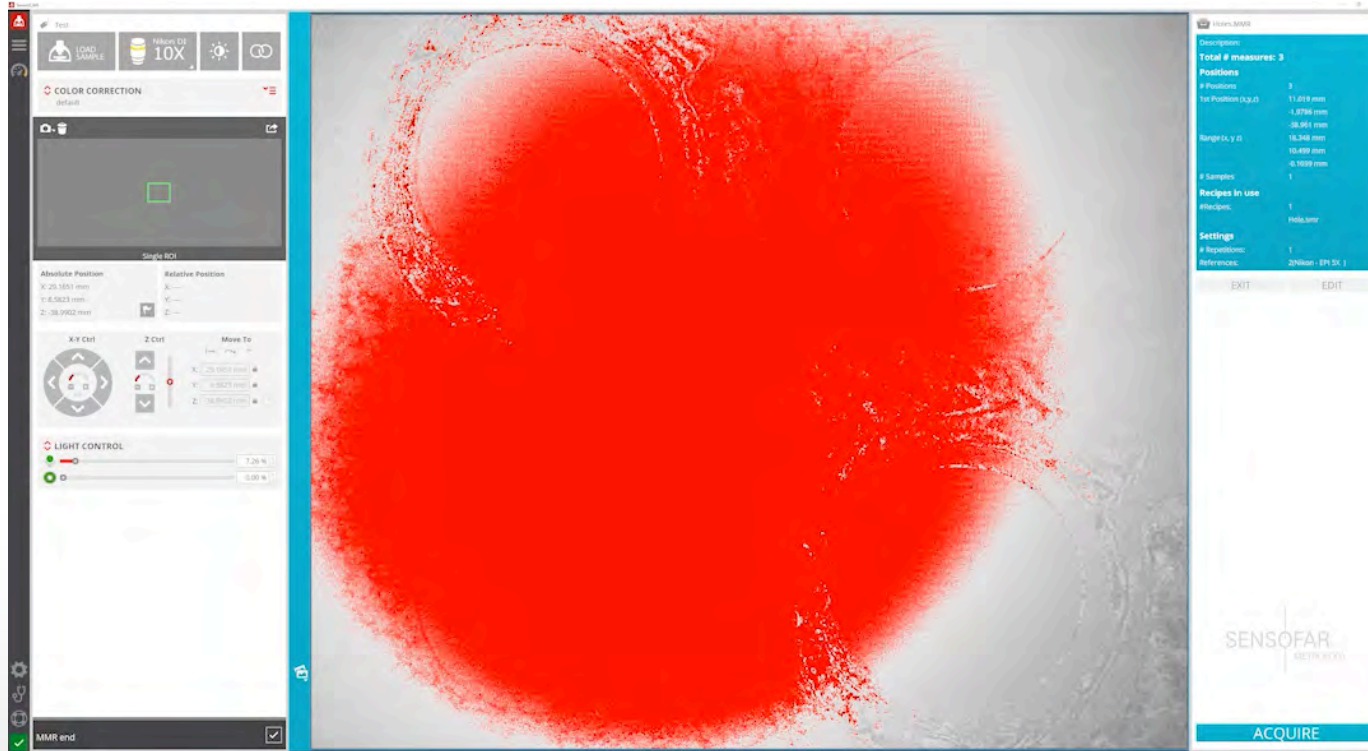


MICRO&SEMIC. APPLICATIONS

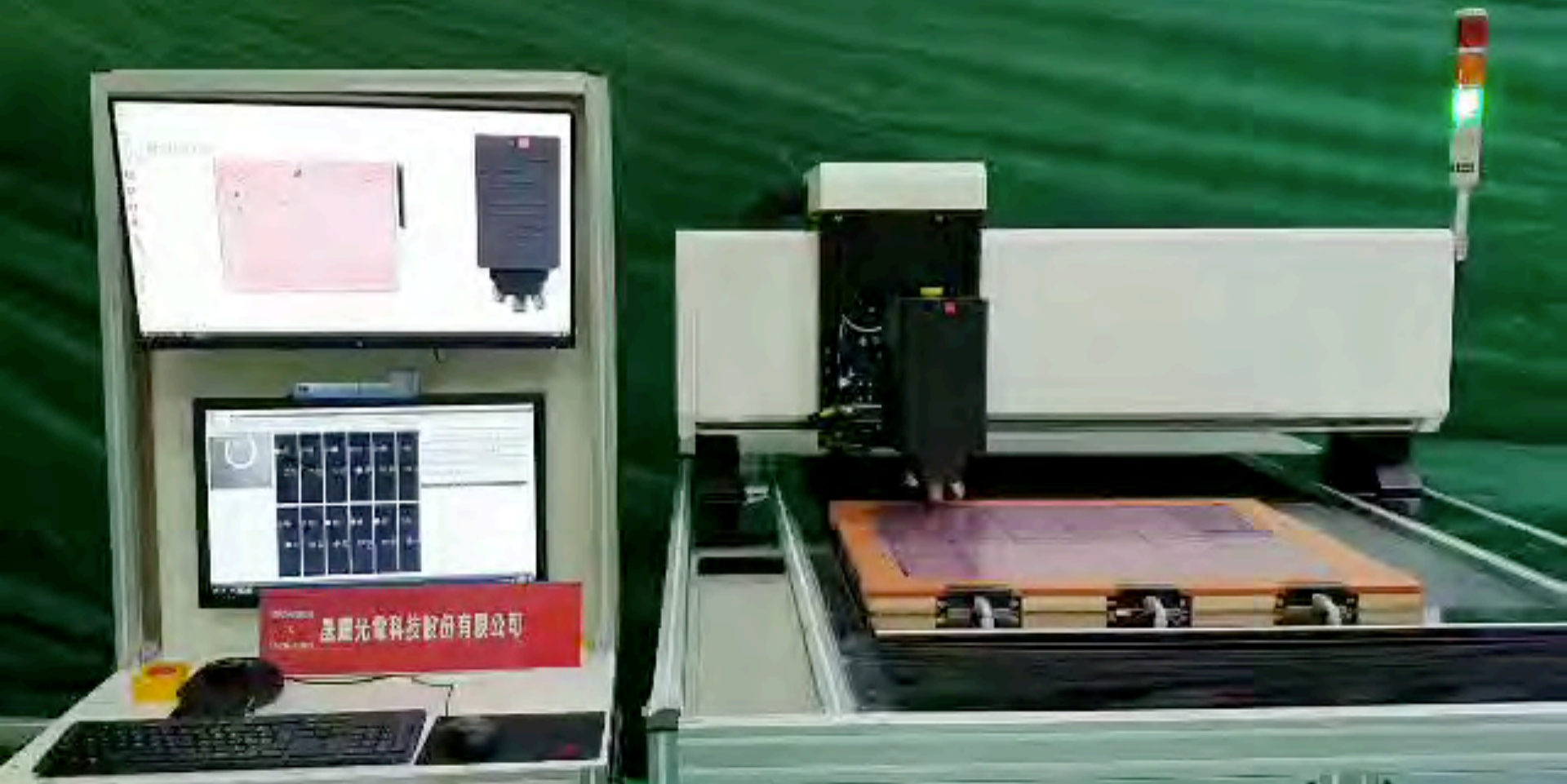
An aerial photograph of a city grid, showing a dense pattern of streets and buildings. The image is semi-transparent, allowing the text