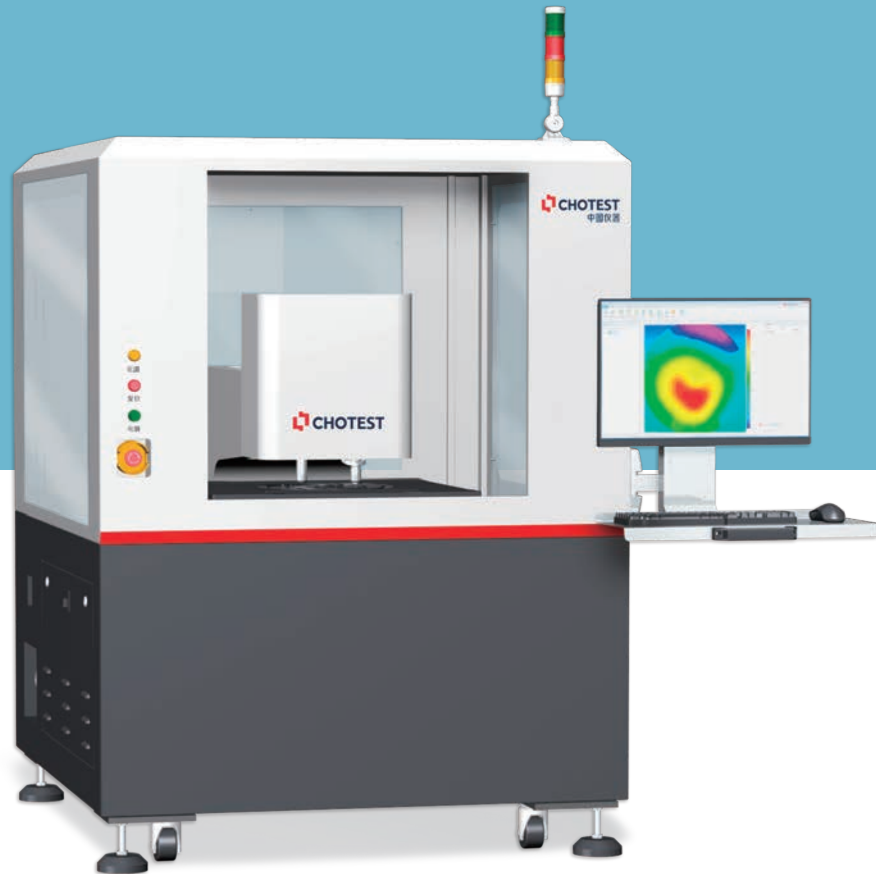
WD4000 Series
Unpatterned Wafer 3D Inspection System

