

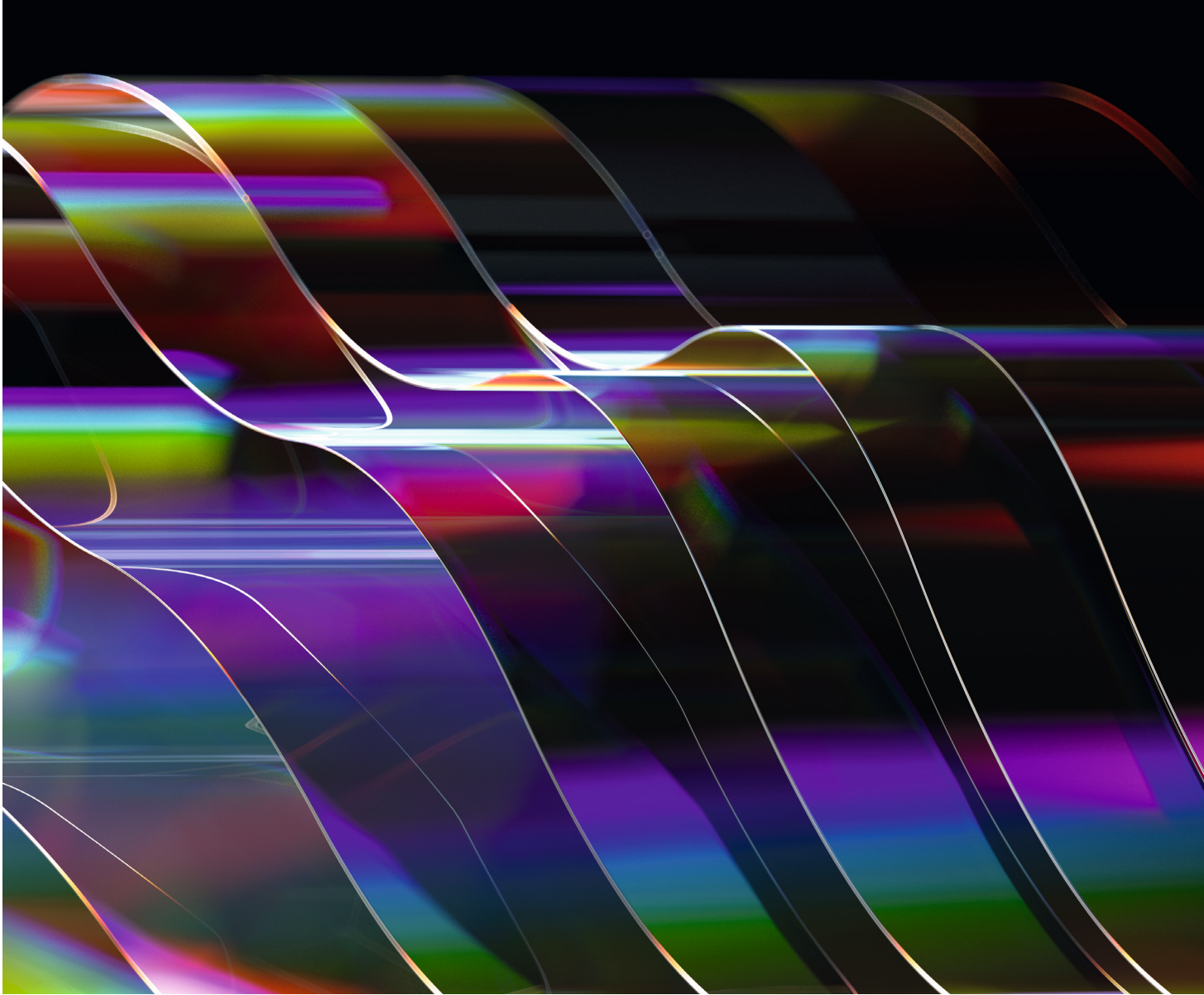
VEpioneer[®] SERIES

PRODUCT FAMILY

COMPREHENDING THE INVISIBLE



Fast. Non-destructive. Comprehensive. The VEpioneer[®] series offers the world's first fully integrated Hyperspectral Vision systems for macro- or microscopic inspection. It captures surface properties, inspects thin films and identifies deviations from production specifications.



