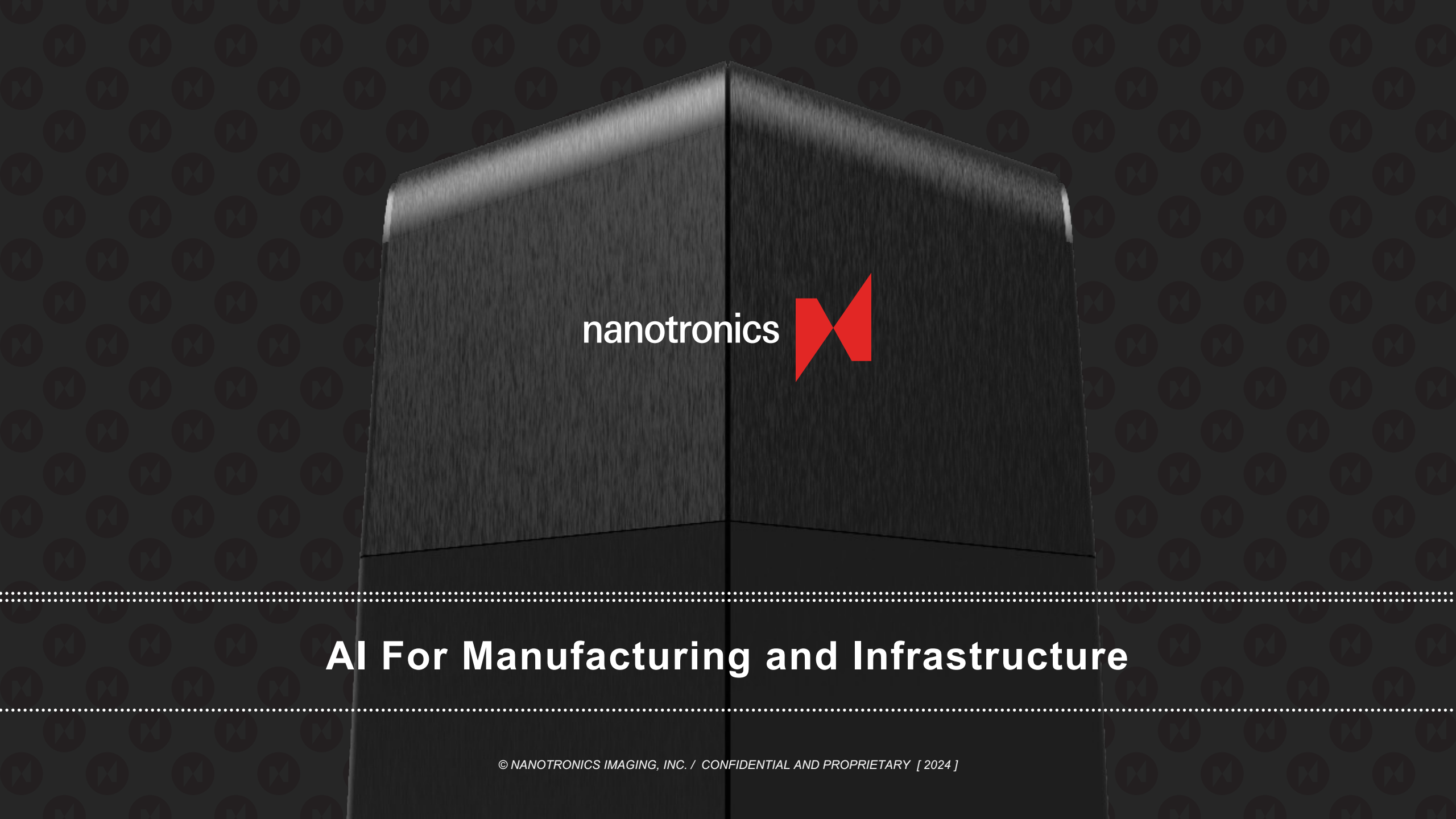


AI For Manufacturing and Infrastructure

~150 EMPLOYEES

~150+ PATENTS*

200+ CUSTOMERS

GLOBAL PLATFORM DEPLOYED ACROSS 15 COUNTRIES

- Nanotronics is an artificial intelligence and deep tech company solving the unique inspection and process control challenges of precision manufacturing.
- Nanotronics' flagship product, nSpec®, is advanced optical inspection system used in precision manufacturing processes.
- Nanotronics SaaS AIPC™ platform, is a full factory solution utilizing both hardware and software to automate and steer production pipelines that enable intelligent, self-inspecting, self-optimizing factories to function securely utilizing real-time data.
- Fully redundant and vertically integrated manufacturing facilities within the United States.
- Customers include leading-edge companies across large and diverse end-markets, including semiconductors, aerospace, automotive, healthcare, and consumer electronics.

COMBINING MICROSCOPY, ARTIFICIAL INTELLIGENCE, AND ROBOTICS, NANOTRONICS IS BUILDING THE TOOLS TODAY FOR THE FACTORY OF TOMORROW.

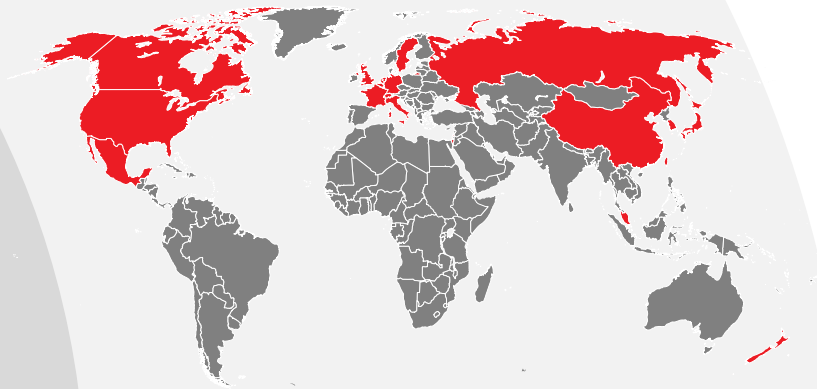
**issued and pending worldwide*

COMPANY TIMELINE

Nanotronics

nanotronics

OVER 200 GLOBAL CUSTOMERS



4 PATENTS | **13 PATENTS** | **20 PATENTS** | **45 PATENTS** | **300+ PATENTS** [ISSUED & PENDING]

2010
- FIRST SUPER-RESOLUTION PATENTS
- OPENS FIRST OHIO OFFICE

2011
- FIRST nSPEC™ SALE TO COMPOUND SEMI CUSTOMER

2012
- FIRST nSPEC™ SALE TO ASIA

2013
- FOUNDERS FUND LEADS SERIES B ROUND

2014
- FIRST nSPEC™ FOR LIFE SCIENCES

2015
- ACQUISITION OF NANOTRONICS AUTOMATION IN HOLLISTER. CA
- FIRST USE OF AI FOR nSPEC's™

2016
- FIRST QUANTUM COMPUTING INSTALLATION
- AI DEPLOYED ON ALL nSPEC's™

2017
- ICD LEADS SERIES D ROUND
- FIRST GENOMICS CUSTOMER

2018
- FIRST GENERATIVE AI PATENTS
- SUCCESSFUL PROOF OF CONCEPT GENERATIVE AI FOR MANUFACTURING

2019
- FIRST AUGMENTED REALITY PATENTS

2020
- nCONTROL™ DEPLOYMENT

2021
- RIBBON CUTTING FOR FLAGSHIP FACTORY IN HISTORIC BUILDING 20

2022
- nSPEC™ SUBSCRIPTION MODEL
- OPENING OF MUNICH OFFICE

2023
- FIRST nCONTROL™ FOR SEMICONDUCTOR CUSTOMERS

PRODUCTS

nSPEC™ | nSPEC™ 2 | nSPEC™ 3D | nSPEC™ CPS | nSPEC™ WIFT | AIPC™ | nTELLIGENCE™ | nCONTROL™ | nCONTROL™ SECURITY | nCONTROL™ LIVE | nSPEC™ TURBO | nSPEC™ PRISM

SEGMENT OVERVIEW

The Nanotronics Ecosystem

AIPC™

- Utilizing effortlessly expandable modular fabrication plants adaptive to specific applications that can be replicated and deployed in multiple locations.
- The platform is modular and configurable to accommodate end application, location, and materials.
- A full-service platform enabling accelerated electronic device manufacturing through leveraging our AIPC ™ technology.

nSpec®

- Artificial Intelligence (AI) powered, vertically integrated, super-resolution, high throughput microscope used to inspect the world's most advanced technologies, including semiconductors, electronics, genomics, EVs, aerospace hardware, nanomaterials, biotech, quantum, and more
- Combines AI, optical microscopy and robotics to detect and classify defects and provide feedback to the process
- Increases yield, reduces footprint and waste, reduces costs and accelerates design iteration
- Eliminates laborious manual inspection

nControl™

- Uses reinforcement learning, generative AI, and other deep-learning networks to make truly intelligent self-inspecting, self-optimizing factories a reality
- nControl™ harnesses data that smart factories and infrastructure are already generating to anticipate problems in the process and implement a solution
- Improves yields, significantly reduces by-products, shortens supply chains and controls costs and carbon footprint, while fostering higher levels of creativity and innovation

