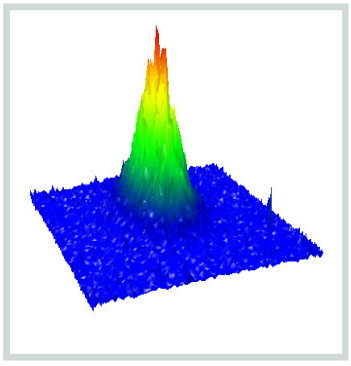
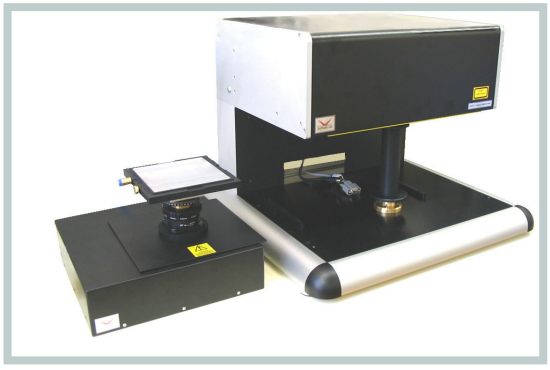
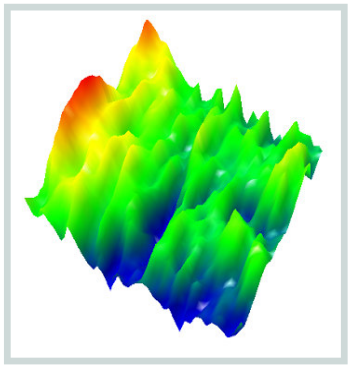
Surfoptic

Imaging Reflectometer SIRS 75







Unique insights into gloss and surface structure in one easy measurement

The SIRS 75 Imaging Reflectometer brings together a novel combination of measurements relating to surface optical properties and appearance in one instrument designed for both routine industrial use and R&D.

A single measurement provides :

- 2-D forward scattering pattern
- Effective refractive index
- Macroroughness
- Microroughness
- 2-D surface slope distribution
- Gloss & haze

These data not only characterise observed reflectance, but help explain the underlying physical origins.

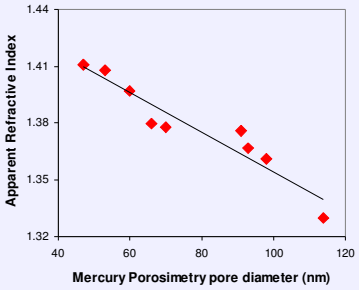
Despite the advanced measurement capability, the instrument is simple to use and all operations are via menu-led Windows® software.

Fast data acquisition and integrated measurement permits time-resolved studies and mapping of parameters over a surface.

Applications include:

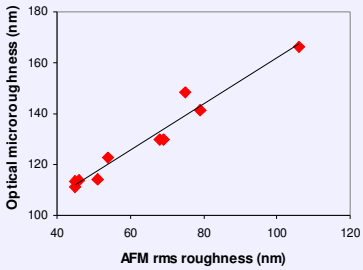
- Coated and printed paper and board,
- Packaging
- Paint & coatings
- Ceramics
- Plastics

Effective Refractive Index (RI) depends on the composition and physical structure of the surface. For porous materials such as coated paper and paint, refractive index is a composite measure of pigment type, binder levels and void fraction. For coated papers, RI is very sensitive to surface porosity.



Correlation between RI and pore diameter determined by mercury porosimetry for a set of coated GCC papers

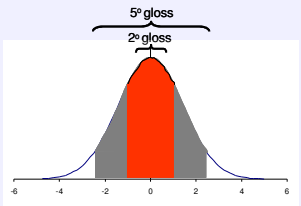
Microroughness is roughness on a sub-micron scale (rms amplitude in nm). It is an important factor in gloss. Reflectometer microroughness shows a good correlation with rms roughness measured by Atomic Force Microscopy. Measurements are applicable to glossy surfaces only.

