OPTIMET
OPHIR
A Newport Corporation Brand

Wafer Tunnels Inspection – SPOS

Executive Summary

Optimet's NanoConoprobe laser sensor was used to inspect wafer tunnels. The main goal of wafer inspection is to measure the lithographic structures on wafer elements. The Conoscopic-holography-based NanoConoprobe laser sensor is highly capable of scanning lithographic structures on wafer elements down to 0.1 µm accuracy.

Results for the SI wafer scan using NanoConoprobe had a resolution of 2x5 µm. Features measured were:

- Structure depth
- Structure width
- Roughness

1. Optimet's Advantages over Other Technologies:

1. Collinearity – In contrast to triangulation technologies, this enables measurements inside holes and tunnels with high accuracy. This feature is demanded when scanning lithographic structures on a wafer.
2. High lateral resolution
3. High sampling rate with no need for extra processing – measurements can also be done with Optimet's Nano9000 at a rate of 6 kHz.

2. Application description

SI wafer scan using NanoConoprobe.

3. Results and Observations

Sample 1, Small Piece (Fragment)

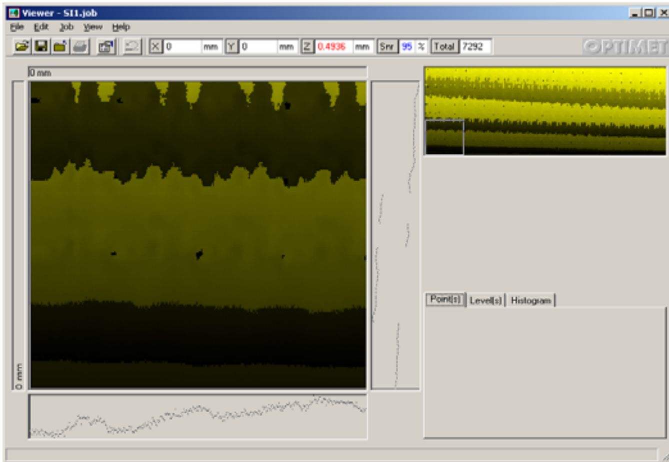
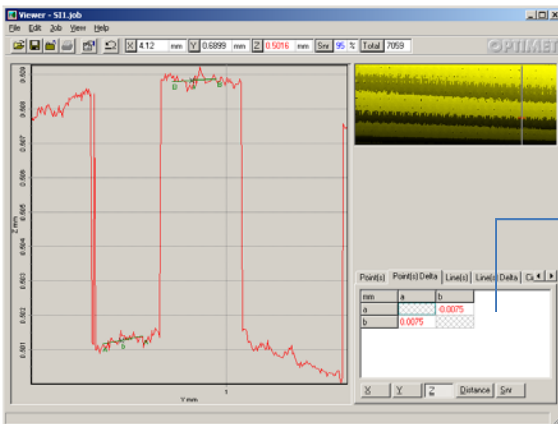