SURFACE AND LAYER INSPECTION REDEFINED

VEpioneer® SERIES

FULL SURFACE INSIGHT FROM YOUR BENCH-TOP

Deviations from production cost time, money, and material – yet most inspection methods are slow, complex, or destructive. The **VEpioneer® SERIES** delivers full-surface insight across all four variants: MACRO, MICRO, CORE, and SEMI.



One button operation. Full surface insight

Fully automated inspection from measurement to result – no complex setup, no prior expertise required.



Fully non-destructive process

Optical spectroscopy leaves samples completely intact – ideal for production-critical parts.



Fast measurements

One scan in less than 10 seconds.



Layer thickness from nm to μm

Precisely inspects ultra-thin to thick layers across a wide range of materials and substrates.



Compatible with virtually any material

Metals, glass, polymers, semiconductors, ceramics.

The VEpioneer® series represents the world's first fully integrated, one-button operation bench-top Hyperspectral Vision system – ready to use straight out of the box, without complex setup or specialist training. Built on PVA's Hyperspectral Vision technology, every system in the series delivers non-destructive, full-surface inspection in a single measurement run, capturing layer thicknesses from nm to μm across a wide range of materials including semiconductors, metals, polymers, ceramics, and glass. The result is not a single data point, but a complete spatially resolved image of the entire sample surface – delivering the kind of comprehensive insight that conventional single-point methods simply cannot provide.

Whether the task is macroscopic surface inspection, high-resolution microscopic inspection, or cleanroom-compliant wafer analysis – the VEpioneer® series offers a precisely tailored solution for each requirement. The **VEpioneer® MACRO** handles large samples up to 360 × 360 mm with

a spatial resolution down to 200 μm , making it the ideal choice for production-scale quality control. The **VEpioneer® MICRO** achieves sub-micron spatial resolution for detailed microscopic inspection of smaller samples up to 130 × 130 mm, operable manually via joystick or fully automated through software. The **VEpioneer® CORE** – the world's smallest fully integrated Hyperspectral Vision system with a footprint of just 230 × 200 mm and a weight of only 12 kg – offers a powerful and space-efficient entry point into hyperspectral metrology. And the **VEpioneer® SEMI** brings cleanroom-compatible wafer inspection (ISO class 3) with integrated laminar flow FFU for safe, contamination-free handling of 100, 150, 200 and 300 mm wafers directly into the fab environment.

All systems are centrally controlled and evaluated via the AI-powered **VEsolve® PRO** software, delivering spatially resolved results on layer thickness, defects, contaminations, and surface properties – in under 10 seconds.

TECHNICAL DATASHEET

VEpioneer® CORE

The VEpioneer® CORE is engineered for precision hyperspectral analysis in a compact form factor.

- World's smallest fully integrated Hyper-spectral Vision bench-top system
- Designed for sample sizes up to 50 x 100 mm²
- Spatial Resolution of 100 µm
ideal entrypoint into hyperspectral inspection



SPECIFICATIONS	
Measurement Mode	Reflectance
Measurement Time	< 10 s (typical)
Wavelength Range	VNIR 450–900 nm
Spectral Resolution	1.34 nm
Field of View (FOV)	100 mm ²
Spatial Resolution	100 µm ¹
Max. Sample Size	up to 50 x 100 mm, max. height 10 mm ²
Lighting	VELuminise® – LED broadband excitation
Software	VEsolve® PRO
Connectivity	RJ45 (Ethernet)
ENVIRONMENT	
Power Requirements	230 VAC (115 V optional), 50 Hz, 80 W
System Dimensions	230 x 200 x 500 mm (L x W x H)
System Weight	12 kg
Certifications	CE, RoHS, UKCA
Operating Conditions	+ 5 °C to + 40 °C (non-condensing)
SUBSTRATES & LAYERS	
Substrates	Metals, glass, polymers, semiconductors (Si, SiC), ceramics, and many more
Layers	Oxides, nitrides, carbides, polymers, and many more
Layer Thickness Range	1 nm – 500 µm (material dependent)
Surface Information	Cleanliness Contaminations Defects Surface states Custom target parameters

¹ High-resolution scan-modes available. | ² Further customisation available.

