

Introducing the Nightingale-EOS

n-Gauge™

The *n*-Gauge™ is a revolutionary metrology tool for characterising the thickness and material properties of thin film coatings on a wide range of devices including:

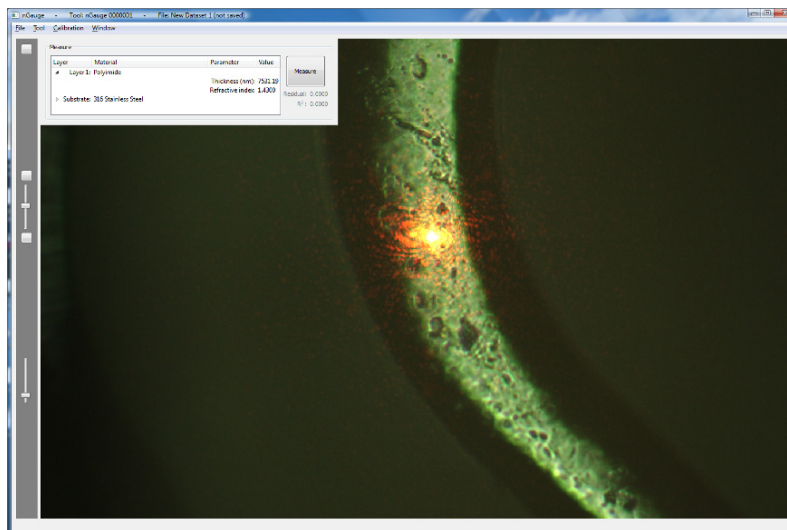
- medical implants
- microengineered parts
- silicon wafers
- solar cells
- displays
- optical coatings

...and many others – wherever in fact there are thin transparent films to be measured.

The tool utilises the unique Beam Profile Reflectometry (BPR) technology which has been successfully used in high-volume semiconductor manufacturing for many years. The *n*-Gauge makes this technology available in a smaller form-factor, at lower cost, and with more capability than ever before.

What it is

The *n*-Gauge is a compact self-contained unit, containing no moving parts, that sits on top of a standard optical microscope¹ replacing its standard illumination module and eyepiece assembly. An Ethernet cable connects the tool to an external computer, which provides a simple-to-use graphical user interface and the data analysis capability to make sophisticated measurements of the properties of any films or coatings present on a sample.



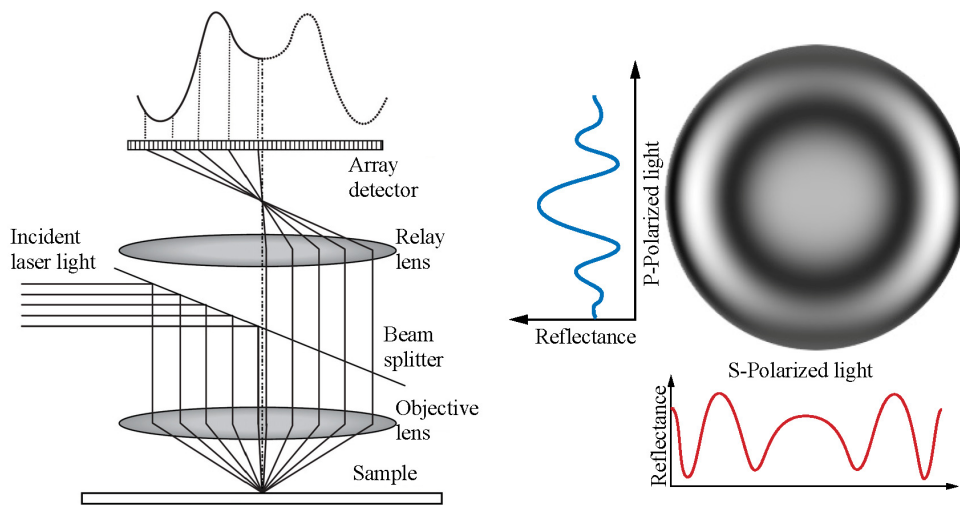
What it does

The *n*-Gauge's user interface provides a high-quality magnified image of the sample being measured (in this example, a cardiac stent). In the centre of the field of view, a highly focused laser spot is visible.

When the spot is located on a coated area, the reflected laser light can be automatically analysed to determine the thickness, refractive index, orientation and strain of the coating at that point.

The tool is suitable for any translucent film, whether freestanding or on a substrate, with thicknesses in the range of a few nanometres up to tens of microns. Multilayer films can also be measured.

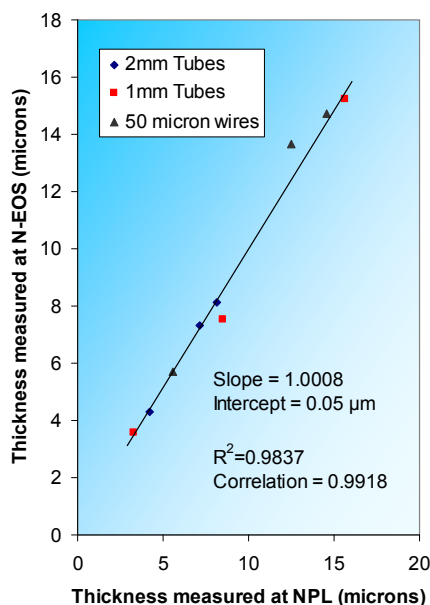
¹ Initially the Nikon Eclipse LV-100 series is supported, with other options to be added later.



Technology

Beam Profile Reflectometry uses a focused laser beam to measure optical reflectance as a function of the angle of incidence and polarisation of the laser light. Because a very large number of independent data points is available at a single wavelength, there is no need to account for the complex effects of optical dispersion (the variation of material optical properties as a function of wavelength) and so accurate, deterministic measurements can be made.

For further details, see our white paper, "Beam Profile Reflectometry – A novel and effective solution for coating quality control."



Unique Capabilities

Beam Profile Reflectometry is uniquely able to make direct measurements of the material refractive index, n , of the coating, for single and multiple layer films. In addition it is able to measure thickness, strain and (in some cases) roughness.

Although originally developed to measure flat smooth silicon wafers in high-volume semiconductor manufacturing, Nightingale-EOS has extended the technology to enable it to be used on substrates with highly-complex shapes, such as cardiac stents and orthopaedic implants, or where the surface is locally tilted, such as stressed or bowed silicon wafers or solar cells. No alignment of the sample is necessary beyond simply focusing the laser spot upon it.

Hence measurements which could previously be made only on test coupons or with sophisticated alignment hardware can now be made on actual devices and under production conditions.

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