to be overlaid. The text "QUALITY CONTROL" is written in a white, sans-serif font in the lower-left corner.

QUALITY  
CONTROL

# FULL AUTOMATION PROCESS

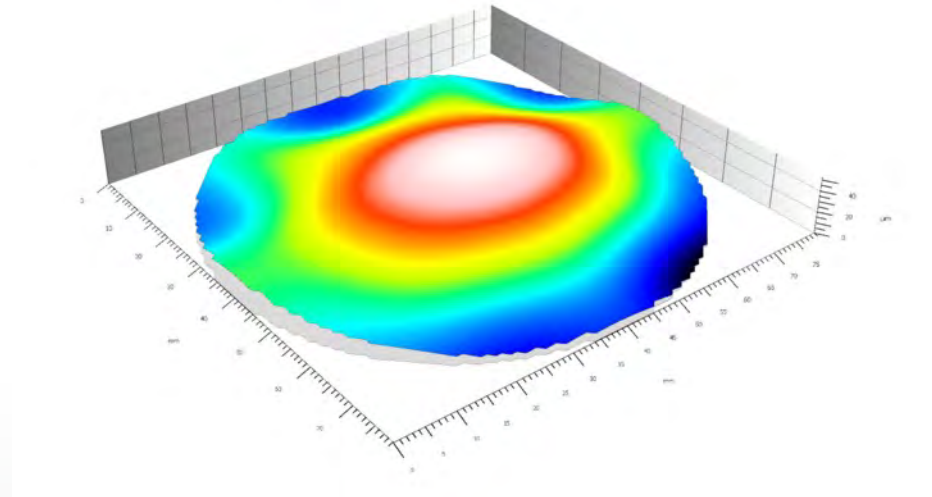
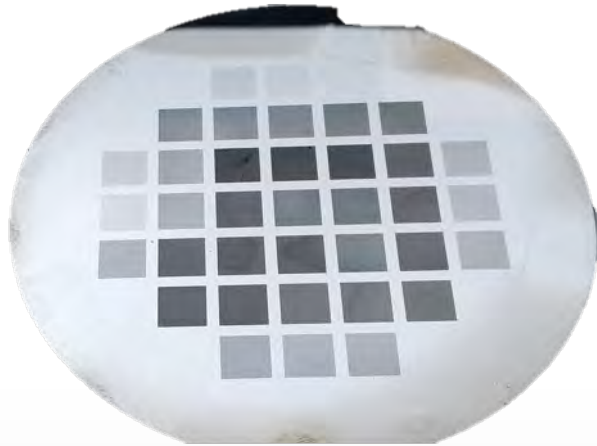