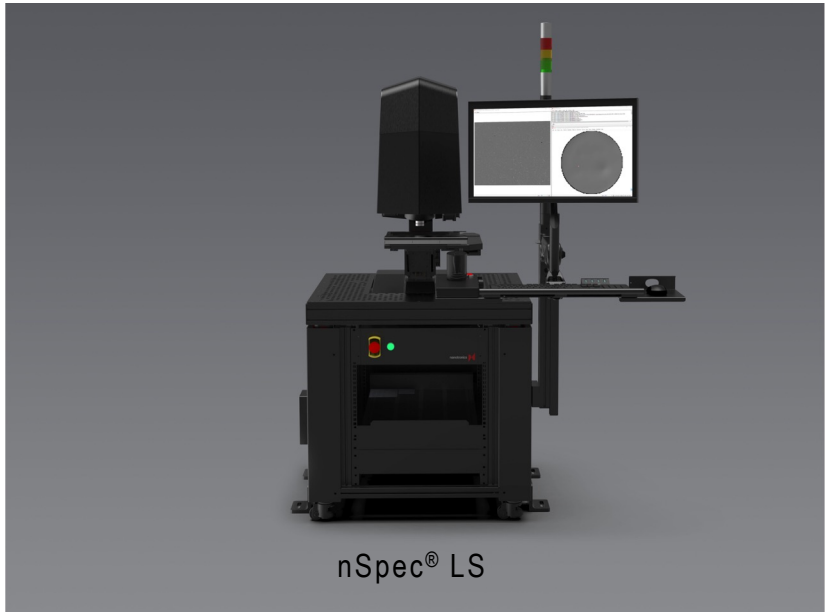
Defect Inspection Methods

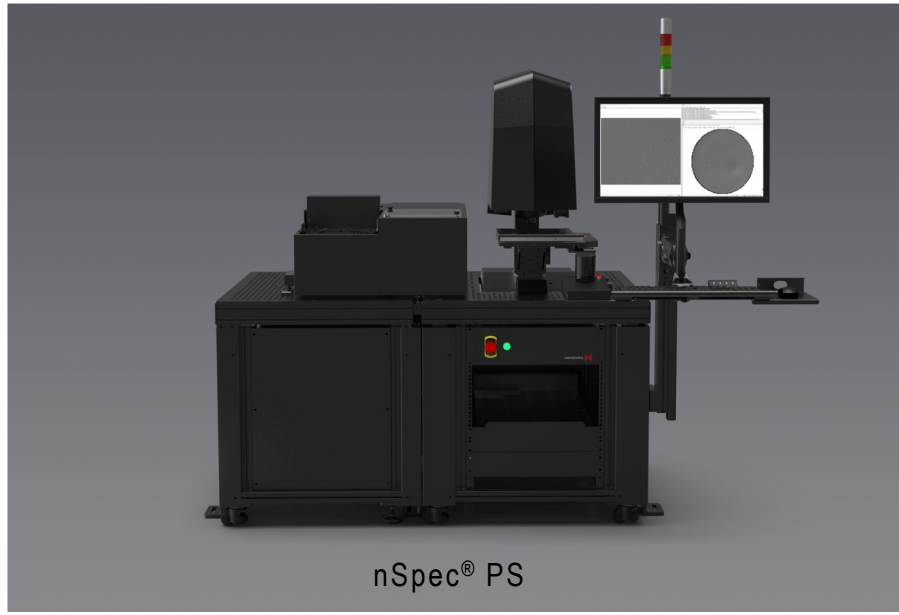
Defect Inspection and Analysis for:

- Substrate, epi, and patterned wafers
- Transparent and opaque materials
- Die on film tape, trays, gel-pak or waffle packs
- Photomasks
- Sample fragments

Common Features:

- Multiple resolution settings, ranging from 0.25 µm and greater
- Rapid scanning
- Customizable defect reports
- Variety of sample chucks to meet specific needs
- Robust analysis for defect or feature of interest detection and classification
- Inspection and review procedures
- Multi-system synchronization
- Small footprint and minimal facilities requirements
- Rack mount controls


nSpec® LS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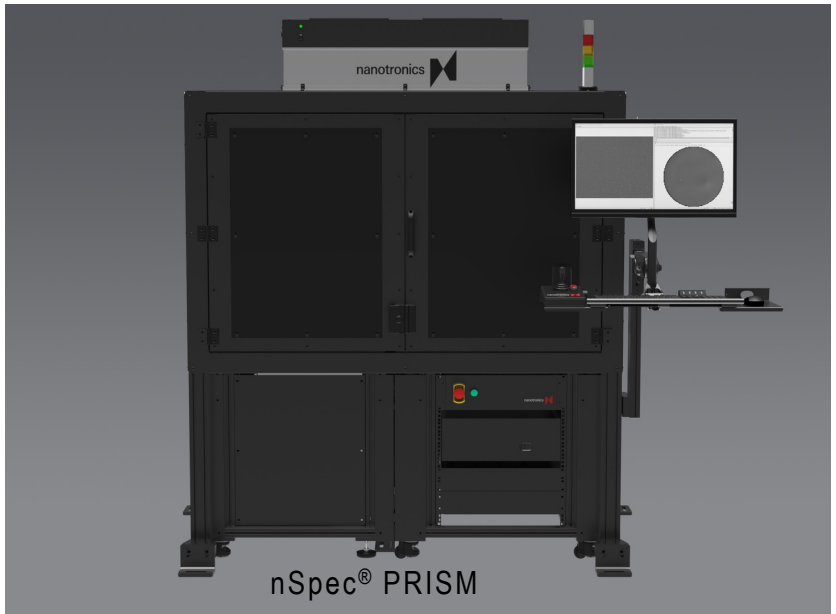
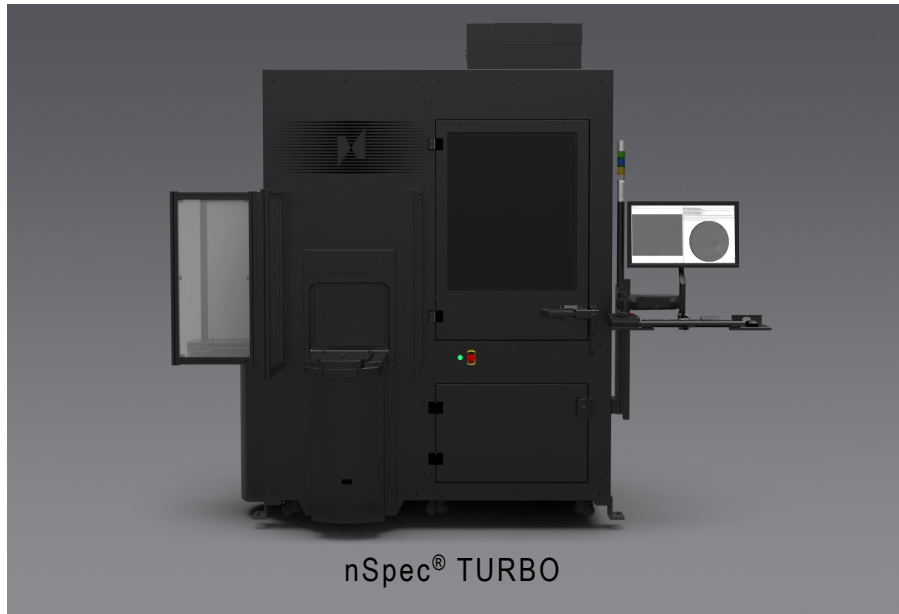


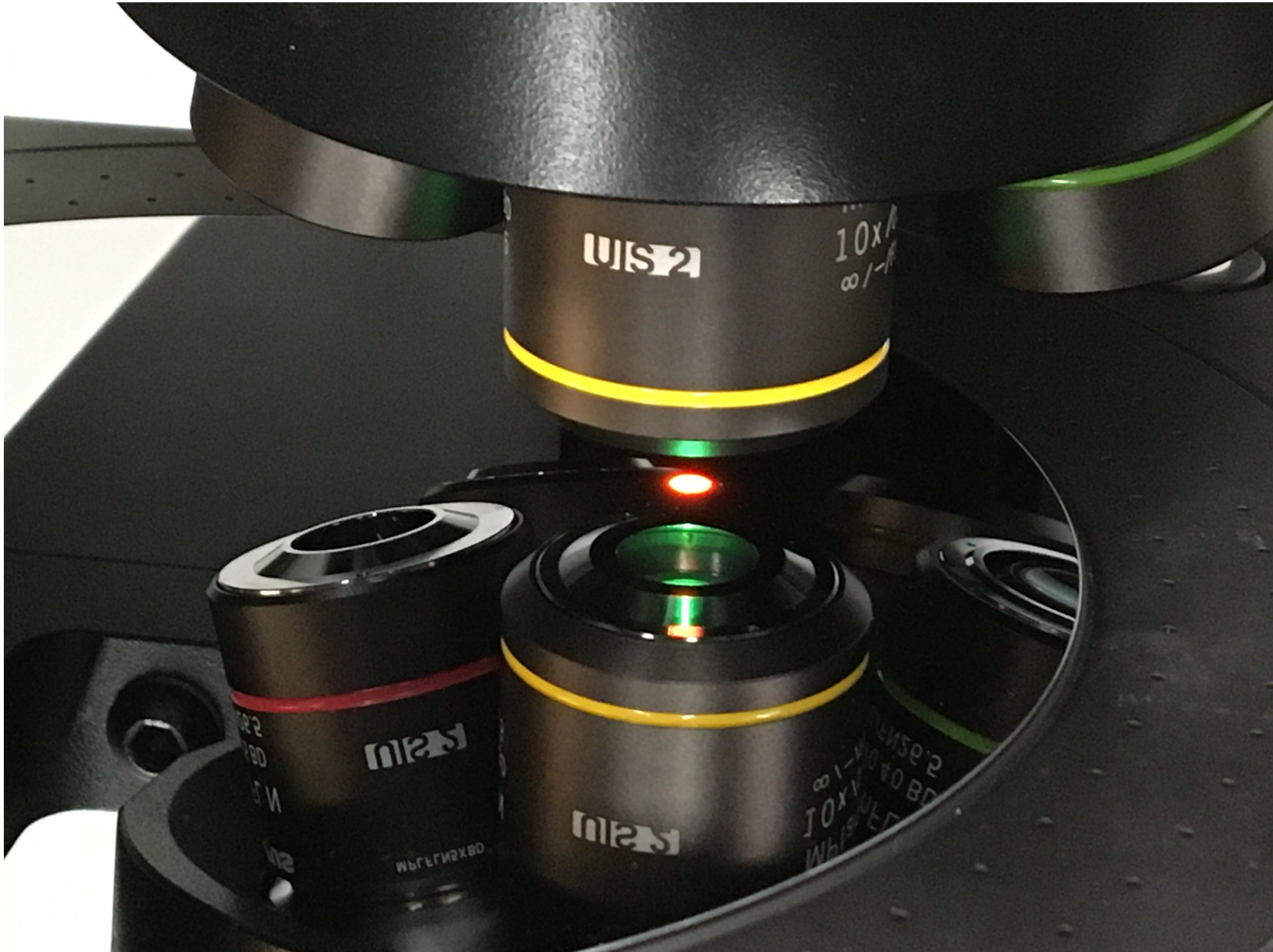
nSpec® PRISM


nSpec® TURBO

HIGH THROUGHPUT DEFECT INSPECTION

Automated optical inspection (AOI) systems that deploy supervised learning for inspection of semiconductor materials are able to take hundreds of thousands of high-resolution images to identify, classify, and assign causality to recurring defect types such as cracks and sliplines, pits, hexagons, and tetrahedra.

