KLA INSTRUMENTS

Candela® 8720

Advanced Inspection for LED and Communications Market

Candela® 8720

Advanced Inspection for LED and Communications Market

The Candela® 8720 advanced surface inspection system captures a variety of mission-critical substrate and epitaxial defects for the LED, photonics, communications and other compound semiconductor markets.

Implementation of automated wafer inspection with statistical process control (SPC) methodology can significantly cut yield loss due to epi defects, minimize metal-organic chemical vapor deposition (MOCVD) reactor process excursions, and increase MOCVD reactor uptime.

The Candela 8720 system employs proprietary optical technology to simultaneously measure scatter intensity at varying degrees of incidence, topographic variations, surface reflectivity, phase shift and photoluminescence for automatic detection and classification of a broad range of defects of interest (DOI).

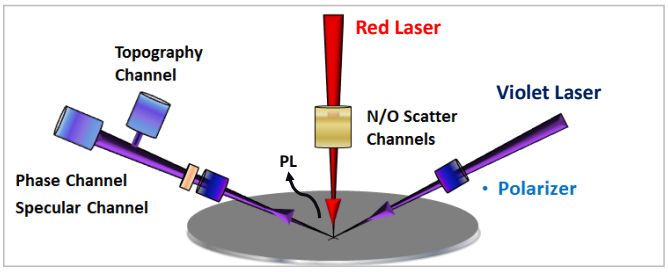

Figure 1: Candela 8720 optics overview

The Candela 8720 system provides:

- Automated defect inspection for LED materials, enabling enhanced quality control of substrates, fast time-to-root-cause determination, and improved MOCVD process control
- A single-tool solution that combines multiple optical inspection techniques in a single scan for maximum efficiency in automated defect detection and classification
- High sensitivity to yield-impacting defects across multiple compound semiconductor substrates

The Candela 8720 system can be operated in three modes to meet the needs of various applications: high-throughput, standard resolution, and high resolution.

In the high-throughput mode, the Candela 8720 system can be used as a simple particle counter for process tool monitoring and qualification applications.

In the advanced classification / high-sensitivity mode, multiple detection channels enable accurate detection and classification of various defect types to characterize process-related issues and identify yield-impacting defects.

The inspection method achieves full-surface coverage in minutes to produce high-resolution images and wafer maps with automatically classified defects.

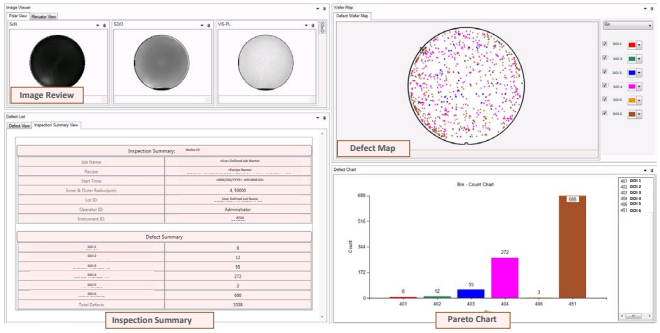

Figure 2: Typical Candela 8720 inspection output

The defect map highlights each defect location on the wafer by color code.

The defect pareto chart plots the number of defects by type.

The defect inspection summary (default view) displays defect statistics across the entire wafer.

The defect log file (switchable view) displays details such as location, pixel size, area, and defect type. It also displays a summary of defect counts by size bin along with total defect count. Both the report and the defect log file can be saved for production review.

The Candela 8720 software can also be used on an offline computer to create analysis recipes.

Other engineering tools include pseudo die grid overlay (to determine the percent wafer area impacted by defect type), defect binning by size, surface uniformity, wafer sorting based on pass/fail criteria, contour mapping (for spatial signature analysis), KLARF output, scribe (to mark defects for review) and factory automation setup.

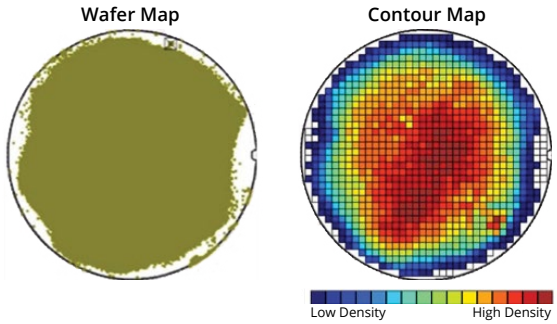

Figure 3: Contour map for high defect count excursions

Comparison to scatterometry systems

The Candela 8720 inspection system provides the option to save raw data collected from multiple detectors.