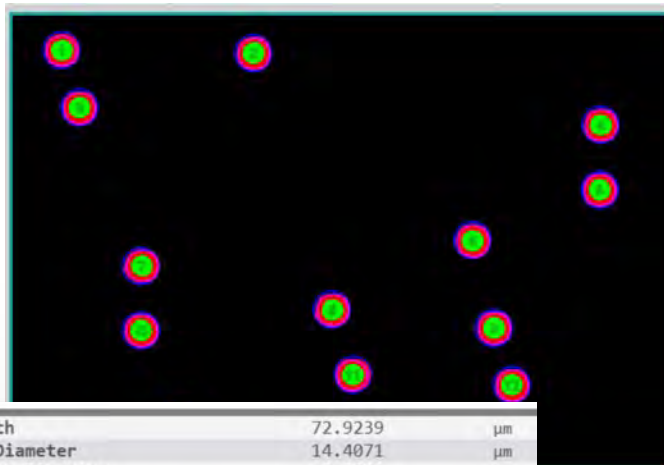
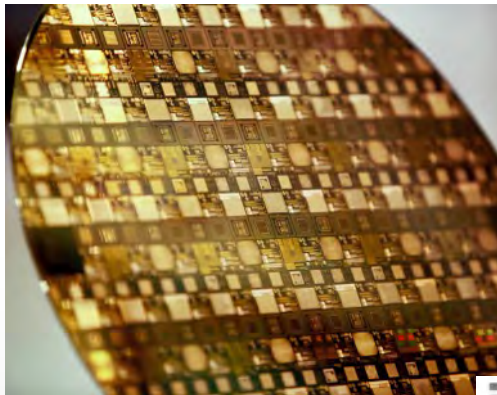
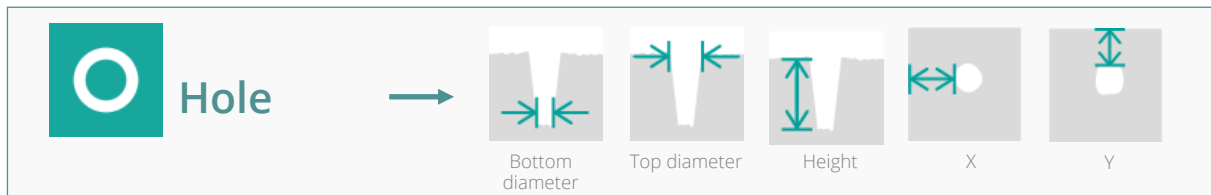
晶晨光电科技股份有限公司

# WARPAGE



Coordinates – 21 points, 2.45 min

# Ga As WAFER



No recipe loaded

HOLE | PROCESSING SETTINGS

Minimum area  
Minimum area: 150.00  $\mu\text{m}^2$

Threshold level  
Top Diameter: 5.00 % Bottom Diameter: 5.00 %

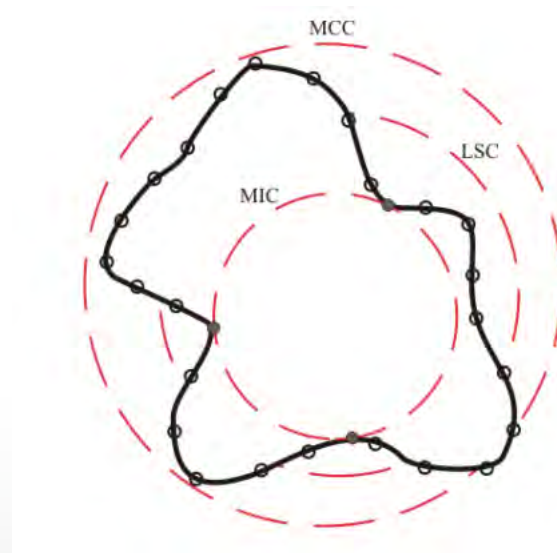
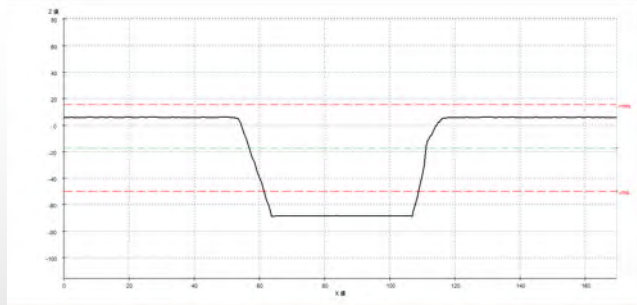
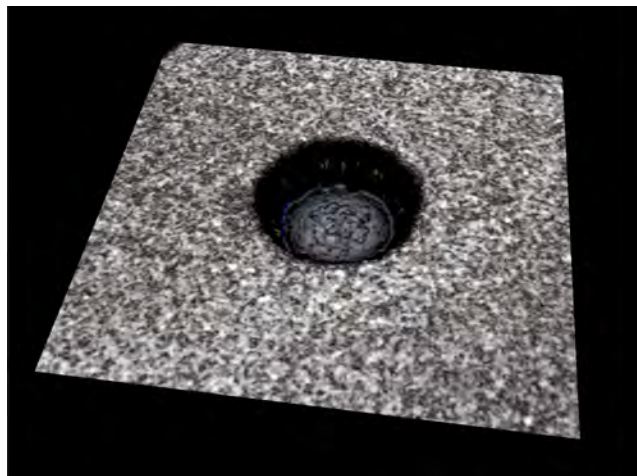
Analysis Area  
Analysis Area:

