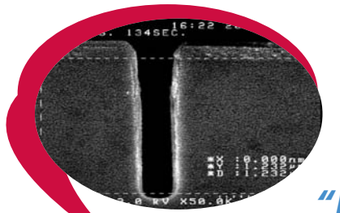
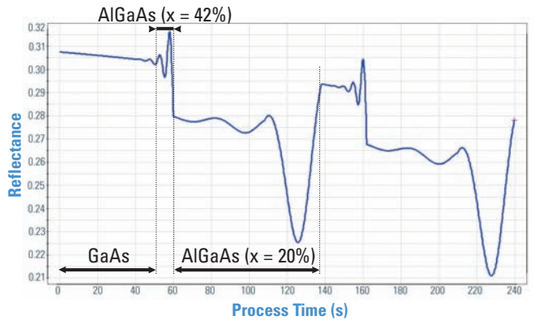
In-Situ Real-Time Process Monitoring and Endpoint Detection

Powerful Applications

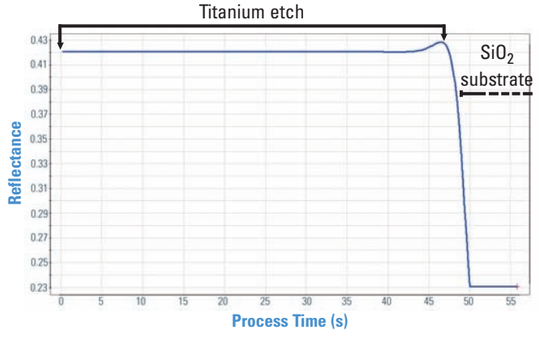


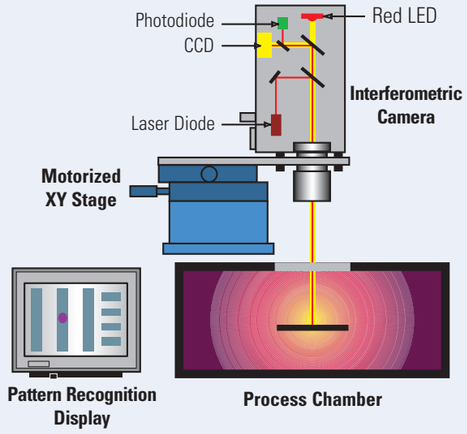
"Interferometry is a powerful technique that measures in real-time etch or deposition rate, trench depth and also detects interfaces"

SOI, III-V's stacks



Metal etching





Measures intensity changes of light reflected from the sample surface during etch or deposition process.

Calculates the etch/deposition rate, once a period of interference has been observed, allowing the etch/deposition to be stopped at a pre-set depth within a layer.

Each interface of the AlGaAs/GaAs stack can be detected, enabling the progress of the etch to be accurately followed.

Detects interfaces by the resultant step change or even absence of the reflectivity signal.

The interface is detected once the etched metal becomes very thin, indicated by the large drop in the signal.

Versatile LEM Series

LEM - Imaging Interferometric Camera

The LEM consists of an interferometric camera with a simple analog output of signal intensity. The compact head design is ideal for easy and rapid installation on chamber top windows. It integrates either a 670 or 905 nm laser source, signal detector and CCD camera. The CCD camera produces a real-time digital image of the wafer surface allowing the laser beam to be positioned accurately using a manual stage.

The LEM includes illumination intensity control to optimize the visibility of the laser spot on different samples depending on their reflectivity. This significantly enhances image quality.

LEM CT - Integrated Endpoint Monitor

The LEM CT includes an integrated software package running under Windows® with a powerful suite of tools to control, visualize, manipulate and store data.

An intuitive interface enables the user to rapidly design and optimize endpoint recipes. The software calculates etch/deposition rate and depth in real-time and features powerful endpoint algorithms that can be easily extended from simple to highly customized applications.

The LEM CT is the perfect tool to enhance the control of process termination and is suitable for a turn-key, integrated solution.

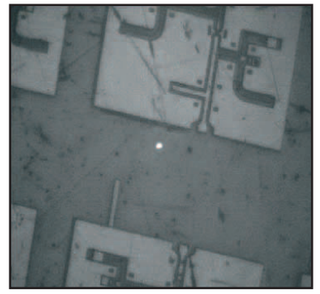
LEM PR - Fully Automated Endpoint System

The LEM PR is the complete automated version of the LEM camera including Cognex® pattern recognition software to automatically move the laser spot to the correct measurement site.