By synthesizing AI and various lighting modalities, these systems improve yields and detect anomalies with rapid precision. Inspection-focused R&D efforts provide innovators with the necessary data to shrink devices, optimize energy usage, and increase performance.



RIGHT: Compound Semiconductor glowing red under exposure to green light

nSpec® PL: Total SiC Inspection Solution

Nanotronics Proprietary Photoluminescent Illuminator

The new proprietary Nanotronics' photoluminescence illuminator allows the user to visualize defects by UV absorption and emission over a filtered spectral band. It is designed for optimal configurability and imaging precision at UV wavelengths.

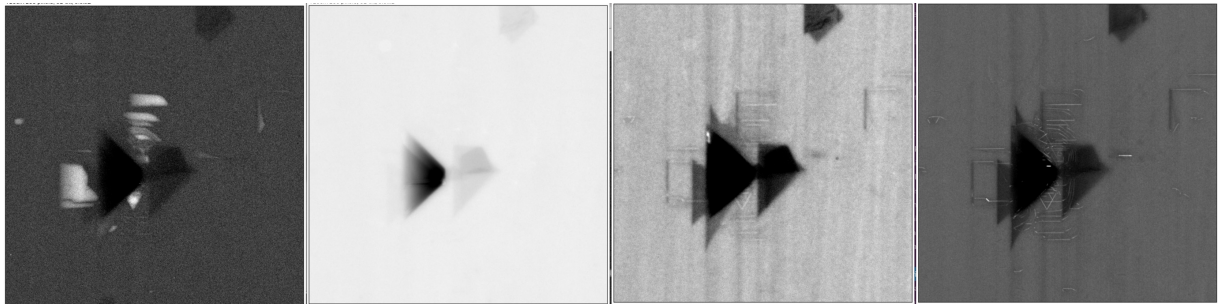
Built in-house, the illuminator reduces supply chain complexity. It will succeed the Olympus illuminator, scheduled to be discontinued.

This microscope supports both reflective and transmission excitation and can hold up to 5 emission filters. This grants you the ability to tune your inspection measurements to specifically detect PL signals of interest.

The illuminator boosts SNR 20% to achieve a cascade of advantageous downstream effects, ultimately increasing throughput. It is built for automation.

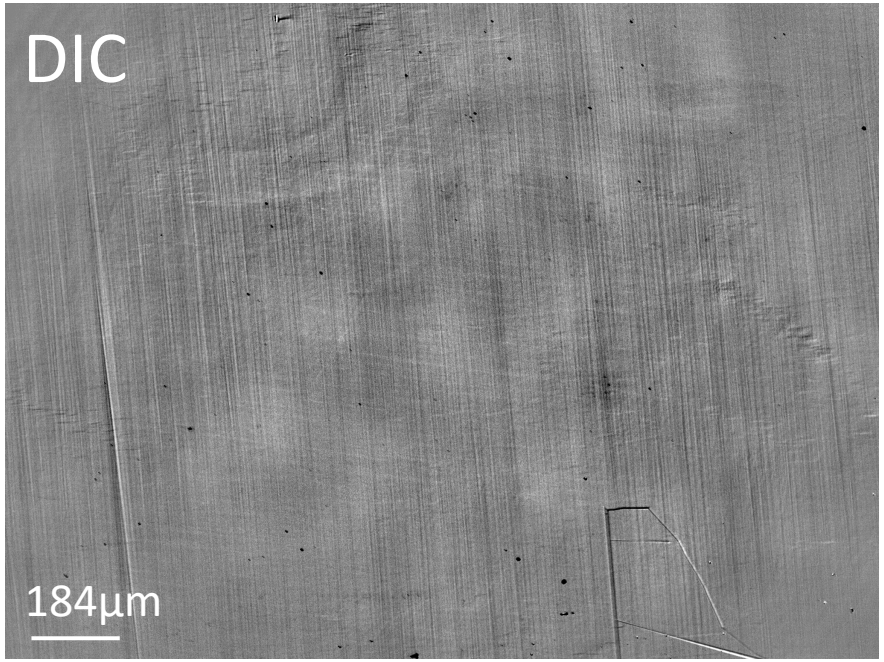
A single tool with multimode support allows imaging a whole wafer or an area of interest with a variety of modes to capture a variety of features.

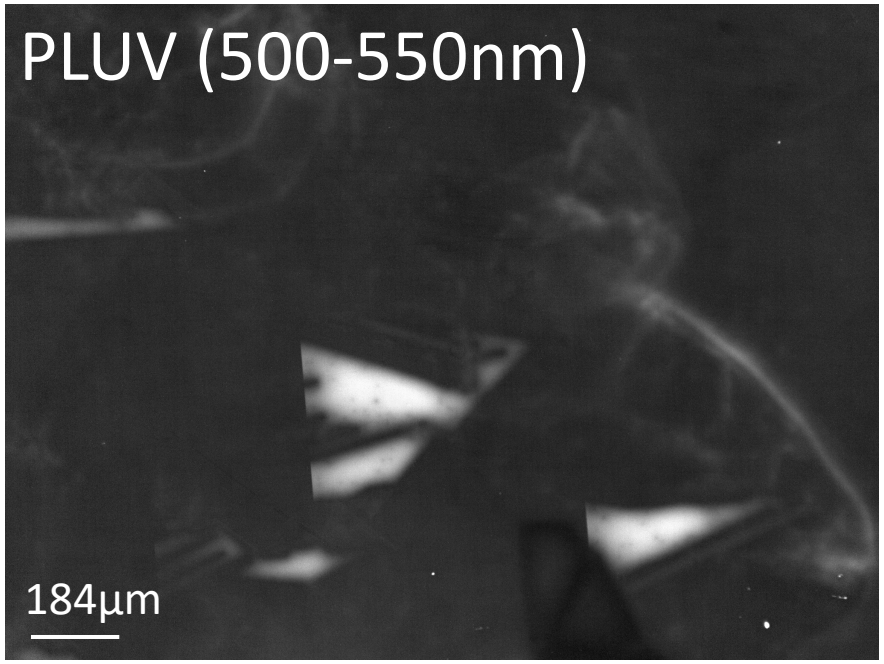
Photoluminescent and transmission polarization imaging reveal defects on non-etched wafers and devices, including basal plane dislocations, stacking faults, and micropipes.