PARAMETERS & TOLERANCES  
 Depth - TopDiameter - BottomDiameter - Space - SpaceAvg - MIC - MCC - Roundness

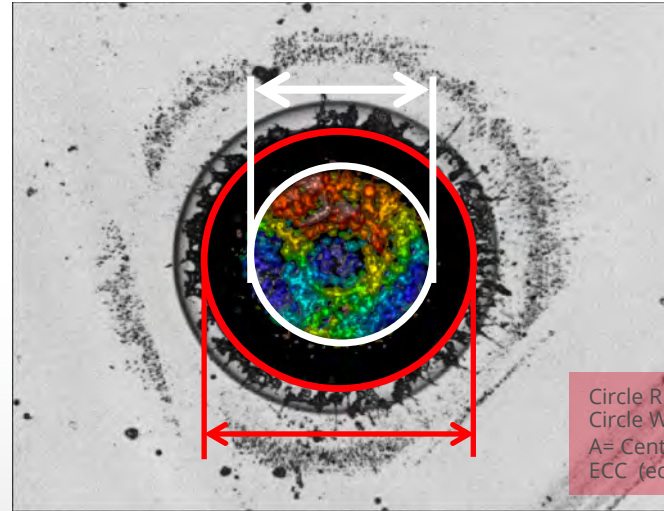
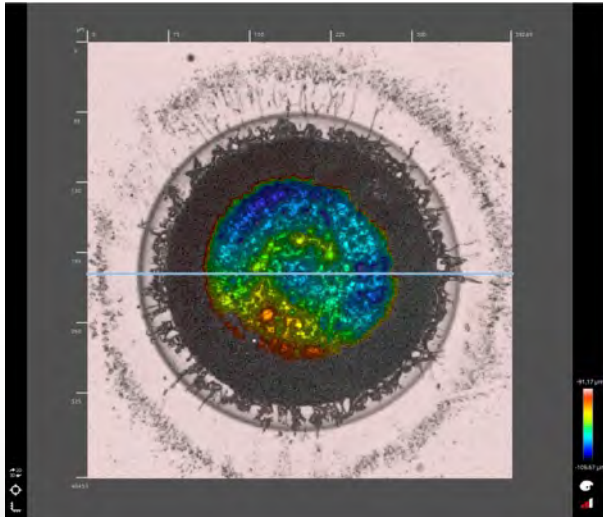
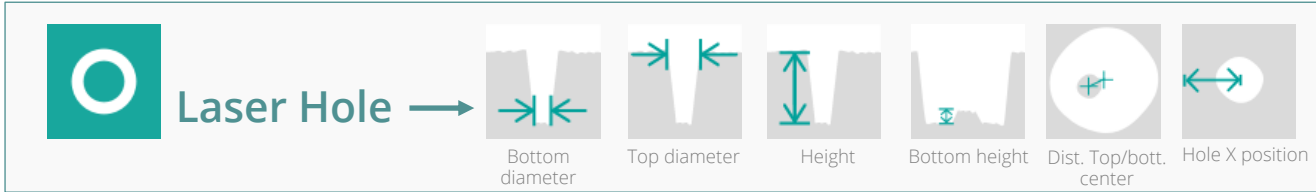
RESULTS OUTPUT  
Root folder: C:\Users\l\ben\Desktop\Metrology\GaAs\_wafer

Export to: CSV Base Name:  
 Extended Report  
Image  Export

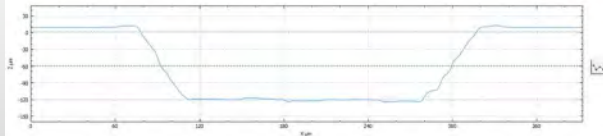
Depth	72.9239	$\mu\text{m}$
TopDiameter	14.4071	$\mu\text{m}$
BottomDiameter	9.0841	$\mu\text{m}$
Space	11.1606	$\mu\text{m}$
SpaceAvg	11.1606	$\mu\text{m}$
MIC	13.8941	$\mu\text{m}$
MCC	14.6911	$\mu\text{m}$
Roundness	94.5752	%



