Applied Physics, Inc.

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Nano Particle Technology

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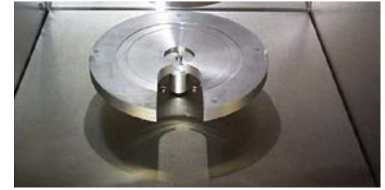
Particle Deposition System, PDS-300

Particle Deposition System, PDS-300 Half Deposition (Half Dep), Platen Control



Wafer Platen

Deposition Timer Control

The Particle Deposition System, PDS-300 is designed to produce PSL Wafer Standards on 300mm, 200mm, 150mm, 125mm and 100mm silicon wafers, or other material, depositing the PSL peak size on the wafer surface, FILM surface or pattern wafer. The PDS-300 controls the particle deposition through constant airflow and exhaust, timing and type of deposition, i.e.; full deposition, half deposition or spot deposition. Deposition Count is controlled by a timed deposition from 10 seconds to 1 minute or more with most depositions under 1 micron requiring no more than 30 seconds, depending on the PSL concentration in DI Water suspended in the glass nebulizer.

Particle size depositions range from 80nm to 5um to produce Particle Wafer Standards in the form of a full deposition across the wafer, 1 or more spot depositions on the wafer surface, or a half deposition on the wafer surface. The spatial resolution between close size peaks is superb, *as seen on the following page*, providing NIST traceable, calibration peaks for your Wafer Inspection System.

Full deposition advantages allow the metrology Engineer to challenge the wafer inspection system by verifying the size peak detected matches the true size peak deposited by the PDS 300 on the wafer standard. The second advantage of a full deposition wafer is that the wafer inspection system scans across the entire wafer surface; therefore, the scan uniformity can be visually observed for a desired uniform density across the wafer, verifying scan uniformity and size accuracy across the wafer. Half Deposition provides the same advantage, but 1 side of the wafer is always clean, thus the Metrology Engineer can determine when a PSL Wafer Standard has become contaminated, and create a new PSL Wafer Standard is required.

Spot Depositions provide a different set of advantages in that the Metrology Engineer can deposit up to 4 peak sizes as spot depositions around the wafer, for example, 80 (nm) nanometers, 126nm, 304nm, and 1.112um. By depositing 4 different peak sizes on a 200mm or 300mm wafer, the inspection system is challenged across a broad size range in 1 scan to challenge the calibration and size accuracy of the wafer inspection tool. The clean areas around the wafer give excellent indication of the background cleanliness of the wafer over multiple scans, thus the Metrology Engineer can determine when a new PSL Wafer Standard is required.

E Charge Control

Dry Nitrogen or Dry Air flow is filtered using a 0.02um membrane filter, while a pressure regulator controls the volume of air for each deposition. PSL Spheres are aerosolized in droplet form and passed through an evaporation tube to ensure particles are dry when deposited on the surface. A battery charged, Electrical (E) Charge module provides a charge to the platen to attract PSL Spheres down to the desired wafer surface area. The E Charge module gives a visual LED alert when time to replace the E Charge battery.

Low Cost, NIST Traceable, PSL Wafer Standards, 100mm to 300mm, 60nm to 5um
Prime Silicon Wafers, Film Wafers, Patterned Wafers, Blank Photo Masks