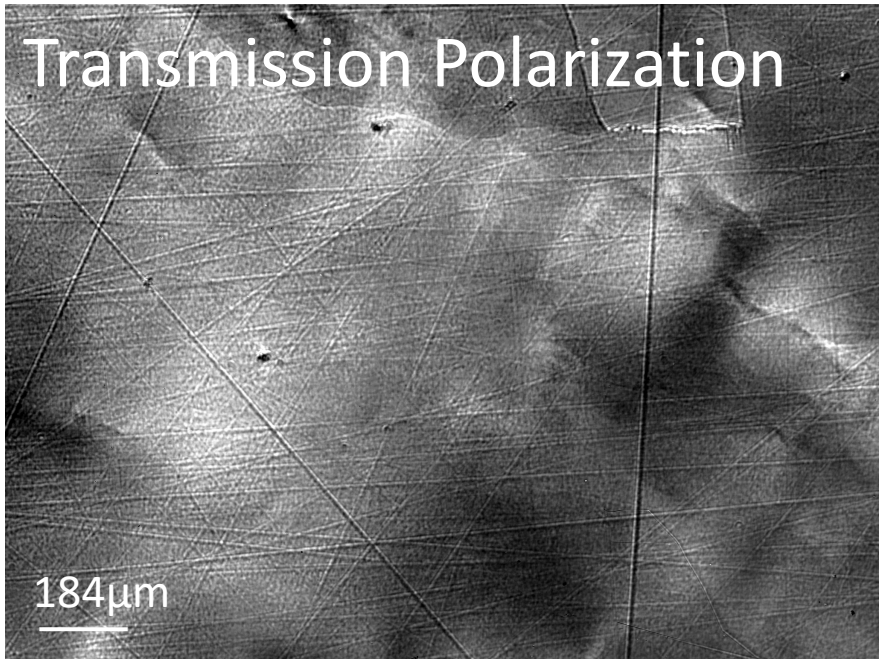


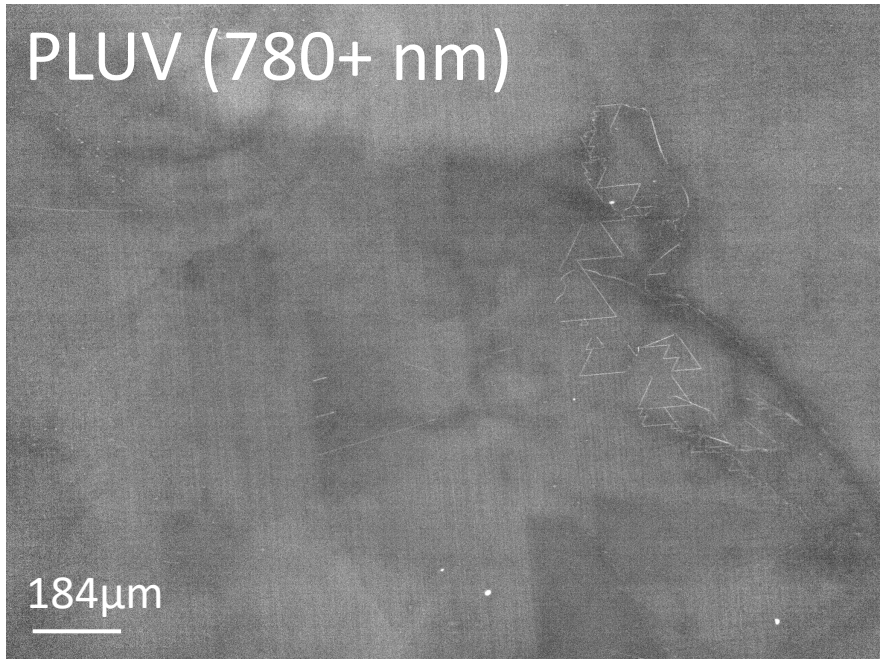
425nm 520nm 600-650nm 780+ nm

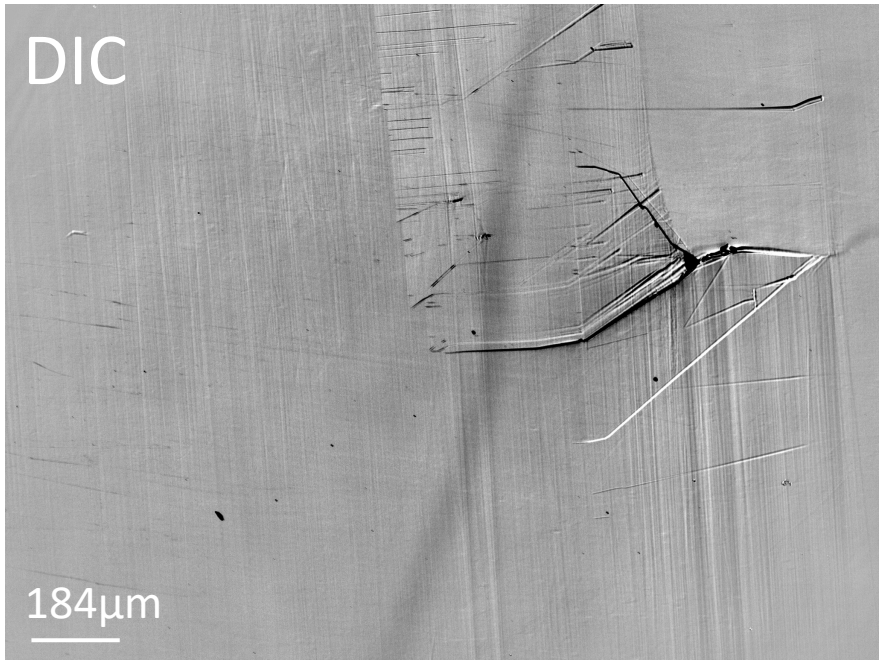
RIGHT: examples of defects revealed by several filters.