Roundness



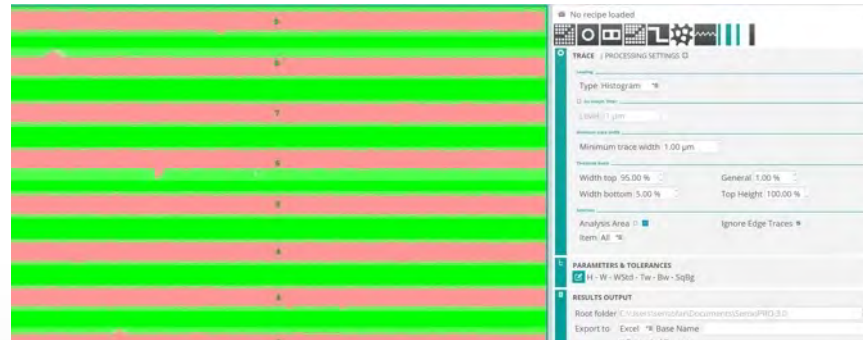
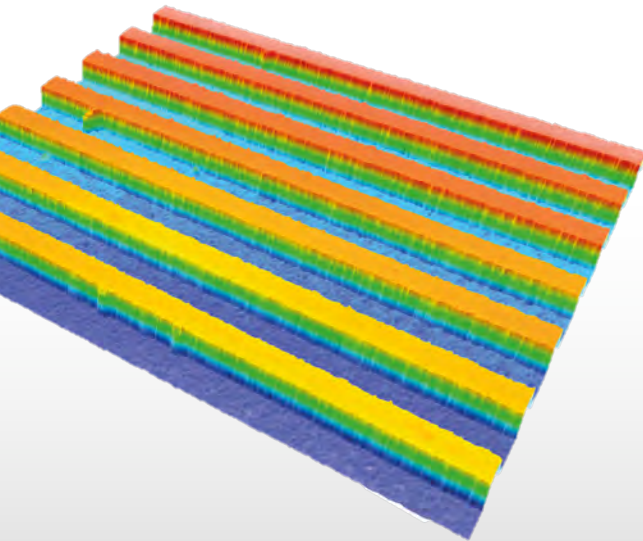
Circle RED : Diameter = D1, Radius =R1, Center = C1  
 Circle White : Diameter = D2, Radius =R2, Center =C2  
 A= Center distance (Distance between C1 to C2)  
 ECC (eccentric) = (R1-R2-A)/(R1-R2+A)