Figure 1 – Fragment – Scan



mm	a	b
a		-0.0075
b	0.0075	

Figure 2 – Fragment – Cross section – Position 1

mm	a	b
a		0.0076
b	-0.0076	

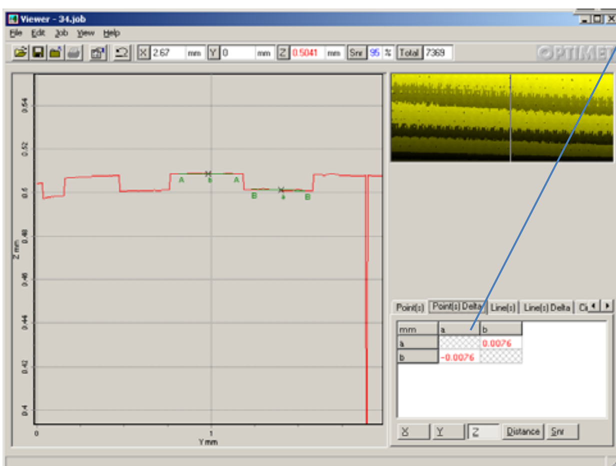


Figure 3 – Fragment – Cross section – Position 2

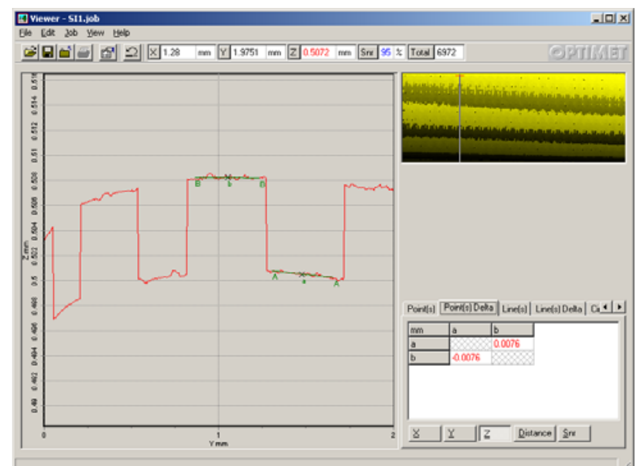


Figure 4 – Fragment – Cross section – Position 2 zoomed

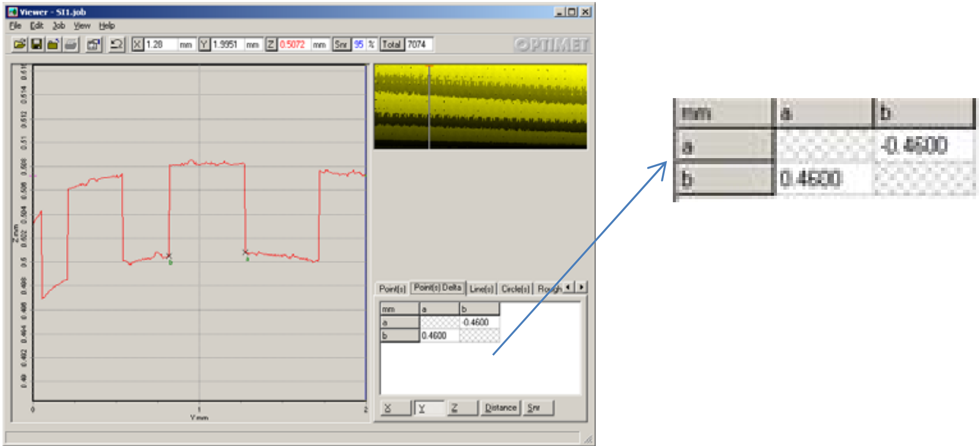
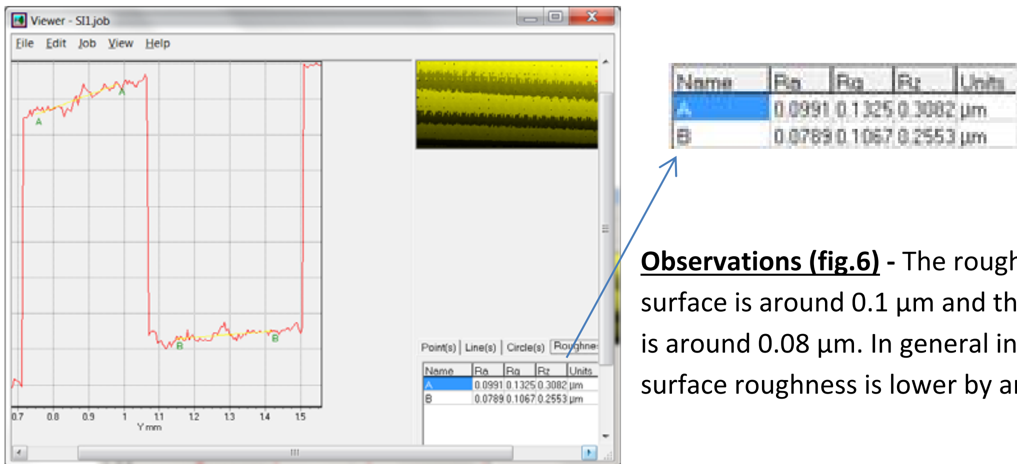


Figure 5 – **Fragment** – **Width measurements**

Note to fig. 5 – Small angle may affect the width.