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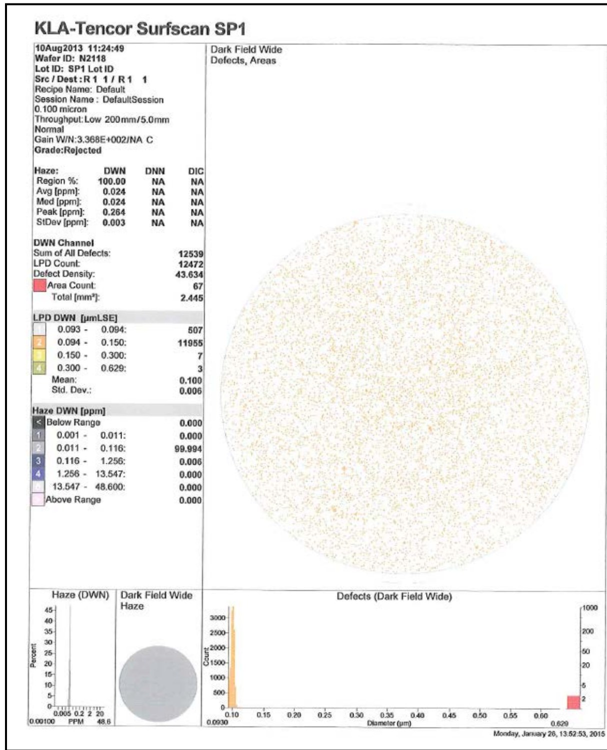
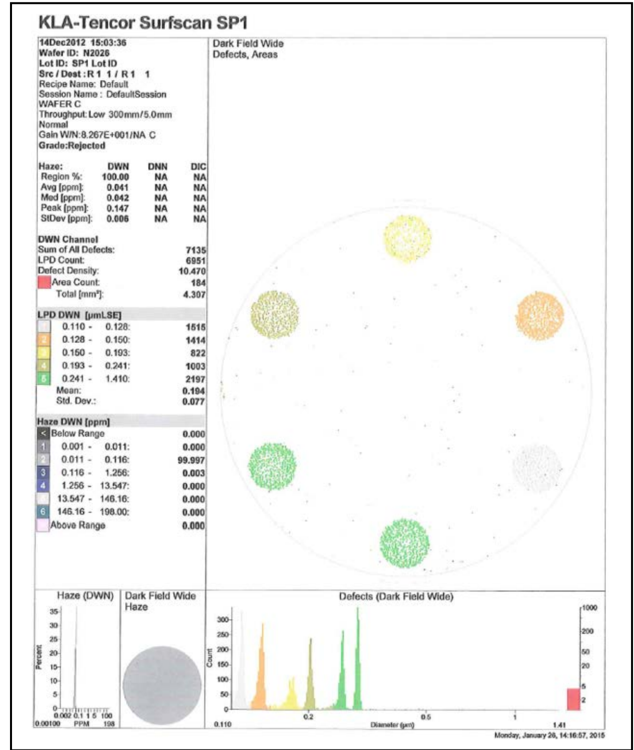
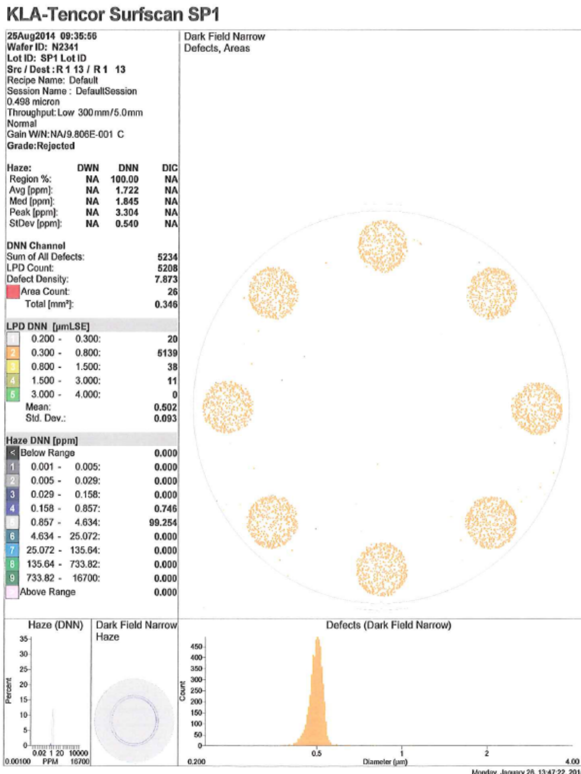
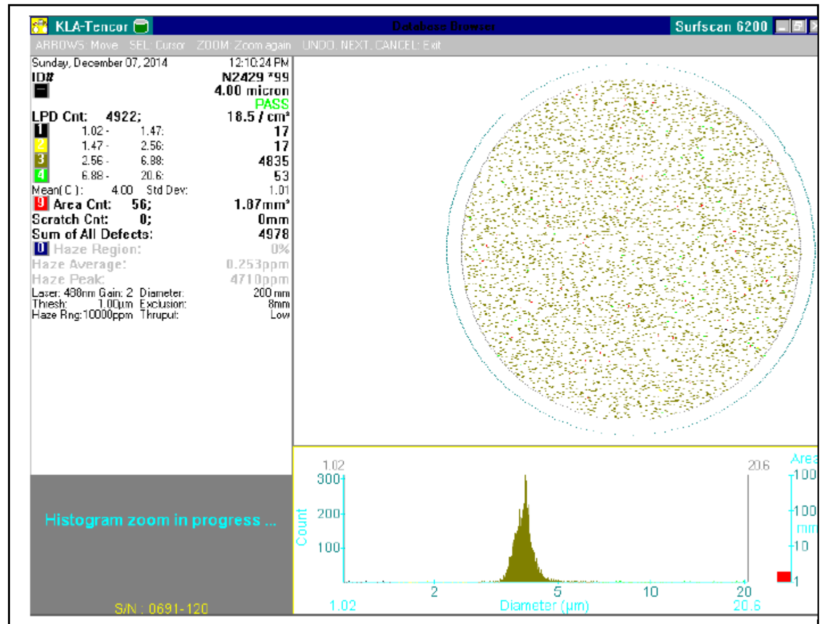
PDS-300 Depositions and Wafer Scan Results using SP1 and Tencor 6200 Wafer Inspection Systems





200mm, FULL DEP: 0.102um **KLA-Tencor SP1 Scans** **300mm, SPOT DEP: 125nm, 147nm, 204nm, 304nm, 350nm**





300mm, SPOT DEP: 498nm x 8x, KLA-Tencor SP1 Scan **150mm, FULL DEP: 4.0um, Tencor 6200 Scan**

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