# TRACES



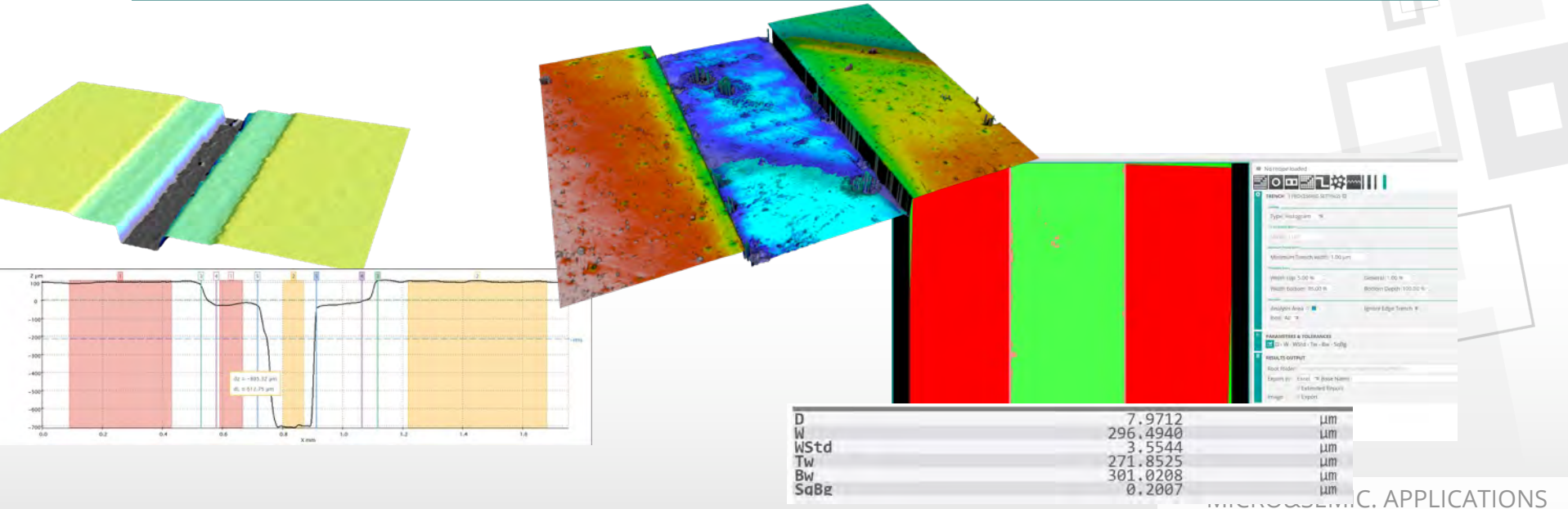
SENSOFAR.  
METROLOGY



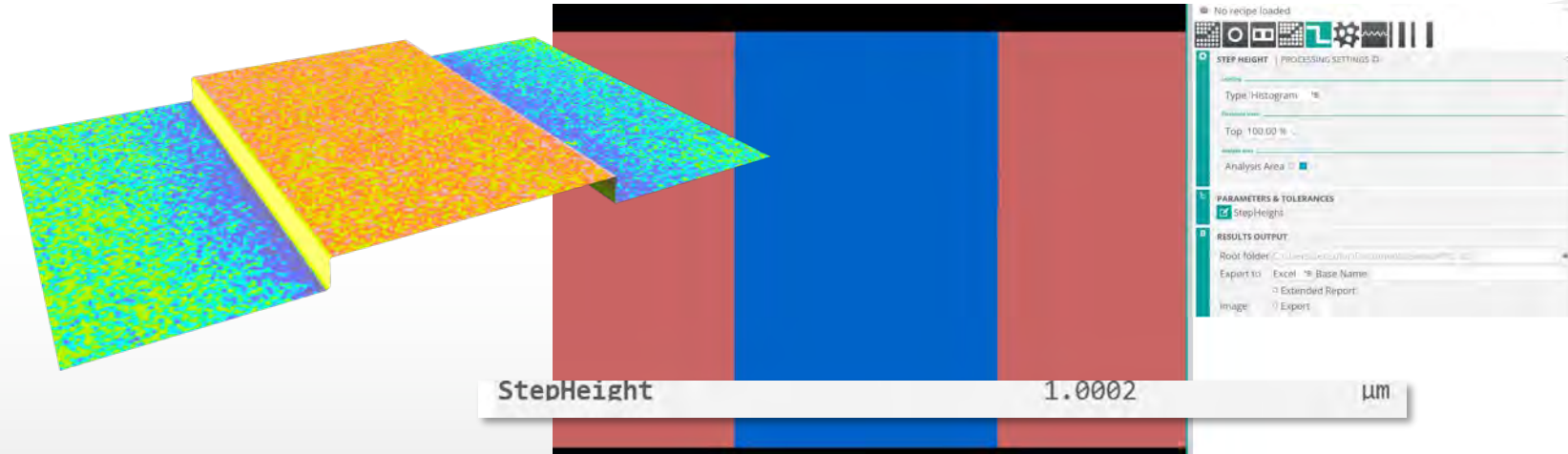
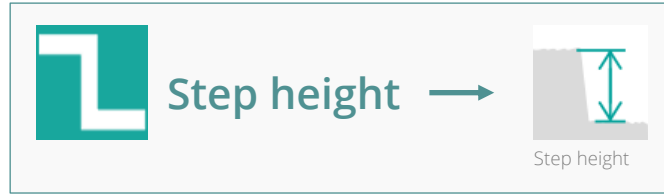
H	22.5704	µm
W	32.5072	µm
WStd	0.9895	µm
Tw	29.4647	µm
Bw	35.0244	µm
SaBg	0.9126	µm