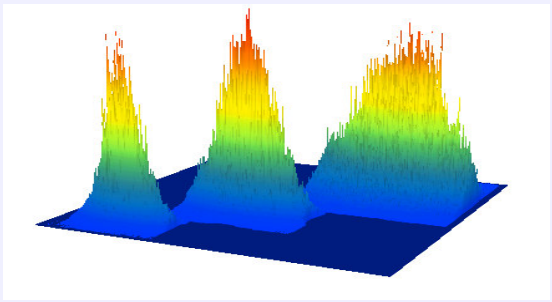


Correlation between reflectometer microroughnes and AFM microroughness for a set of coated papers

Macroroughness is a measure of surface topography on a scale much greater than the wavelength of light. Reflectometry measures the 2-D forward scattering pattern which relates directly to the 2-D distribution of surface slopes. Macroroughness is expressed as the full-width at half-maximum of the surface slope distribution. Measurement in 2-D allows surface anisotropy to be quantified in a single measurement.

Gloss and Reflection Haze are descriptive measurements of reflectance. Gloss may be evaluated for various acceptance angles. Haze is a measure of the degree of specularity of the reflected light.



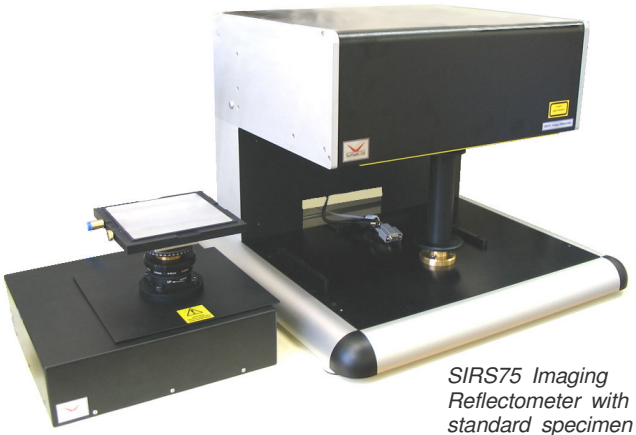


2-D angular distribution of scattered light for coated papers calendered to different pressures

Established Principles

The Imaging Reflectometer uses established geometrical and physical optics to describe light scattering from rough surfaces.

The model used assumes that the surface can be described by roughness at two length scales: one roughness component greater than the wavelength of light (macroroughness), the other at a scale less than the wavelength of light (microroughness). This model proves to be a useful practical approximation to many surfaces of industrial interest.