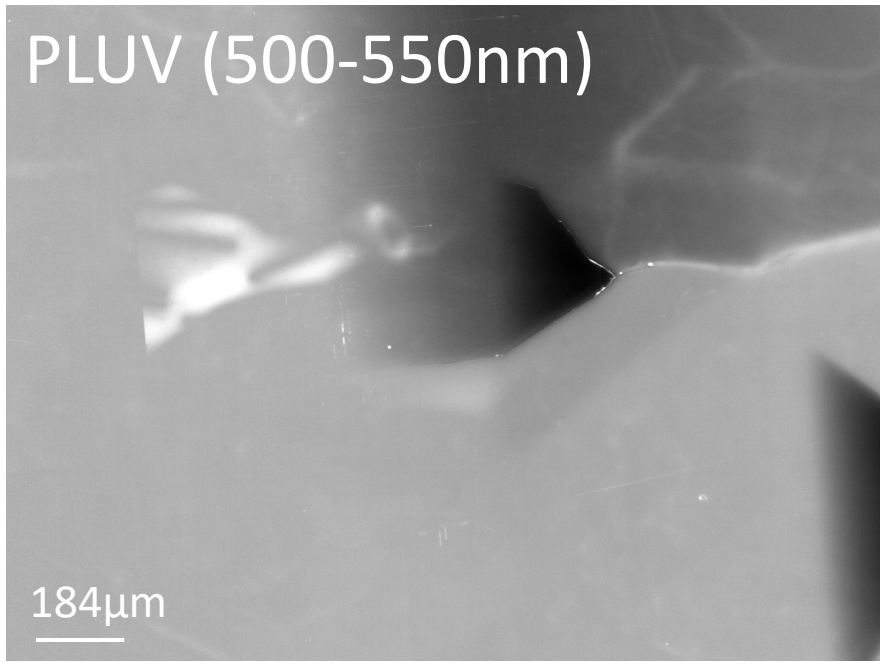


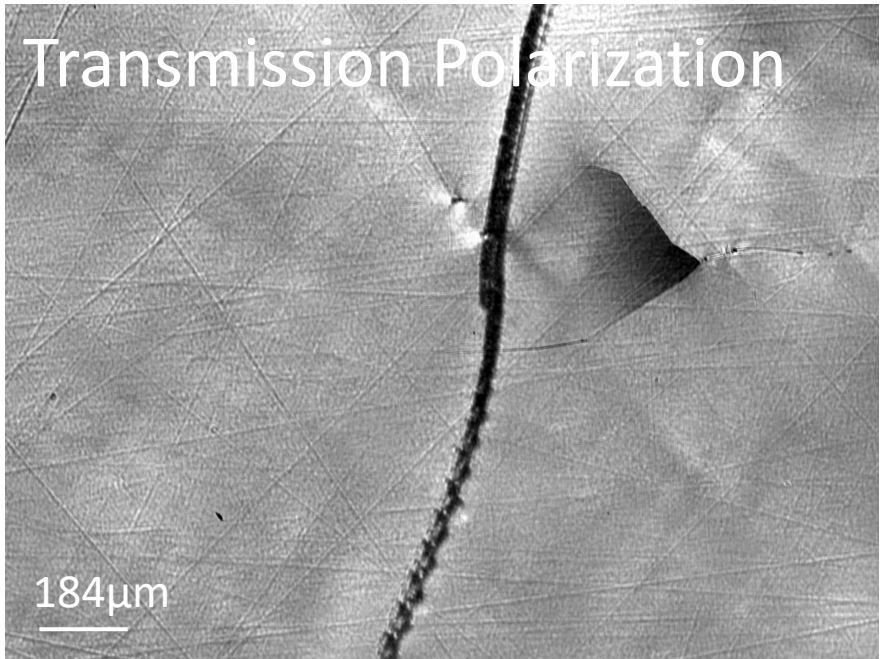


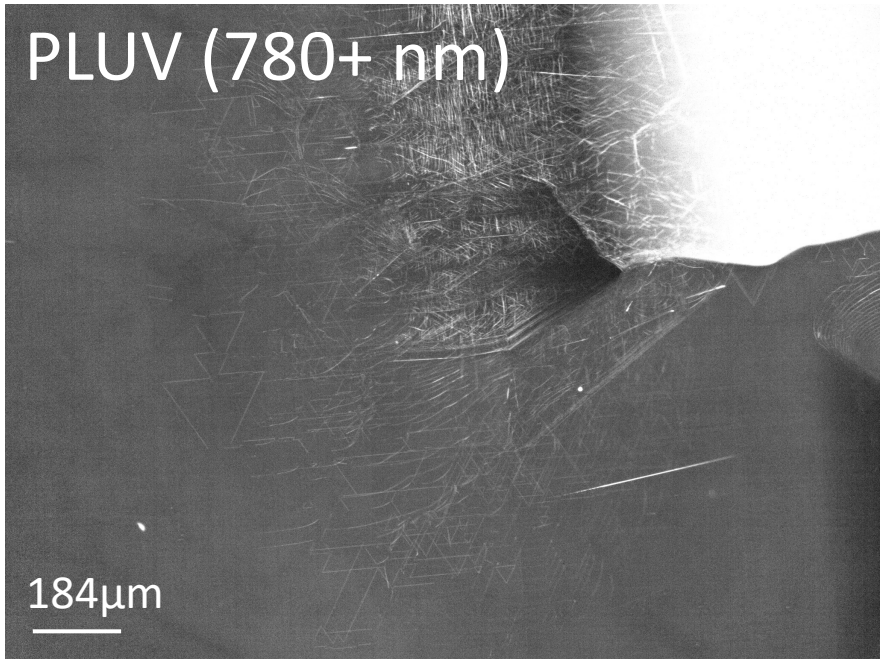


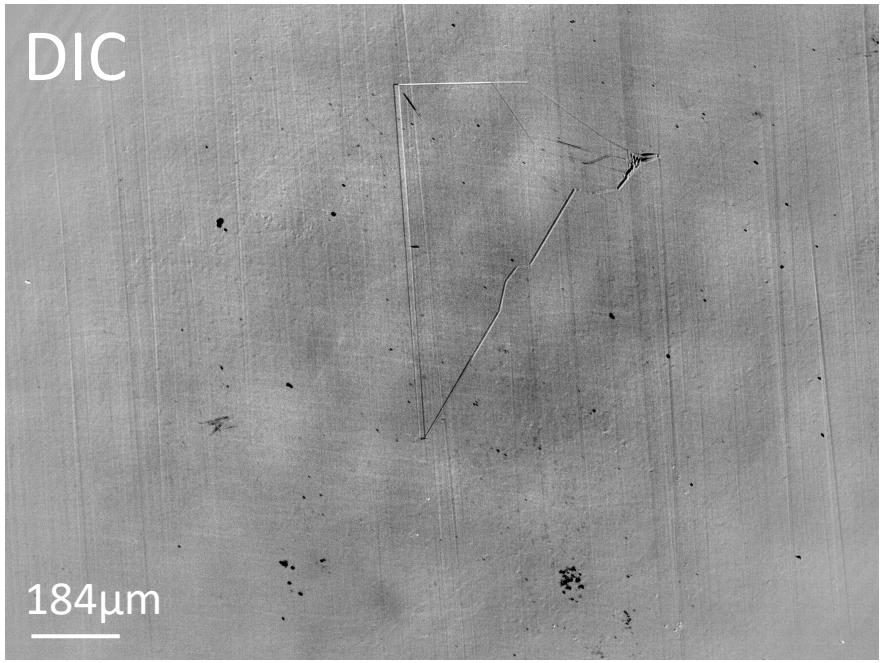


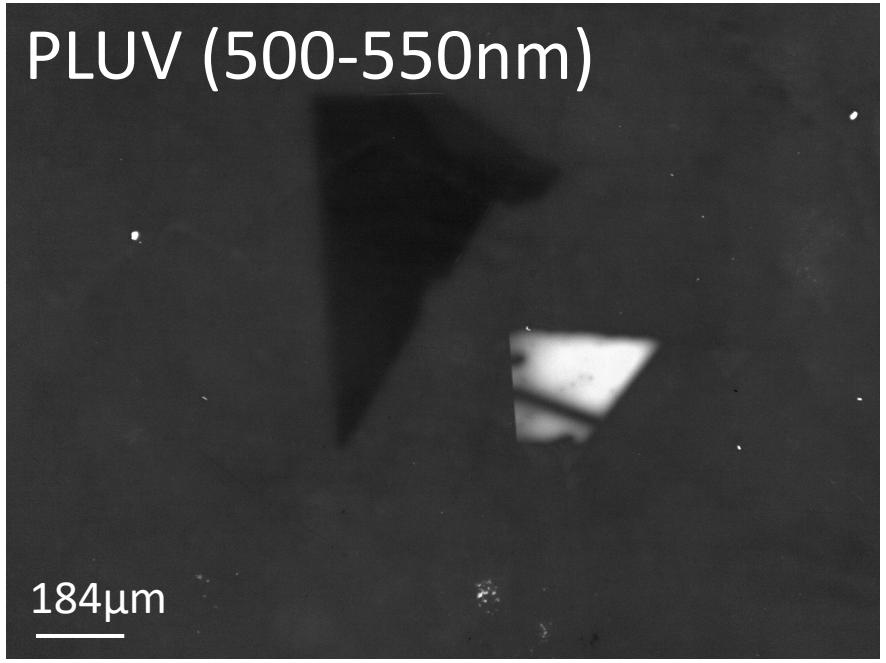


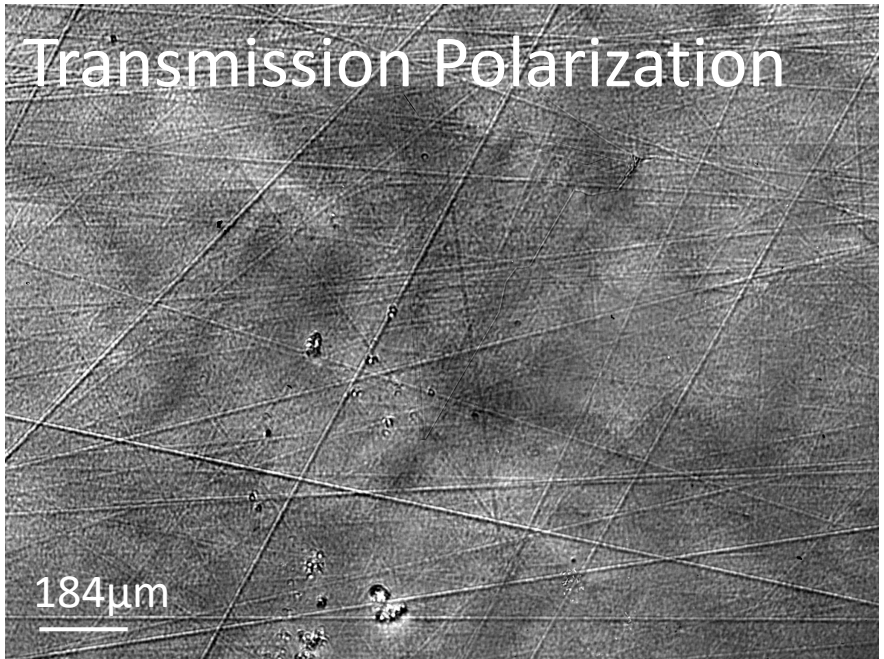


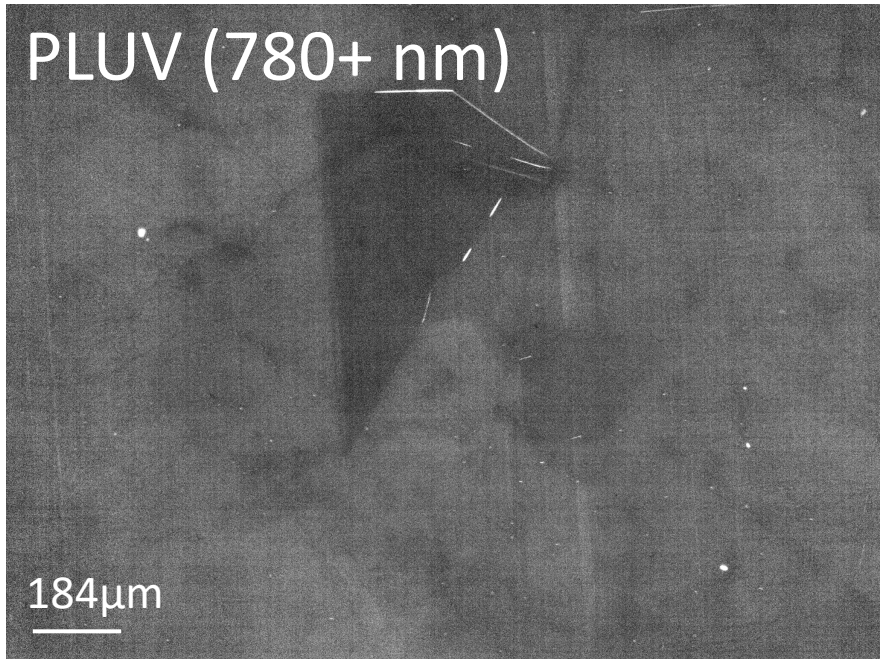


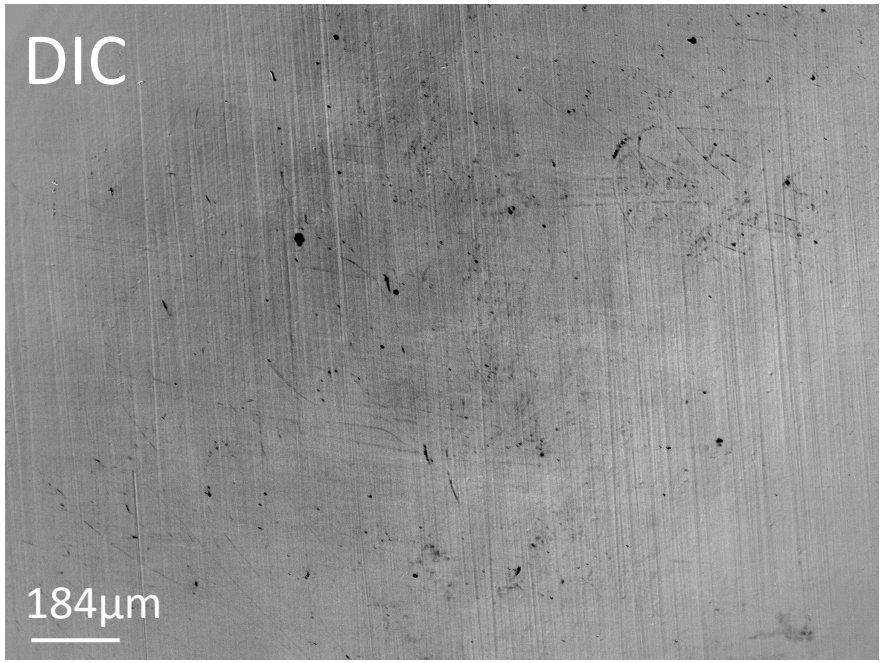


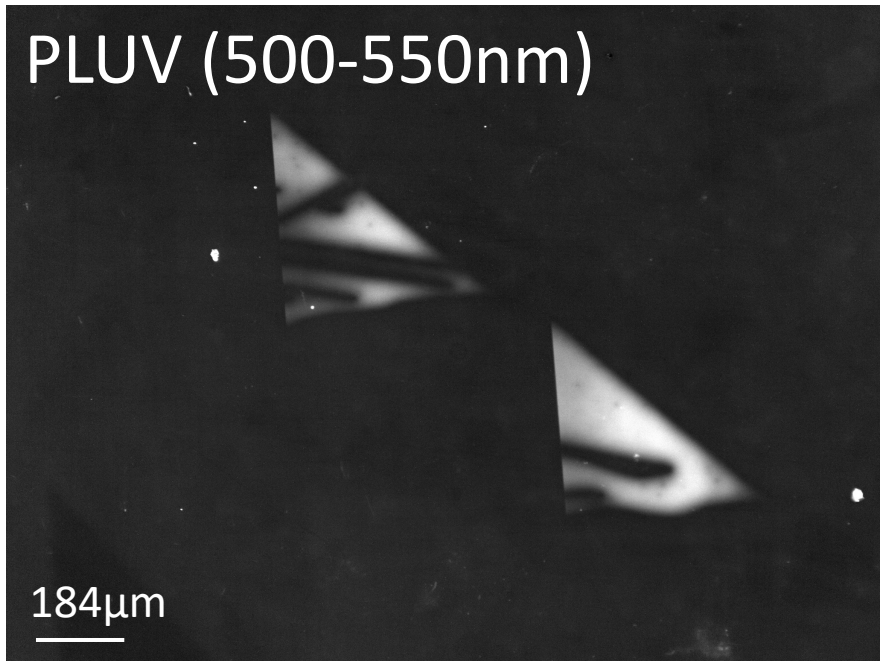


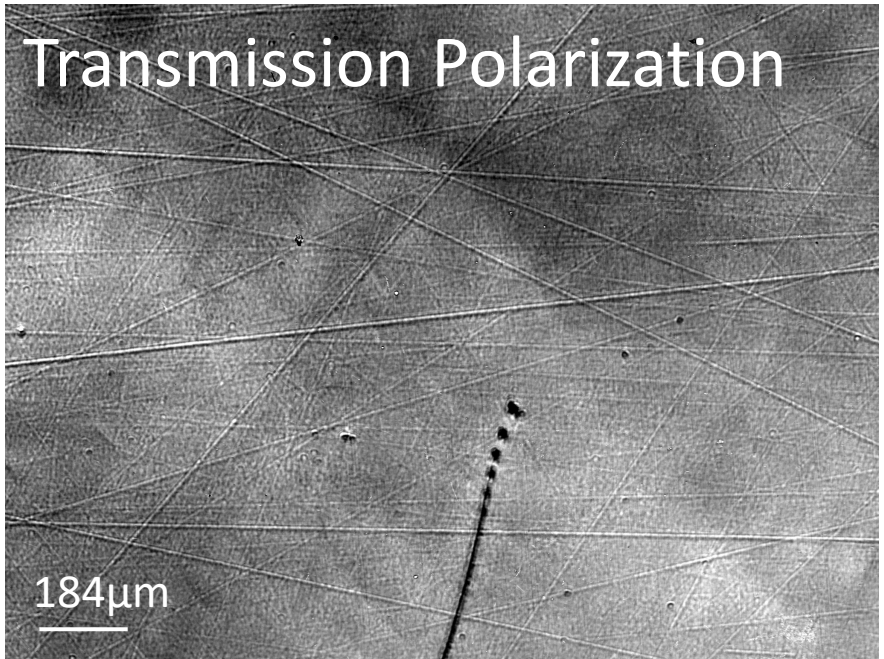


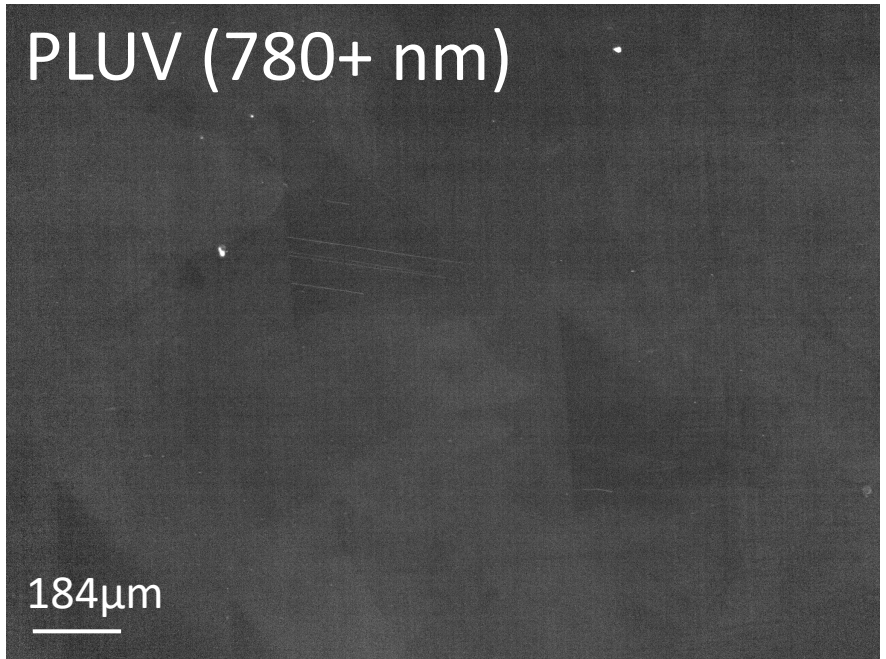








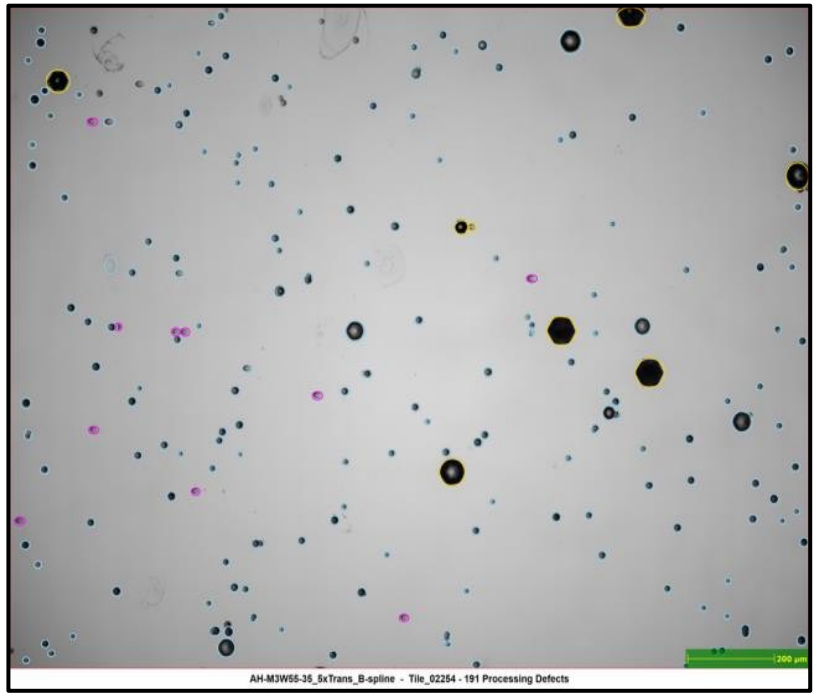




nSpec® PL: Total SiC Inspection Solution

Automated Optical Defect Detection

- Multimode imaging
  - **Brightfield**
  - **Darkfield**
  - **Differential Interference Contrast**
  - UV Photoluminescence
  - Fluorescence
  - Transmission Polarization
- Automatic whole-wafer scanning
- Automatic Defect Detection



Traditional illumination methods support etched dislocation detection, revealing **Threading Screw Dislocations, Threading Edge Dislocations, Basal Plane Dislocations, Hexes, and Chains**.

nSpec® PL: Total SiC Inspection Solution

Nanotronics Dislocation Defect Analyzer