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# TRENCHES



# STEP HEIGHT



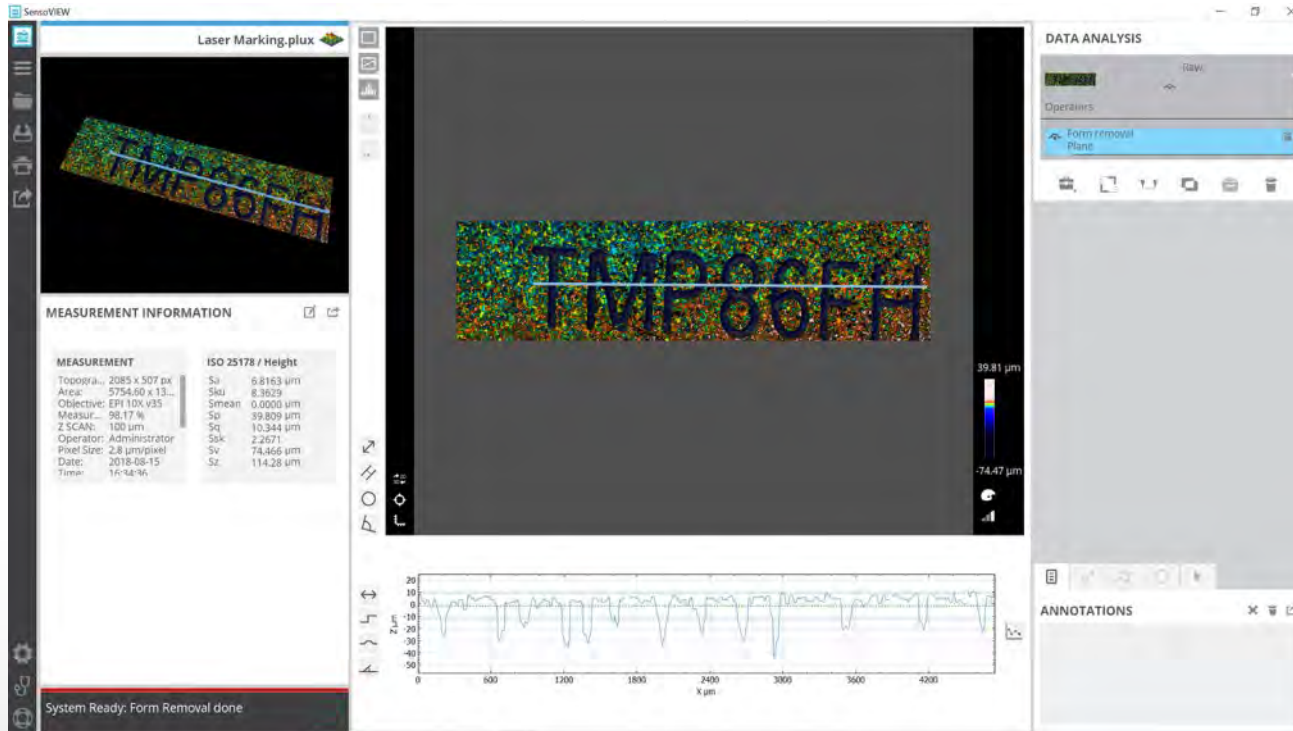


# WAFER PROCESSING

Laser mark Max / average depth



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METROLOGY



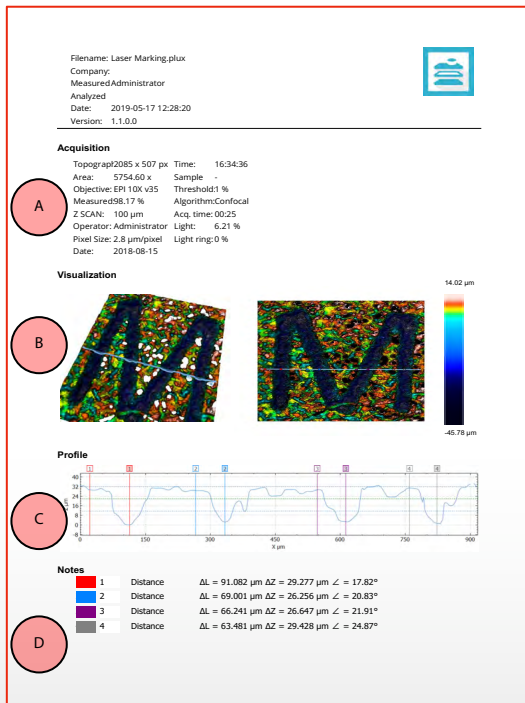
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# WAFER PROCESSING

Laser mark Max / average depth



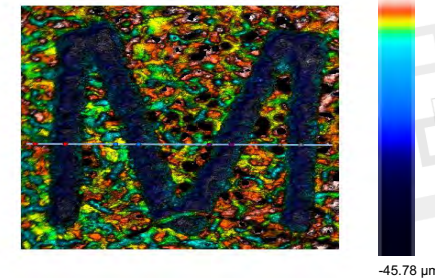
SENSOFAR.  
METROLOGY



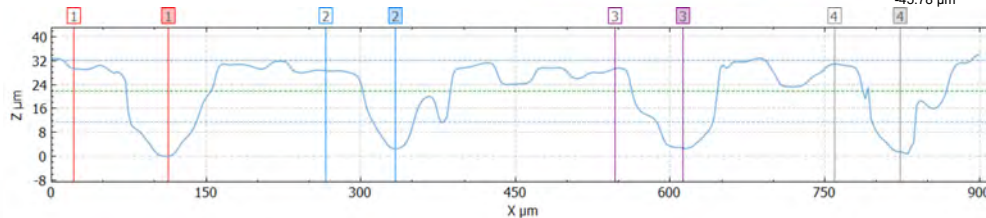
## A Acquisition

Topograph2085 x 507 px Time: 16:34:36  
Area: 5754.60 x Sample -  
Objective: EPI 10X v35 Threshold: 1 %  
Measured 98.17 % Algorithm: Confocal  
Z SCAN: 100 µm Acq. time: 00:25  
Operator: Administrator Light: 6.21 %  
Pixel Size: 2.8 µm/pixel Light ring: 0 %  
Date: 2018-08-15

## B Visualization



## C Profile



## D Notes

1	Distance	ΔL = 91.082 µm ΔZ = 29.277 µm ∠ = 17.82°
2	Distance	ΔL = 69.001 µm ΔZ = 26.256 µm ∠ = 20.83°
3	Distance	ΔL = 66.241 µm ΔZ = 26.647 µm ∠ = 21.91°
4	Distance	ΔL = 63.481 µm ΔZ = 29.428 µm ∠ = 24.87°