TECHNICAL DATASHEET

VEpioneer® MACRO

The VEpioneer® MACRO is engineered for precision, speed, and versatility.

- Compact bench-top system designed for macroscopic inspection
- Sample sizes up to 360 x 360 mm²
- Spatial resolution of 100–300 µm with high-resolution scan modes available
- Tailored sample stage and versatile customization options



SPECIFICATIONS	
Measurement Mode	Reflectance
Measurement Time	< 10 s (typical)
Wavelength Range	VNIR 400–1000 nm / SWIR 900–1700 nm
Spectral Resolution	VNIR 1.34 nm / SWIR 3.5 nm
Field of View (FOV)	300 mm (Standard) ²
Spatial Resolution	VNIR 300 µm / SWIR 470 µm ¹
Max. Sample Size	up to 360 x 360 mm, max. height 10 mm ²
Lighting	VEluminise® – adjustable halogen broadband source, LED broadband or UV-LED excitation
Software	VEsolve® PRO
Connectivity	RJ45 (Ethernet)
ENVIRONMENT	
Power Requirements	230 VAC (115 V optional), 50 Hz, 170 W
System Dimensions	1002 x 530 x 331 mm (L x W x H)
System Weight	58 kg
Certifications	CE, RoHS, UKCA
Operating Conditions	+ 5 °C to + 40 °C (non-condensing)
SUBSTRATES & LAYERS	
Substrates	Metals, glass, polymers & foils, semiconductors (Si, SiC), ceramics, and many more
Layers	Oxides, nitrides, carbides, polymers, and many more
Layer Thickness Range	1 nm – 500 µm (material dependent)
Surface Information	Cleanliness Contaminations Defects Surface states Custom target parameters

¹ High-resolution scan-modes available. | ² Further customisation available.

VEpioneer® MICRO

The VEpioneer® MICRO is engineered for microscopic-level hyperspectral imaging with outstanding spatial resolution.

- Bench-top system for microscopic inspection
- Achieves sub-micron spatial resolution (depends on microscope lens)
- Sample sizes up to 130 x 130 mm²
- Flexible Operation: manual control with joystick or fully automated via software



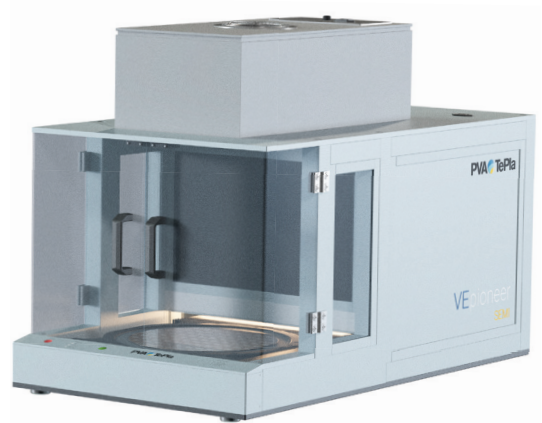
SPECIFICATIONS	
Measurement Mode	Reflectance
Measurement Time	< 10 s (typical)
Wavelength Range	VNIR 400–1000 nm / SWIR 900–1700 nm
Spectral Resolution	VNIR 1.34 nm / SWIR 3.5 nm
Field of View (FOV)	adapted to wafer size ¹
Spatial Resolution	< 1 µm (depending on microscope lens)
Max. Sample Size	up to 130 x 130 mm, max. height 30 mm
Lighting	VELuminise® – adjustable halogen broadband source
Software	VEsolve® PRO
Connectivity	RJ45 (Ethernet)
Control	manual via joystick or automatic via VEsolve® PRO Software
ENVIRONMENT	
Power Requirements	230 VAC (115 V optional), 50 Hz, 80 W
System Dimensions	600 x 600 x 732 mm (L x W x H)
System Weight	32 kg
Certifications	CE, RoHS, UKCA
Operating Conditions	+ 5 °C to + 40 °C (non-condensing)
SUBSTRATES & LAYERS	
Substrates	Metals, glass, polymers, semiconductors (Si, SiC and others), ceramics, and many more
Layers	Oxides, nitrides, carbides, polymers, and many more
Layer Thickness Range	1 nm – 500 µm (material dependent)
Surface Information	Cleanliness Contaminations Defects Surface states Custom target parameters

¹ High-resolution scan-modes available.