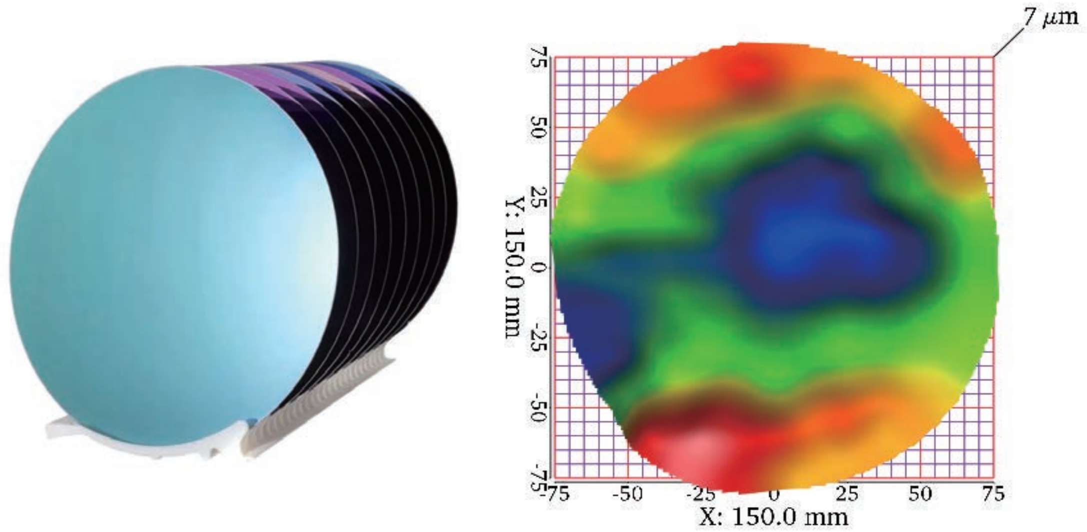


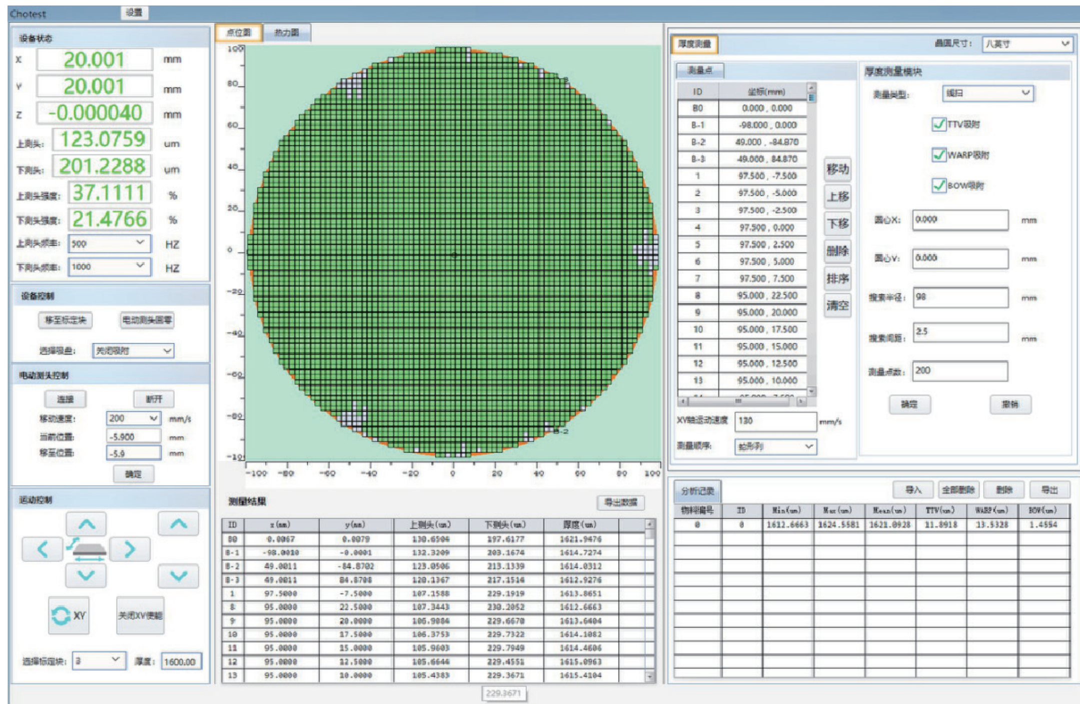
Description

Unpatterned Wafer 3D Inspection System WD4000 series can automatically measure wafer thickness, surface roughness, and micro-nano 3D microtopography at a time. Use white light confocal probes to measure wafer thickness, TTV, LTV, BOW, WARP, line roughness; use white light interferometry probe to scan the Wafer surface to create a 3D profile image of the surface , then analyze the roughness and relevant 2D and 3D parameters according to ISO/ASME/EUR/GBT standards.

Application

Thickness and warpage measurement for unpatterned wafer





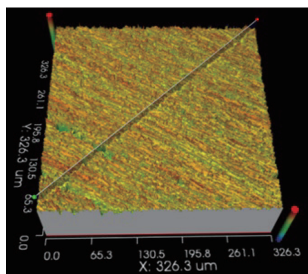
Measurement results of wafer thickness and warpage

The 3D shape based on the upper and lower surfaces of the wafer is reconstructed by non-contact measurement. The powerful measurement and analysis software ensures the stable calculation for the thickness, roughness, total thickness variation(TTV) of the wafer.