# WAFER PROCESSING

Laser mark Max / average depth



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METROLOGY



- ▣ Easy to use
- ▣ Multiple plugins
- ▣ Pass/fail reports

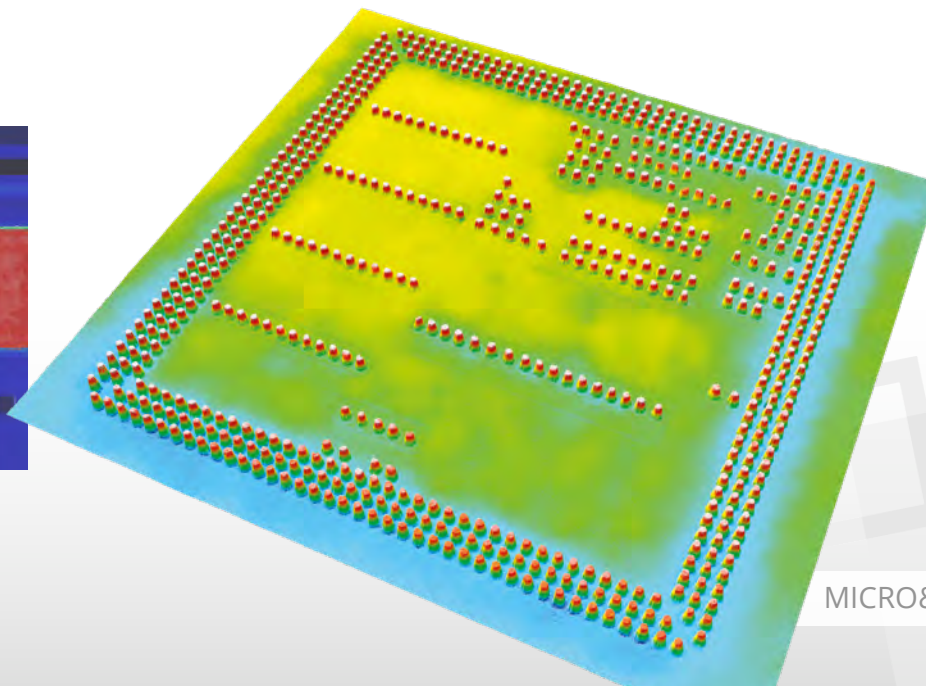
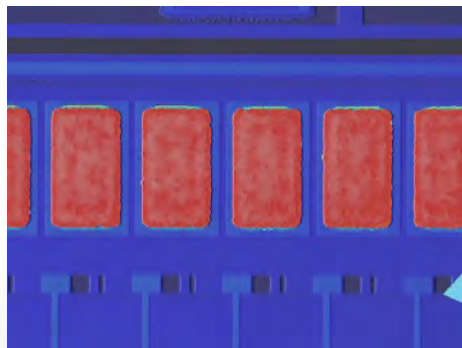
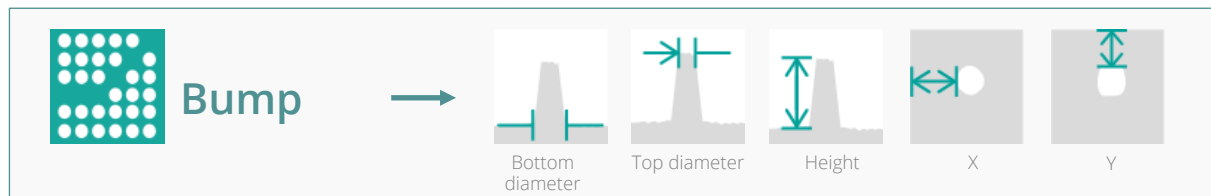
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# WAFER PROCESSING

Bump height, diameter & coplanarity

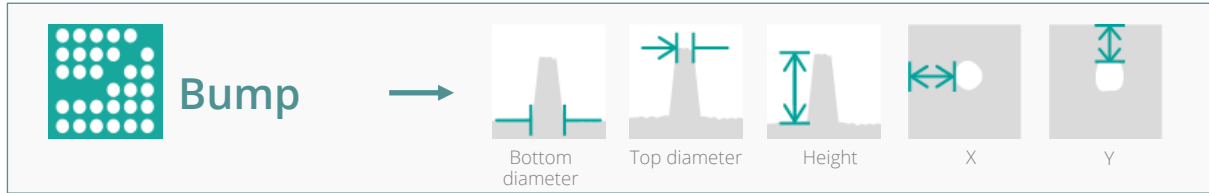


SENSOFAR.  
METROLOGY



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# BUMP



No recipe loaded

**BUMP** PROCESSING SETTINGS 33

Minimum area: 150.00  $\mu\text{m}^2$

Top Diameter: 10.00 %      Bottom Diameter: 10.00 %

Round Bump      Local substrate

Filter substrate

Analysis Area

**PARAMETERS & TOLERANCES**

Height - Diameter - TopDiameter - BottomDiameter - Coplanarity

**RESULTS OUTPUT**

Root folder: C:\Users\mario\Documents\Sensofar\3.0

Export to: Excel \*% Base Name

Extended Report

Image  Export

Height	14.4084	$\mu\text{m}$
Diameter	98.1562	$\mu\text{m}$
TopDiameter	57.5505	$\mu\text{m}$
BottomDiameter	138.7619	$\mu\text{m}$
Coplanarity	0.2527	$\mu\text{m}$

# PCB

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MICRO&SEMIC. APPLICATIONS

# WHY SENSO FAR?

- ▣ Speed
- ▣ Versatility
- ▣ Full automated solution for QC
- ▣ 18 years of experience

# Thank You!



**Adam Platteis**

USA – Sales Manager

[platteis@sensofar.com](mailto:platteis@sensofar.com)



[sensofar.com/metrology](https://sensofar.com/metrology)

**SENSOFAR.**  
METROLOGY



#### HEADQUARTERS

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#### SALES OFFICES

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**SENSOFAR USA** | NEWINGTON (USA) | T. +1 617 678 4185 | [info.usa@sensofar.com](mailto:info.usa@sensofar.com)