VEpioneer® SEMI

The VEpioneer® SEMI is engineered for high-throughput semiconductor inspection.

- **Cleanroom-compatible version (ISO Class 3)**
with integrated laminar flow FFU
- **Best for macroscopic wafer inspection**
supports 200 mm and 300 mm wafers
- **Equipped with 3-point wafer holder**
for safe, contamination-free handling
- **Spatial resolution from 300 µm**
with high-resolution scan modes available

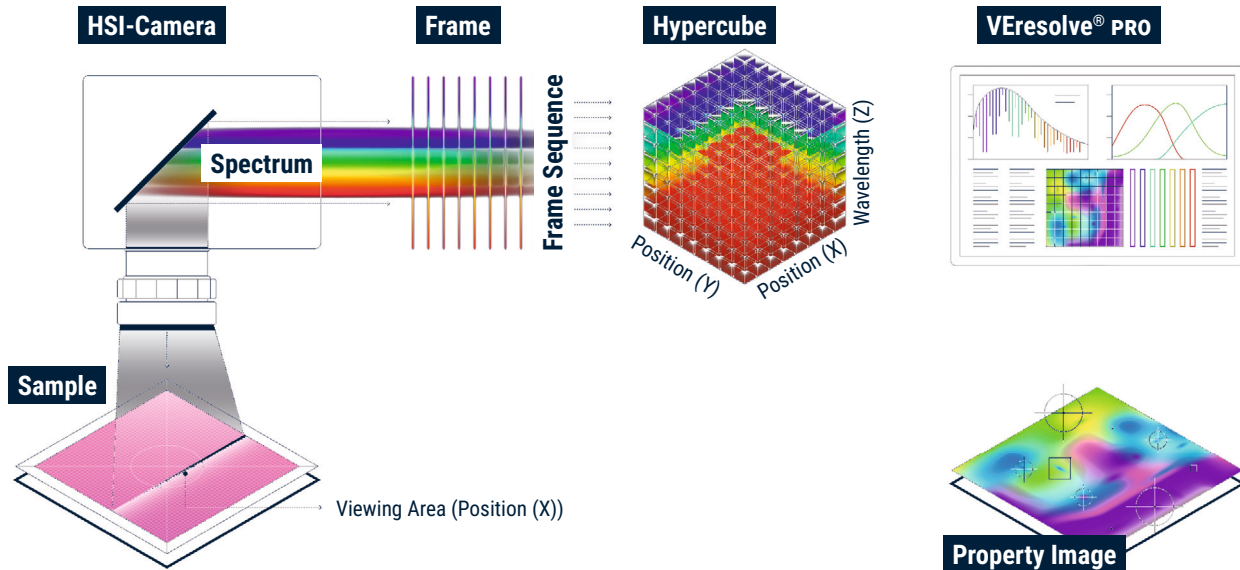


SPECIFICATIONS	
Cleanroom capability	ISO class 3, including laminar flow FFU
Measurement Mode	Reflectance
Measurement Time	< 10 s (typical)
Wavelength Range	VNIR 400–1000 nm / SWIR 900–1700 nm
Spectral Resolution	VNIR 1.34 nm / SWIR 3.5 nm
Field of View (FOV)	300 mm 200 mm ²
Spatial Resolution	VNIR 300 µm / SWIR 470 µm ¹
Max. Sample Size	up to 360 × 360 mm, max. height 10 mm ²
Lighting	VELuminise® – adjustable halogen broadband source, LED broadband or UV-LED excitation
Software	VEsolve® PRO
Connectivity	RJ45 (Ethernet)
ENVIRONMENT	
Power Requirements	230 VAC (115 V optional), 50 Hz, 170 W
System Dimensions	1050 x 568 x 721 mm (L x W x H)
System Weight	83 kg
Certifications	CE, RoHS, UKCA
Operating Conditions	+ 5 °C to + 40 °C (non-condensing)
SUBSTRATES & LAYERS	
Substrates	Semiconductors (Si, SiC and others), metals, glass, polymers, ceramics, and many more
Layers	Oxides, nitrides, carbides, polymers, and many more
Layer Thickness Range	1 nm – 500 µm (material dependent)
Surface Information	Cleanliness Contaminations Defects Surface states Custom target parameters

¹ High-resolution scan-modes available. | ² Further customisation available.

THE TECHNOLOGY

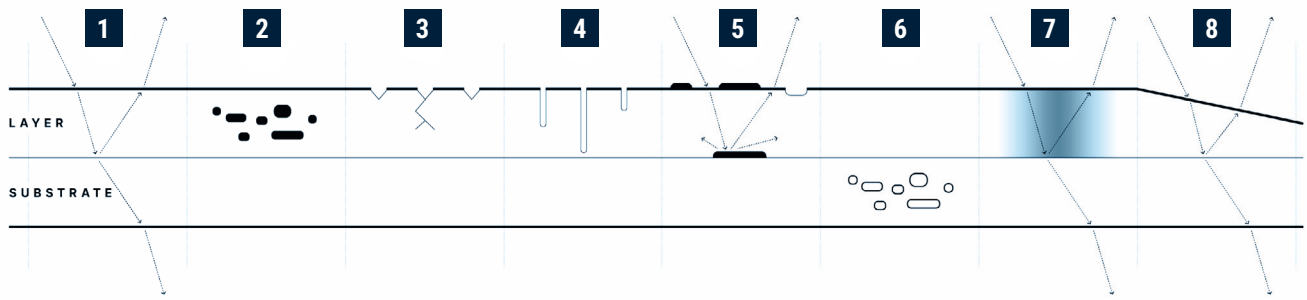
FROM SAMPLE TO KNOWLEDGE.



The VEpioneer[®] SERIES is built on PVA's Hyperspectral Vision technology — a unique combination of optical spectroscopy and imaging. During a scan, the system captures a so-called hypercube: a high-dimensional data structure that contains full spectral information for every single point across the entire sample surface simultaneously.