nSpec® uses a combination of AI, computer vision, and a decade of inspection experience to classify dislocations revealed by KOH etching of SiC.

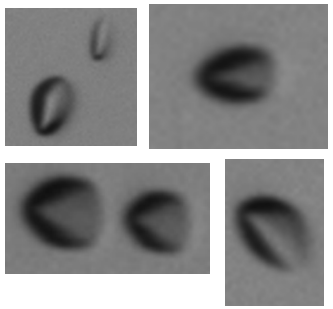
Inspection parameters, including which defect classes to find, are defined by user requirements.

Analysis output is highly tunable; users may define report file formats and defect metrics to include like size, class, and wafer coordinate.

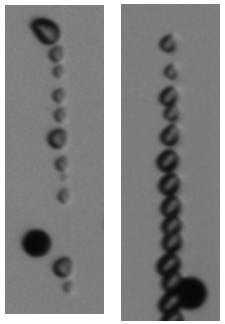
DefectID	ImageID	AnalysisID	DeviceID	X	Y	W	H	Area
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	378	1	0	116.6003183...	3702.134745...	10.84654123...	3.618015876...	28.61465717...
2	378	1	0	1192.667597...	3697.612225...	44.29004339...	12.66305556...	397.7437346...
3	378	1	0	1986.724803...	3696.707721...	32.53962371...	14.47206350...	355.6393105...
4	378	1	0	3643.082038...	3695.803217...	33.44350215...	16.28107144...	407.5544742...
5	378	1	0	2464.424557...	3693.541957...	31.63574527...	20.80359128...	563.7087462...

ABOVE: Screenshot of nSpec's® defect database. Device ID may be imported from GDS file.
RIGHT : Typical defects identified on etched SiC.

