About Us

Mass manufacturing of integrated circuits requires **hundreds** of precise processing **steps** depending on component/device type produced. With the increase in devices density and process complexity, there is a need to ensure fast and constant wafer production quality **by controlling precisely deposition or etching process ends**, checking **health chamber** state to evaluate **any variability, evolution or instability**.

HORIBA has developed a specific product line of sensors dedicated to **real-time in situ advanced endpoint process control, fault detection and chamber health monitoring** for semiconductor industries.
Such non intrusive sensors are integrated on wafer process chamber.

We distinguish:
- **OES (Optical Emission Spectroscopy) sensors**
- **Laser or Multi Wavelengths (MWL) Interferometry sensors,**

Key Applications

OES, laser/MWL interferometry sensors can be used in a large range of processes such as **Dry Etching, cleaning and (Plasma Enhanced) Chemical Vapor Deposition (PECVD) or more complex one like Atomic Layer Deposition (ALD)/ Atomic Layer Etching (ALE)**.

Different **Endpoint approaches** are available and adaptable to any tool, **single chamber or cluster based**. They concern:
- Wafer monitoring (local information) with Interferometry sensors
- Plasma Monitoring (global information) with OES sensors
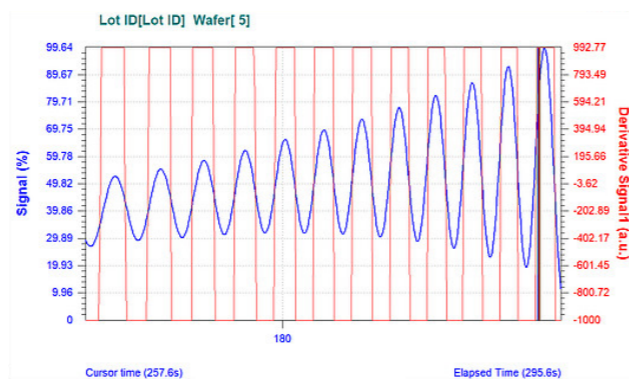
Type of Controls:
- Endpoint on interface
- Endpoint on thickness/depth
- Etch/deposition rate and thickness
- Endpoint on fringes counting
- Stop in remaining thickness
- Endpoint dry cleaning optimization
- Fault detection
- Chamber health and plasma monitoring
- …
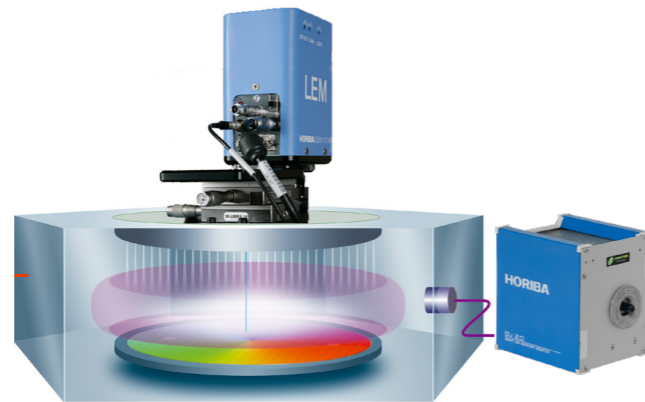
Endpoint Process Control
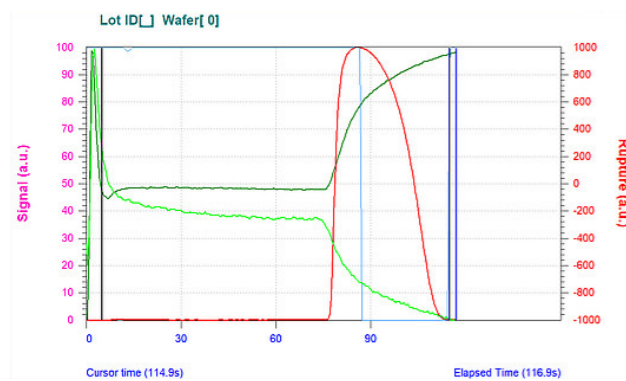
Typical OES Endpoint example
(Sigma_P Real time Endpoint software)

Typical Interferometry Endpoint example
(Sigma_P Real time Endpoint software)

Products

Based on **innovative technologies and a unique software architecture** including analytical methodology, and a sophisticated signal processing, this product line allows to **satisfy all the needs of 24/7 in-situ process control**.