Advanced machine learning algorithms within the VEsolve[®] PRO software then process this data in real time, delivering clear, actionable results without requiring specialist expertise. The result is not just a single measurement — it's a complete spatial image map of layer thickness, surface condition or material properties in one pass.

Unlike single-point methods such as FT-IR, XPS, SEM or AFM, the VEpioneer[®] SERIES inspects 100% of the sample surface — non-destructively, non-contact, and fast.



THIN LAYER AND SURFACE INSPECTION

Thin-film performance starts with material quality and is shaped by structure, uniformity, and defects. A seemingly intact layer can be compromised by a wide range of factors: structural anomalies within the **[1]** sample stack, embedded **[2]** inclusions, or mechanical damage such as **[3]** cracks and scratches. Even microscopic **[4]** pinholes – invisible to the naked eye – can render a coating ineffective.

Beyond structural integrity, surface contamination plays an equally critical role. **[5]** Contaminations and debris alter surface properties and compromise adhesion or functionality. At the substrate level, **[6]** substrate defects can propagate into the layer above, while gradual changes in material composition (**[7]** material gradient) and uneven deposition (**[8]** thickness gradient) affect performance across the entire sample area.



SOFTWARE

VEsolve® PRO

VEsolve® PRO turns raw hyperspectral data into clear decisions – powered by AI, designed for production.

- Acquisition – captures full hypercubes of entire sample
- Screening – data pre-processing and data review
- Exploration – ML algorithms detect deviations, defects

SPACE FOR IDEAS

YOUR NOTES



WANT TO FIND OUT MORE?
CONTACT US FOR INFORMATION!



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