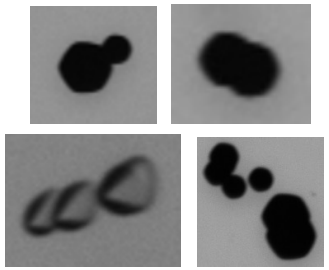
Basal Plane Dislocation (BPD)



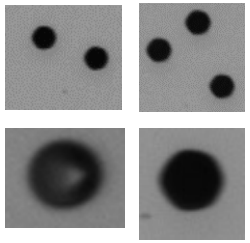
BPD Chain



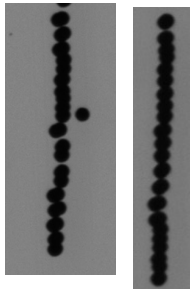
Cluster



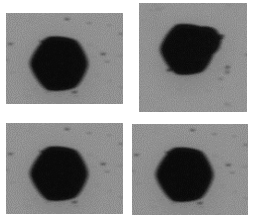
Threading Dislocation (TD)



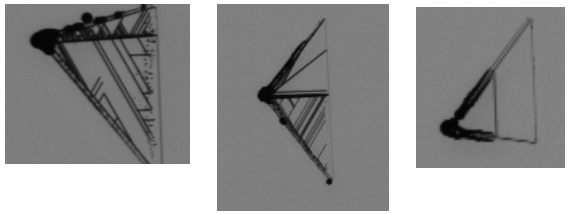
TD Chain



Grand Hex (GH)



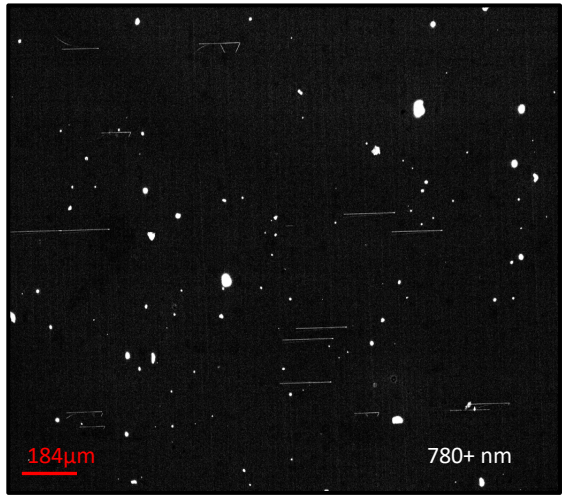
Triangle with Downfall

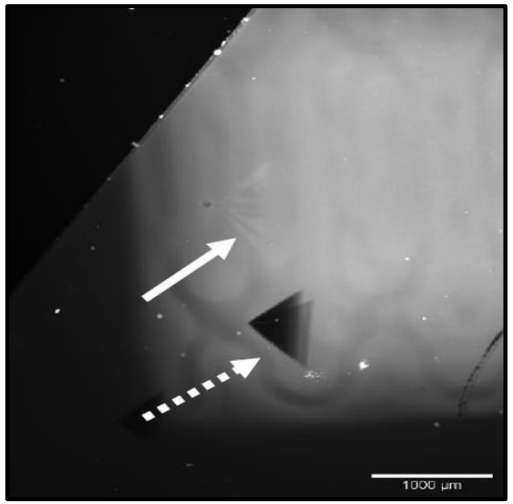


nSpec® PL: Total SiC Inspection Solution

Automated Optical Defect Detection

- Multimode imaging
  - Brightfield
  - Darkfield
  - Differential Interference Contrast
  - **UV Photoluminescence**
    - **High-contrast stacking fault detection on epi-wafers**
  - Fluorescence
  - Transmission Polarization
- Automatic whole-wafer scanning
- Automatic Defect Detection

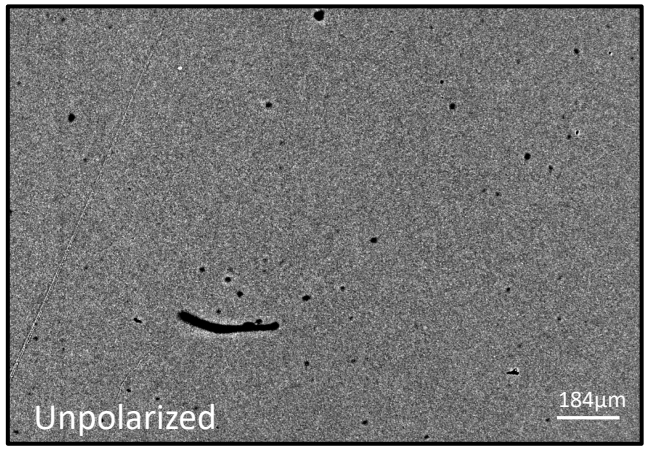


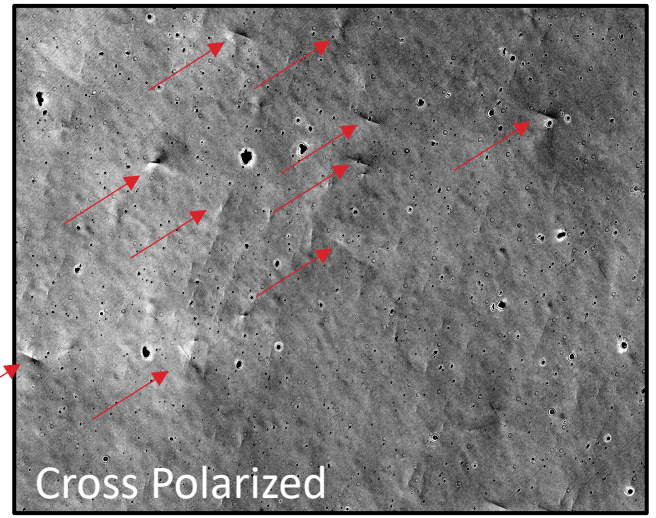


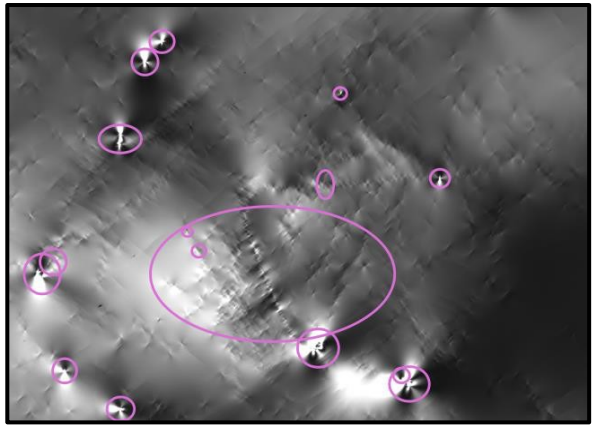
nSpec® PL: Total SiC Inspection Solution

Automated Optical Defect Detection

- Multimode imaging
  - Brightfield
  - Darkfield
  - Differential Interference Contrast
  - UV Photoluminescence
  - Fluorescence
  - **Transmission Polarization**
    - **High-contrast micropipe detection**
- Automatic whole-wafer scanning
- Automatic Defect Detection





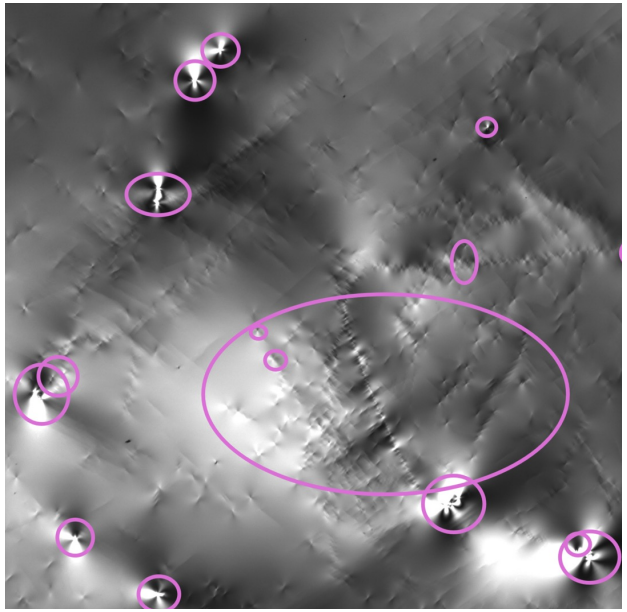


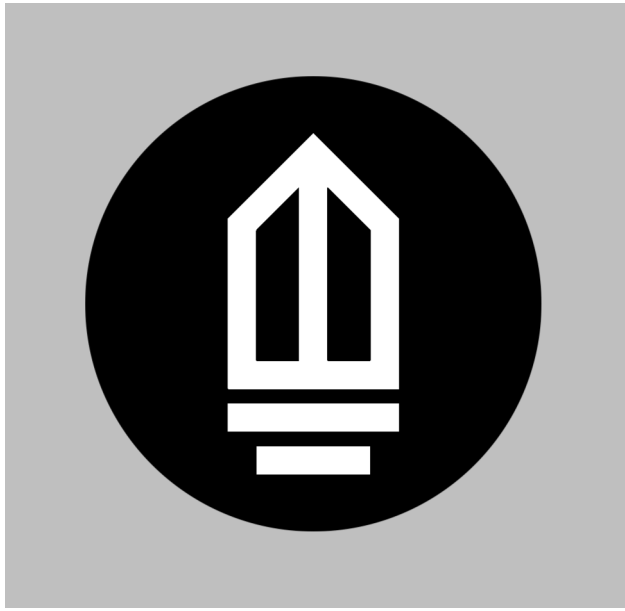
SiC INSPECTION

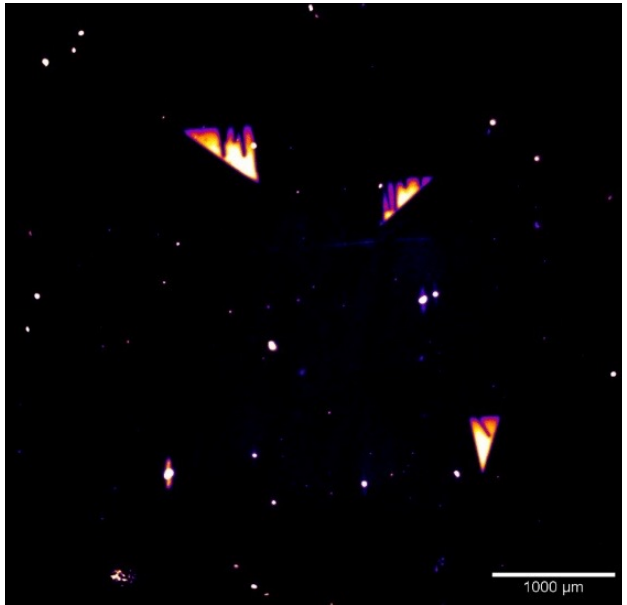
With **transmitted light** and **cross-polarized illumination**, AOI systems can accurately detect and classify subtle crystallographic defects such as micropipes quickly and easily, covering virtually the full area of the wafer. Precise locations are provided in order to intelligently inform downstream processing.