For integration into a OEM tool and factory network, both LEM CT and LEM PR include advanced communication capabilities via RS232, SECS, TCP/IP. An integrated SQL database allows data quality management for powerful APC functionality. Additional features include an interferometric simulator and reprocessing facilities for off line endpoint algorithm optimization.

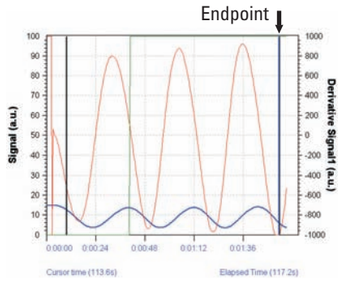
The LEM PR provides the full performance and automation required for high volume production facilities.

OEM - Laboratory QC



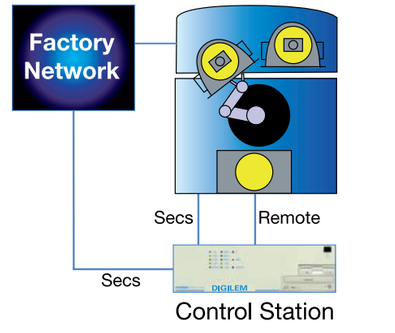
Camera image makes spot positioning simple

OEM - Industrial R&D



Real-time view for the etch of photoresist on Si, endpoint detected at 1204 nm

Fab - Volume Production



Advanced process control

LEM Camera Series Specifications

Standard Configuration	LEM	LEM CT	LEM PR
Light source	Laser diode	Laser diode	Laser diode
Wavelength	670 nm or 905 nm	670 nm or 905 nm	670 nm or 905 nm
Magnification*	x 50 or x 120	x 50 or x 120	x 50 or x 120
Spot size*	From 20 to 120 µm	From 20 to 120 µm	From 20 to 120 µm
Camera to wafer distance	150 mm to 1000 mm	150 mm to 1000 mm	150 mm to 1000 mm
Signal gain and offset, and illumination level	Adjustable on the camera	Adjustable on the camera	Adjustable on the camera
Detector	Solid state photodiode	Solid state photodiode	Solid state photodiode
Translation stage	-	Manual XY 16 x 16 mm Accuracy ± 100 µm	Motorized XY 25 x 25 mm Accuracy ± 0.5 µm - Speed: 5 mm/s
Vision system	-	Integrated frame grabber	Integrated frame grabber
Pattern recognition system	-	-	Cognex® software
Options			
Translation stage	Manual XY 16 x 16 mm Accuracy ± 100 µm	Motorized XY 25 x 25 mm Accuracy ± 0.5 µm - Speed: 5 mm/s	-
Vision system	Frame grabber and/or black and white video monitor 9"	Black and white video monitor 9"	Black and white video monitor 9"
System Performance			
Sampling frequency	50 Hz	50 Hz	50 Hz
Trench depth monitoring range	From < 100 nm to tens of µm	From < 100 nm to tens of µm	From < 100 nm to tens of µm
Maximum etch rate	Up to 20 µm/min	Up to 20 µm/min	Up to 20 µm/min
Layout & Facilities			
Dimensions (w x d x h in mm)	Camera: 65 x 100 x 160	Camera: 65 x 100 x 160 Control unit: 520 x 500 x 190	Camera: 65 x 100 x 160 Control unit: 520 x 500 x 190
Weight camera / control unit	1.2 kg	1.2 kg / 15 kg	1.2 kg / 15 kg
Power supply	5 V ± 10% DC - < 1.5 A	100 - 240 VAC	100 - 240 VAC
Analog signal output	0 - 10 V	-	-
Warm-up	1 hour	1 hour	1 hour

** Depending on the wafer to camera distance*

Worldwide Customer Support

HORIBA Jobin Yvon manufactures state-of-the-art thin film characterization and optical instrumentation, and is today the leading supplier of thin film metrology and optical solutions to original equipment manufacturers (OEMs). Our instruments are manufactured under a strict quality assurance program and are supported by a worldwide network of strategically located facilities in the United States, Europe and Asia that are ready to provide assistance when and where it is needed.
Our staff of highly trained service and application specialists install and certify instrument performance, and conduct technical and application user training for smooth and efficient commissioning of the instruments. This commitment to product excellence and continued support is part of the HORIBA Jobin Yvon culture.

LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
λ = 660-680 nm, P ≤ 1 mW
CLASS 1 LASER PRODUCT
λ = 900-920 nm, P ≤ 1 mW

This instrument complies with 21 CFR 1040.10 and IEC 60825-1 (08-2001)

HORIBA JOBIN YVON

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LEM Camera Series

Laser Interferometric Camera Endpoint Detector

Excellence in Advanced Process Control