Features	EV 2.0 Spectrometer	LEM Camera	EV 2.0 Spectrometer + Flash Lamp / Tilt Head
Technology	Optical Emission Spectroscopy	Laser Interferometry	Multi Wavelengths Interferometry
Monitoring	Global plasma	Wafer or pieces of wafer	Wafer
Process type	Dry Etching / PECVD / ALD /ALE	Dry Etching / (PE)CVD	Dry Etching / (PE)CVD
Endpoint	Layer interface / Chamber dry clean	Layer interface or thickness/depth	Layer interface or thickness/depth
Health chamber monitoring & fault detection	Yes	No	Yes
Etching/deposition rate & thickness	No	Yes at 1 wavelength	Yes at any wavelength
Software	Advanced & robust OES and Interferometric endpoint algorithms		

Software Tools

HORIBA proposes **two software platforms, Recipe Designer 2.0 and Sigma_P software** to highlight process engineering with **automatic elements time trend view and easy Endpoint Recipe management**.
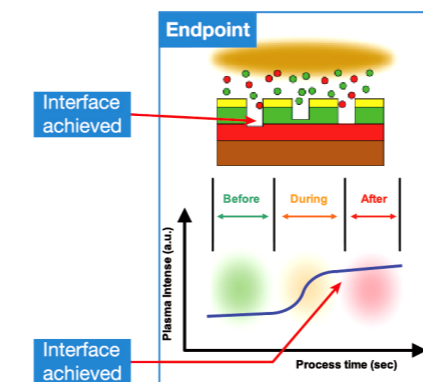
Endpoint at interface
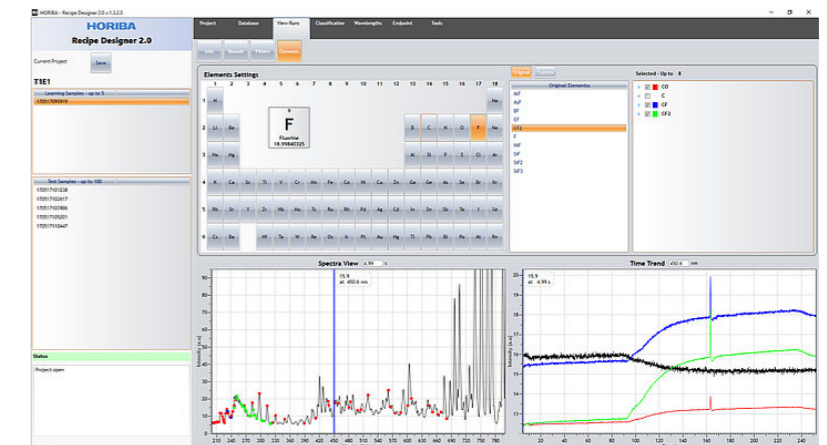
Recipe Designer 2.0 for easy and fast Endpoint development

Modular Solutions: From single sensor to turnkey solutions

HORIBA OES sensors can be proposed in different configuration of use :
1. **Turnkey solutions:**
   - Sensors with computer and full software package (Sigma_P and RECIPE Designer 2.0) for easy integration
2. **Sensors only:**
   - Sensors with Application Programmatic Interface (API), with several type of tools, where user will have to develop its own software for EPD calculation and controls.
   - Sensors with internal smart calculation based on 1 or 2 wavelengths (results in digital or analogic output)