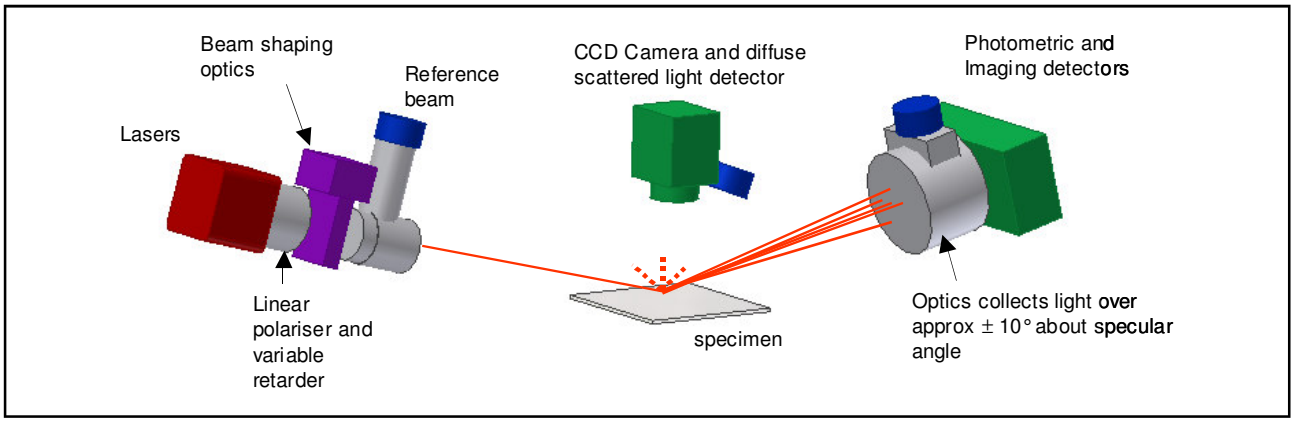


SIRS75 Imaging Reflectometer with standard specimen mount

motorised x-y stage and vacuum platform

Latest technology

The Imaging Reflectometer uses the latest optoelectronics and imaging detectors. Such components have a strong reputation for longevity and robustness. The imaging detector provides measurement of the angular distribution of the forward scattered light without need for moving parts.



Features

- Unique combination of data from a single measurement.
- Robust & low maintenance hardware with no moving parts in basic instrument.
- No user alignment of optics.
- Enclosed internal optics.
- Fast data acquisition for high throughput of samples and time-resolved studies.
- Quantitative measurements referred to a calibration standard. Calibration typically takes less than 20 s.
- Dual beam for stable operation over extended periods.
- Insensitive to specimen colour
- Specimens presented from below – suitable for wet or liquid surfaces.
- Colour optical image of specimen (viewed from above) to facilitate sample positioning.
- Space below reflectometer approx. 200 mm providing room for large specimens.
- Variety of specimen presentation devices available, including a vacuum platform.
- Operated via a PC with Windows® software for all instrument operations.
- Straightforward operation designed for routine industrial use.
- Data may be exported in various ASCII or image formats.

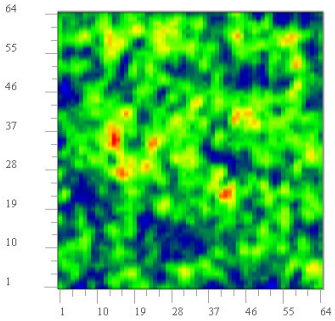
Extended Measurement capabilities

Mapping

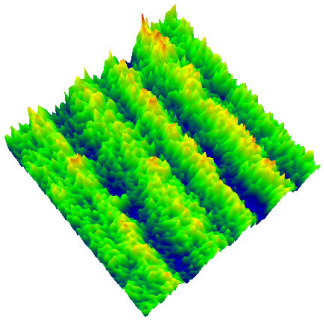
The optional motorised x-y stage allows all numerical parameters to be measured over the surface of a specimen to give 2-D maps or line scans.

Spatial resolution in mapping mode is around 0.25 mm.

Mapping can be used to quantify gloss mottle, print mottle, coating defects, porosity and roughness variation over a surface. Not only does mapping show how properties vary over a surface, but the unique combination of data permits much greater insight - for example to explain *why* gloss varies from point-to-point.



Gloss map for mottled halftone print

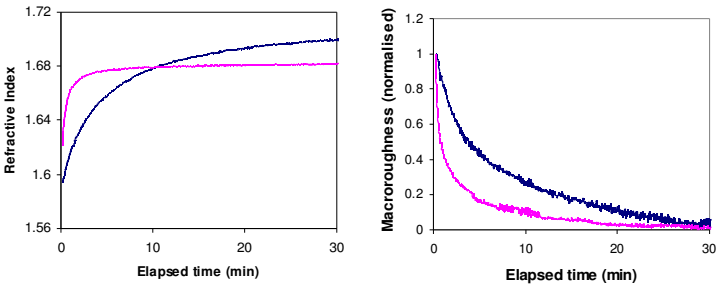


RI map showing density variations in a hand-drawn coating

10 pt text mapped in RI (magnified view)

Time-resolved analysis

A measurement takes about 0.7 s. This speed of operation allows the reflectometer to be used for time-resolved studies, for example, measurements of the setting and drying of inks and paints.



Variation of RI (left) and macroroughness (right) with time for ink printed on pigment coatings of different porosity.

Customers include:

- Imerys Minerals Ltd (UK)
- Imerys Clays Inc (US)
- Institute for Paper, Pulp and Fibre Technology, Technical University of Graz (Austria)
- Omya Development AG (Switzerland)
- A major paper company (Finland)

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