

QC for Solar Cell Wafer Manufacturing

Zeta-200 3D Metrology System

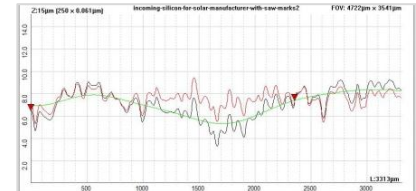
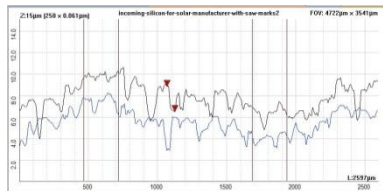
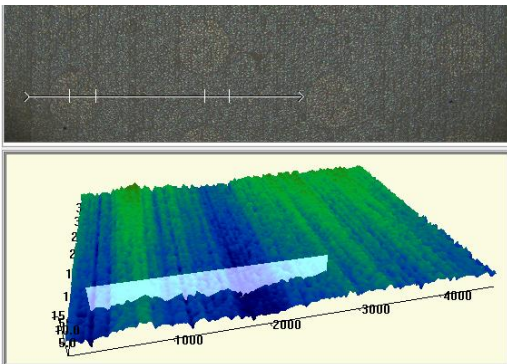


Silicon substrates for solar cell applications must meet exacting technical requirements. Adding surface texture increases light-gathering efficiency, but too much texture scatters light away and reduces efficiency. The quality of the diamond wires used for sawing wafers is also an important factor in controlling the quality of the finished wafers.

The Zeta-200 Automated 3D Metrology System enables quality control of critical properties:

- Roughness of substrates at multiple steps, from very rough to very smooth
- Height and periodicity of saw marks
- Wafer bow
- Edge cracks and other defects
- Height and density of diamond features on saw wires

Silicon Wafer Inspection

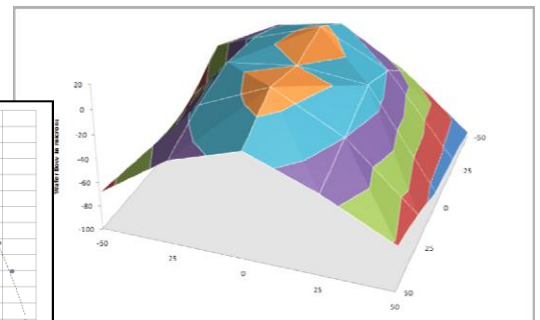
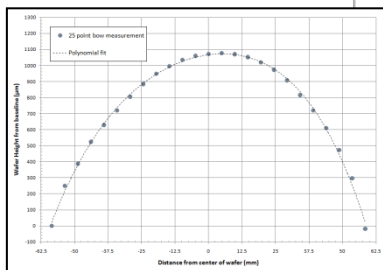
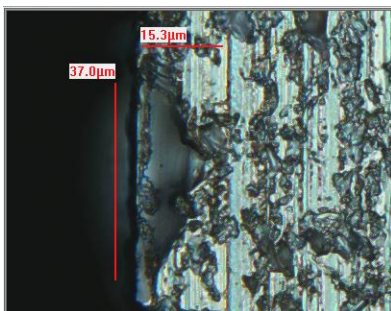


Step height:

Zeta 2D and 3D images of an incoming substrate (left) show saw marks. Distance between cursors is 1215 μm ; height difference between cursors is 3.4 μm ; depth of single groove is 2.3 to 3.0 μm .

Surface roughness:

Analysis of surface roughness finds R_a is 0.95 μm total, or 0.57 μm with waviness correction.



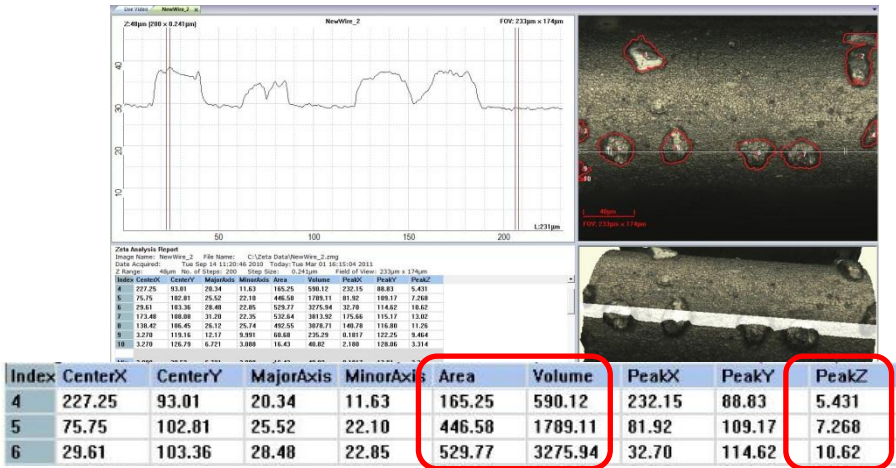
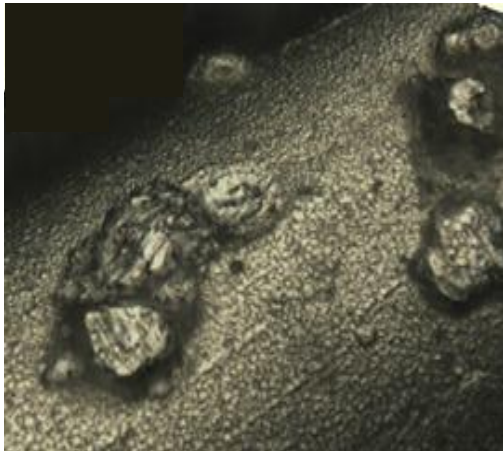
Edge inspection:

Zeta 2D image of wafer edge. Length markers are 37 μm (vertical) and 15 μm (horizontal).

Wafer bow:

Shape of 5-inch wafer based on 2D or 3D measurements at 25 sites.

Diamond Wire Inspection



Zeta 3D image of a new diamond wire and automated analysis of diamond particles. Each diamond in the field of view is analyzed for area, volume, and height.

The Zeta-200 System



The Zeta 200 Automated 3D Measurement System provides true color imaging of complex surfaces in less than one minute per site.

Zeta 3D Software analyzes 2D or 3D images:

- Step height
- Surface roughness
- Feature size, diameter, area, and volume
- Multi-surface analysis for transparent features
- 3D surface visualization
- Statistics

The Zeta-200 supports production use:

- Multi-site measurements with statistics
- Recipe-based measurement definitions
- Automated data and image export

Features:

- High-brightness white LED light source
- XY stage with 200mm x 200mm travel
- 30mm total vertical travel
- Multiple FOV configurations available

Intel Core2 Duo processor with 3GB RAM, 320 GB disk, and widescreen LCD monitor



Optical Specifications					
	5x	10x	20x	50x	100x
Z res (µm)	5.90	1.50	0.50	0.10	0.07
N.A.	0.15	0.30	0.45	0.80	0.90
XY res (µm)	2.20	1.10	0.75	0.42	0.40
FOV 1 (µm)	1920x1440	960x720	480x360	192x144	96x72
FOV 2 (µm)	5029x3771	2514x1886	1257x943	503x377	251x189
Accuracy	±2.5%				
Repeatability	≤ 1.5% (1σ/mean)				

Features and specifications subject to change without notice