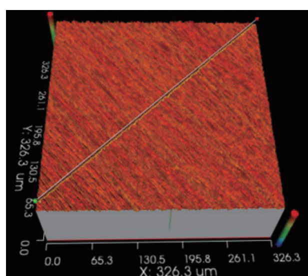
Application

Roughness measurement for unpatterned wafer

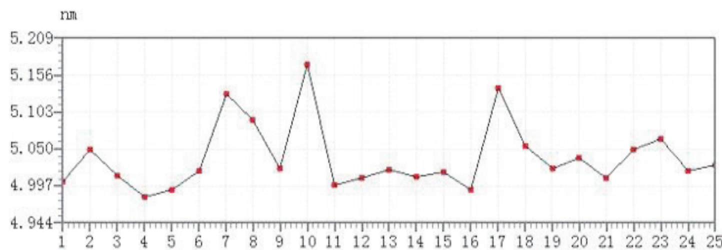
Thinned silicon wafer



3D image of
rough grinding silicon wafer



3D image of
fine grinding silicon wafer



Sa curve of 25 times measurement data for fine grinding wafer

文件		3D参数分析					
序号	名称	图标	Sq[高度参数][I...	Sp[高度参数][I...	Sv[高度参数][IS...	Sz[高度参数][IS...	Sa[高度参数][I...
1	sa_1		7.597	25.179	319.103	344.283	5.004
2	sa_2		8.288	24.684	319.429	344.113	5.050
3	sa_3		7.092	24.394	316.239	340.633	5.012
4	sa_4		6.772	25.329	320.325	345.654	4.982
5	sa_5		6.999	24.388	318.774	343.162	4.992
6	sa_6		7.330	24.164	316.117	340.280	5.019
7	sa_7		9.190	24.424	308.329	332.754	5.129
8	sa_8		8.700	24.930	319.030	343.961	5.092
9	sa_9		7.583	25.466	313.352	338.818	5.022
10	sa_10		9.636	24.834	318.285	343.119	5.171
11	sa_11		7.269	25.343	318.515	343.858	4.998
12	sa_12		7.149	25.556	318.074	343.630	5.009
13	sa_13		7.425	24.911	318.300	343.211	5.021
14	sa_14		7.461	25.519	318.559	344.078	5.011
15	sa_15		7.340	24.668	318.259	342.927	5.017
16	sa_16		6.986	24.730	312.806	337.536	4.992
17	sa_17		9.301	24.702	313.648	338.350	5.137
18	sa_18		7.826	25.271	314.494	339.766	5.054
19	sa_19		7.294	24.903	313.570	338.472	5.022
20	sa_20		7.684	24.940	316.623	341.563	5.038
21	sa_21		7.260	25.037	310.442	335.479	5.009
22	sa_22		7.757	25.130	315.120	340.250	5.049
23	sa_23		8.493	24.773	316.354	341.127	5.064
24	sa_24		7.373	24.986	316.743	341.729	5.018
25	sa_25		7.545	25.111	316.822	341.933	5.028
	统计	平均	7.734	24.935	316.292	341.227	5.038

Multi-file analysis of 25 times measurement data for fine grinding wafer

During rough grinding and fine grinding process for the Wafer thinning, the surface roughness Sa values and their stability are used to evaluate the processing quality. When the thinned silicon wafer is measured in the strong noise environment of the production workshop, the roughness Sa values of the fine grinding silicon wafers are ranging around 5nm, and the repeatability is 0.046987nm based on 25 times of measurement data which proves the measurement stability is good.

Parameters

Model No.		WD4100	WD4200
Wafer Size		4", 6", 8", 12"	
Wafer Table		Vacuum chuck	
Loading and Unloading		Manual(Auto robot arm is optional)	
XYZ Travel Range		400mm/400mm/75mm	
Max Moving Speed		500mm/s	
Main Frame		Marble	
Anti-Vibration		Air-floating anti-vibration system	
Loading Capacity		≤3kg	
Overall Size		1500×1500×2000mm	
Weight		About 1500kg	
Compressed Air		0.6MPa; 60L/min	
Working Environment		Temp. 20°C±1°C/hour, RH 30~80%	
Ambient Vibration		VC-C or better	
Thickness Measurement System			
Material of Object		Arsenide, nitride, phosphorus, germanium, phosphorurate, lithium crickets, sapphire, silicon, silicon carbide, glass, etc.	
Sensor		High-precision white light confocal sensors	
Measuring Range		100μm~2000μm	
Scanning Path		Full map area scanning, Union Jack path, free multi-point	
Accuracy		±0.25μm	
Repeatability(σ)		0.2μm	
Resolution		25nm	
Measurement Parameters		Thickness, TTV (Total thickness variation), LTV, BOW, warp, flatness, line roughness	
3D microtopography Measurement System			
Measurement Principle		——	White light interferometry
Light Source		——	White LED
Objective Lens		——	10X(2.5X, 5X, 20X, 50X optional)
Field of View		——	0.96 mm×0.96 mm
Lens Turret		——	Single hole
Level Adjustment		——	±2°
Z-axis Scanning Range		——	5mm
Z-axis Resolution		——	0.1nm
Lateral Resolution		——	0.5~3.7μm
Scanning Speed		——	2.5~5.0μm/s
Characters of Test Object		——	Reflectivity 0.05%~100%
Roughness RMS Repeatability*1		——	0.08nm
Step Height Measurement*2	Accuracy	——	1%
	Repeatability	——	0.2%1σ
Measurement Parameters		——	Microtopography, line/surface roughness, spatial frequency, etc.

Note:

*1 Roughness performance is obtained by measuring SQ parameters for a 0.2nm SA silicon wafer in the laboratory environment according to ISO 25178.

*2 Step height performance is obtained by measuring a standard 4.7μm stage block in the laboratory environment according to ISO 5436-1: 2000.