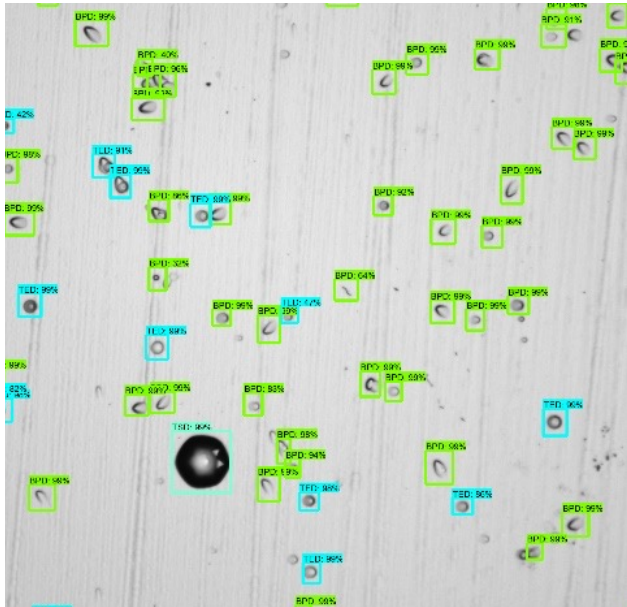
By **utilizing UV Photoluminescence** AOI systems can detect stacking faults and other crystalline defects in the bulk of the material. These systems allow users to scan an entire wafer using alternative wavelengths in high resolution on the same platform.

The defects listed above can be detected without costly and wasteful etching of substrates. When required, AOI systems can be utilized with etched wafers to accurately classify defect types by shape and provide counts, sizes, and locations for all defects such as threading edge dislocations, threading screw dislocations, and basal plane dislocations.









TOP LEFT: cross polarized transmitted DIC
BOTTOM LEFT: UV photoluminescence
BOTTOM RIGHT: dislocation analysis

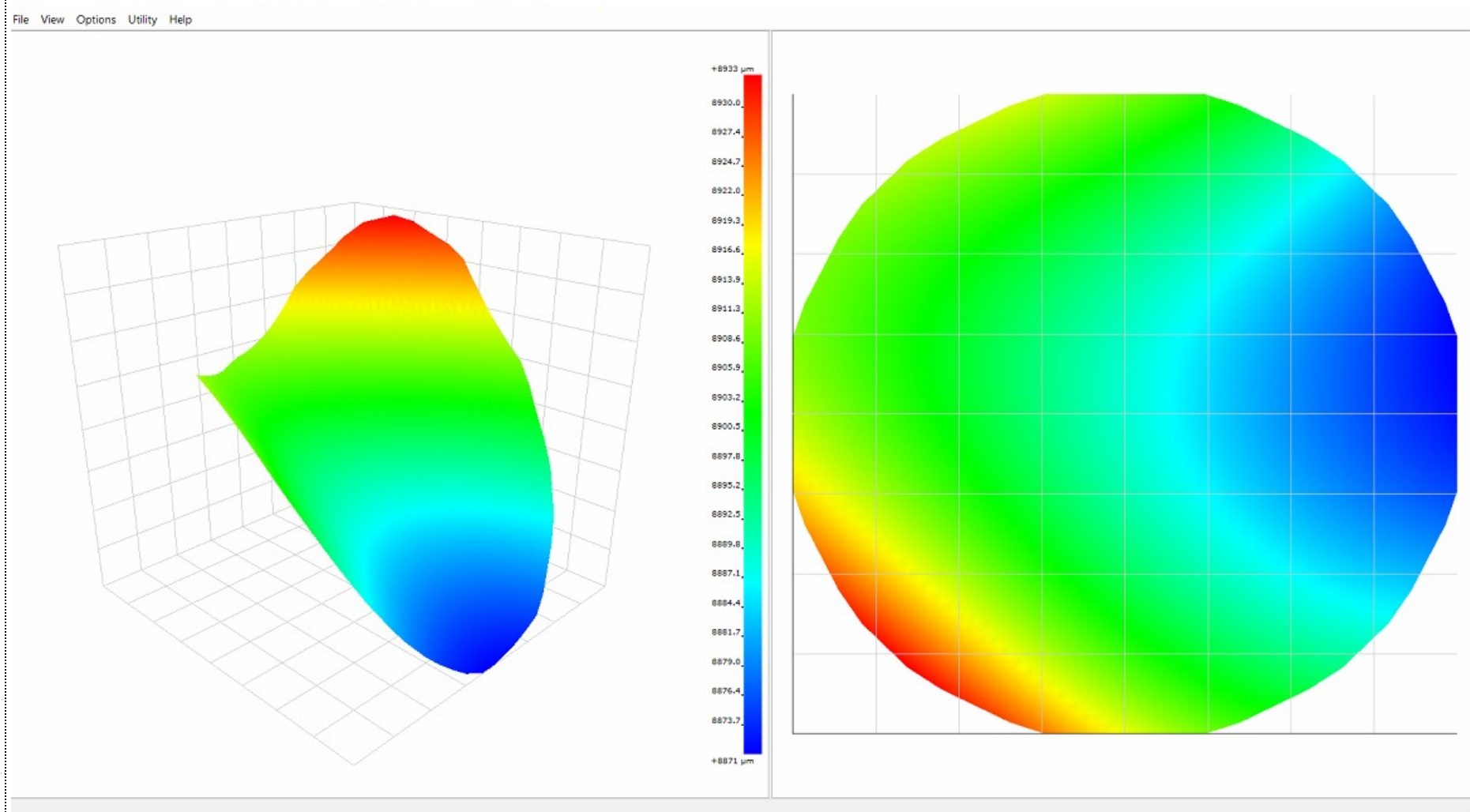
UNDERSTANDING SURFACE TOPOLOGY

A Flatness Report function renders the surface of any AOI system scan. This can help you understand the surface topology of your samples.

This tool can be used to visualize quality control issues such as bow or warping in samples.

Measurements made during the autofocus step of scanning are used as inputs to a user-selected surface prediction algorithm, and the output of the algorithm is the estimated sample surface.

The Flatness Report can also be used as a tool to troubleshoot autofocus settings when used in tandem with the AOI system feature to save autofocus images during scanning.



LEFT: INTERATIVE 3D RENDER OF SAMPLE
RIGHT: DATA RENDERED FROM TOP-DOWN PERSPECTIVE

Resolution: 0.90 µm/pixel
Objective Power: 5X

nSPEC™ COPILOT

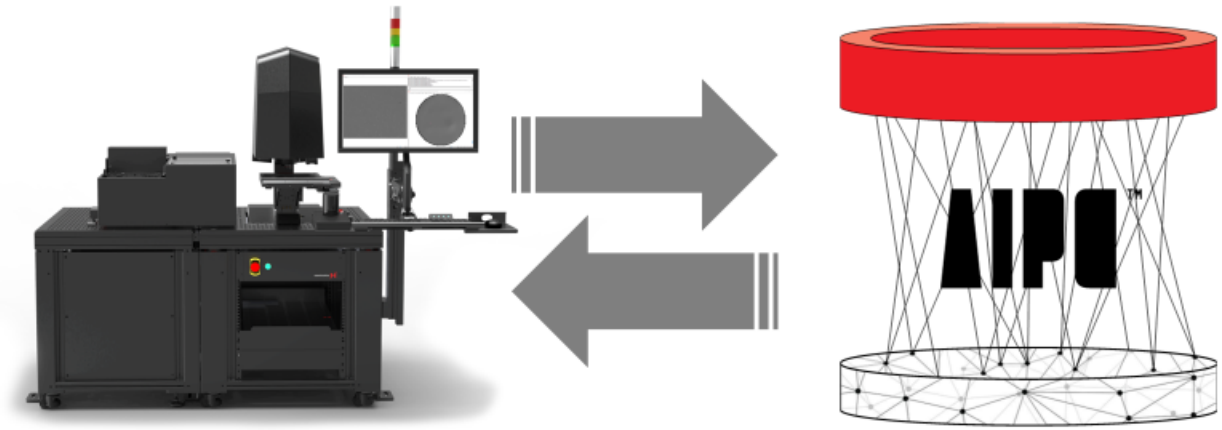
THE FIRST TO BRING AI TO OPTICAL INSPECTION

Tool Scoreboard: provides aggregated score for every tool on the production line based on the incoming nSpec and MES records.

Recipe Optimization: gives process engineers insights that help them diagnose the causes of process problems and the key variables to focus on for updating recipes to improve yield and reliability.

Virtual Inspection: allows finer-grained and more efficient root cause analysis of production problems, with zero impact on production throughput. It is a valuable complement to the nSpec™ and a force multiplier on a single nSpec™'s ability to improve yields.

Enables our customers to identify the causes of defectivity in their process reducing the amount of re-work, waste, and power consumption.



nSpec® INSPECTION **PROCESS CONTROL**

THANK YOU

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