Observations (fig. 2, 3, 5) - The sensor measures both structure depth with an average value of 7.5 µm and structure width of around 460 µm at the specific point chosen.



Observations (fig.6) - The roughness of the upper surface is around 0.1 µm and the inside the groove is around 0.08 µm. In general inside the groove the surface roughness is lower by around a 20%.

Figure 6 – **Fragment** – **Roughness**

Sample 1, Whole Wafer

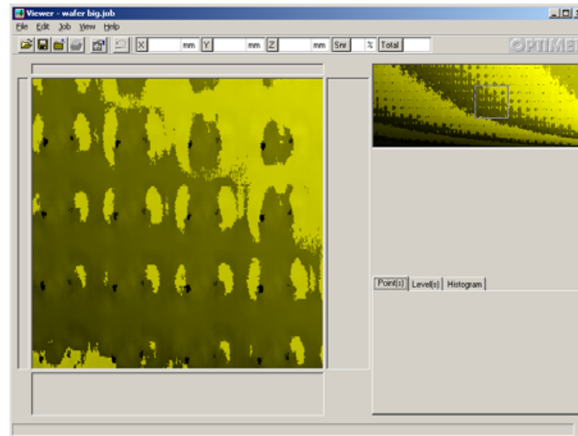
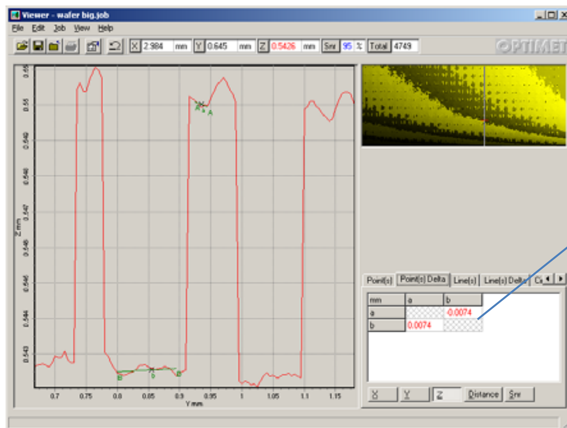
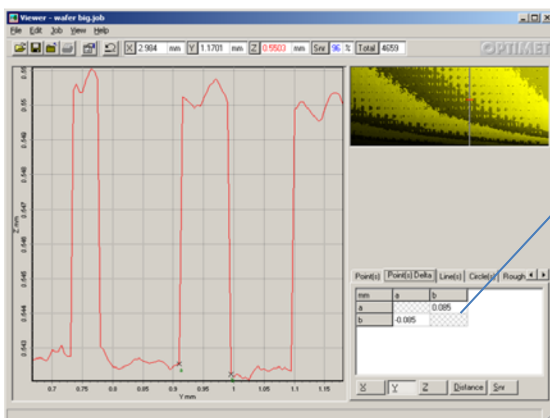


Figure 7 – Whole wafer – Scan



mm	a	b
a		-0.0074
b	0.0074	

Figure 8 – Whole wafer – Cross section



mm	a	b
a		0.085
b	-0.085	

Figure 9 – Whole wafer – Width measurements

4. Data

Parameter	Value
Reflective/Diffusive/Transparent/Translucent	Reflective
Working Range (mm)	1mm-4mm
Precision (µm)	0.5µm
Stand Off (mm)	18
Max. Data Rate (KHz)	3KHz
Lateral Resolution(µm)	2*5
Z Resolution(µm)	0.1 µm
Application Category	-