Defect signatures seen by different detectors can vary by defect type, which can help process engineers to accurately classify defects.

The Candela 8720 system can detect and classify both macro and micro defects. Micro defect classification is done based on comparison of the optical signature from the normal- and oblique-incidence illumination. Macro defect classification uses optical signatures and defect attributes.

MOCVD processes produce a variety of defects when GaN epi is grown on different substrate materials (silicon, sapphire, PSS, SiC and GaN). The Candela 8720 system is sensitive to common yield-impacting defects including micro-pits, cracks, hexagonal bumps, showerhead droplets, crescents, scratches and other topographic defects. Accurate classification is critical to driving key corrective actions for process control. The image gallery (Fig. 4) shows examples of different types of detected defects.

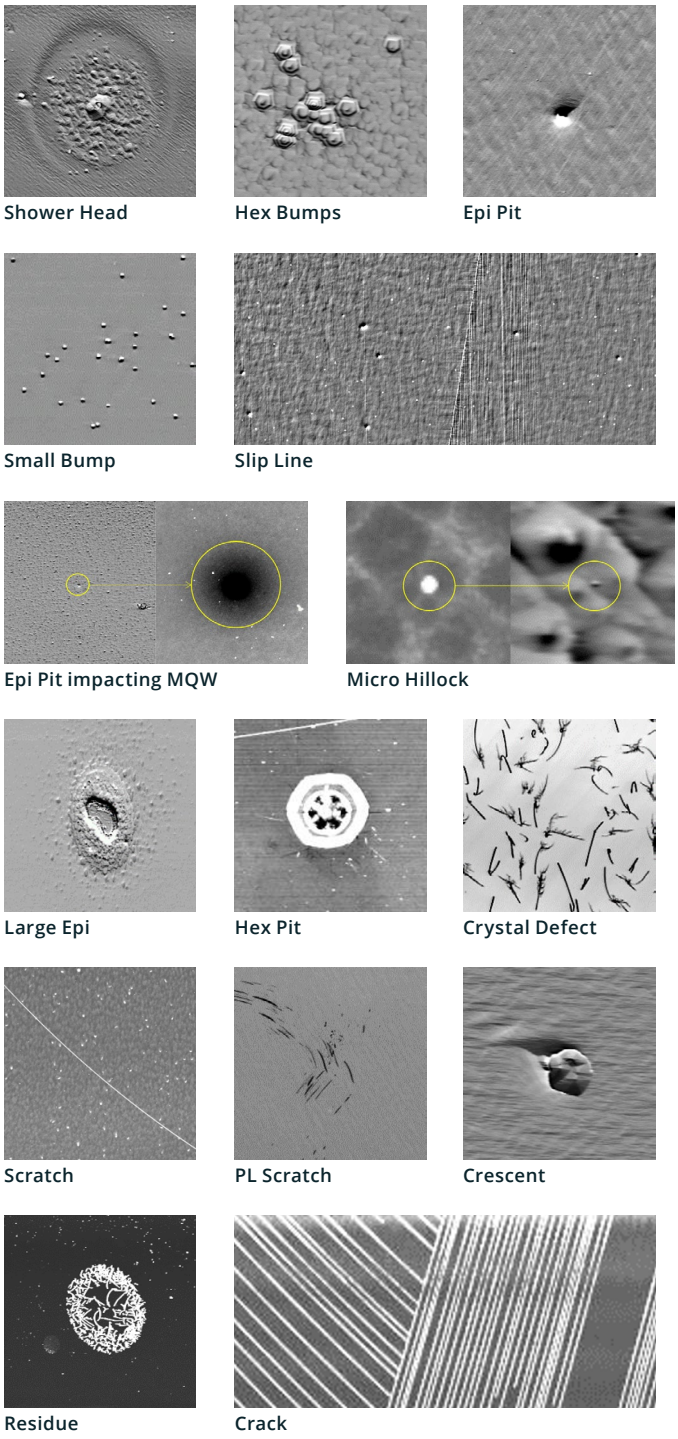

Figure 4: Example defect images

The Candela 8720 system's high sensitivity, throughput and versatility offer a cost-effective solution suitable for both process development and high-volume manufacturing process control.

KLA INSTRUMENTS

KLA SUPPORT

Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

KLA Corporation
One Technology Drive
Milpitas, CA 95035
www.kla.com
Printed in the USA
Rev 1_2020_05_04