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MEASUREMENT REPORT

FAST TRANSMISSION MEASUREMENT OF OPTICAL COATINGS

Characterization of IR Optical Coatings for Live-Monitoring During Production

nlir
MEMBER OF THE NYNOMIC GROUP

Mid-IR Transmission Measurement of Optical Coatings on a Wheel

Optical coatings are often produced on substrates mounted to a rotating wheel, where various materials are deposited while the wheel spins at high speed. Monitoring the coating growth process in real time – and thereby the evolving optical properties – is a challenge. While this is possible using visible-light grating spectrometers, traditional FTIR or monochromator-based IR spectroscopy systems are too slow to follow the process as it happens. However, live monitoring during coating production can significantly reduce production time and improve coating precision and quality.

WHAT MAKES OUR TECHNOLOGY STAND OUT?

NLIR's mid-infrared spectrometers are significantly faster than traditional FTIR instruments and can measure transmission spectra of optical coatings in just a few milliseconds. This enables real-time monitoring during production. Key advantages of NLIR's spectrometers include:

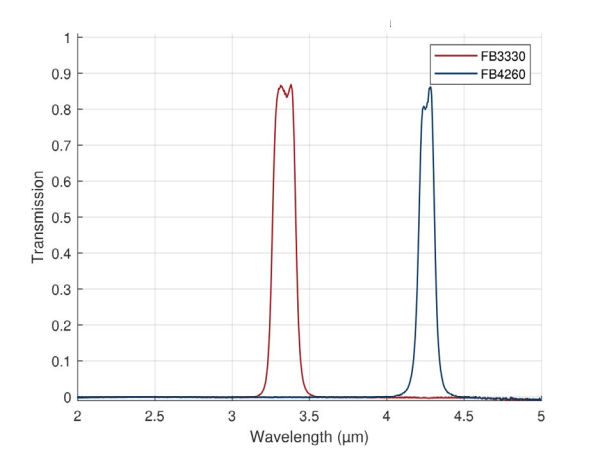
Live Data
Up to 400 Hz full-spectrum acquisition

Good Resolution
2000 pixels across 2.0 - 5.0 µm

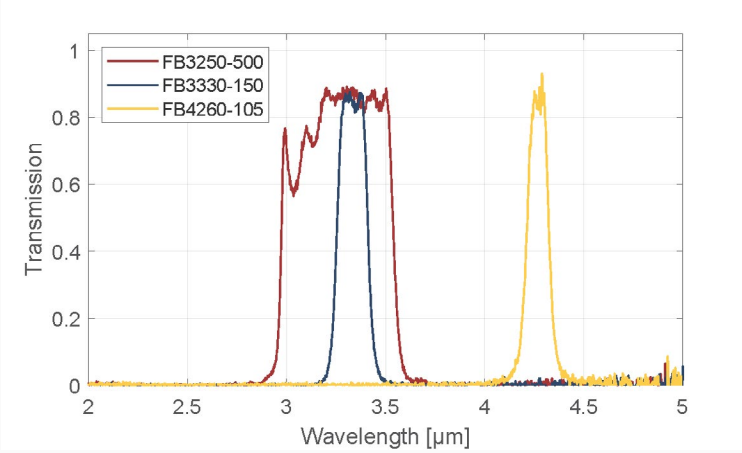
OEM Ready
No moving parts and no cooling required

Excellent Service
Professional advice and lifetime support

Transmission Measurements of Optical Coatings with MIDWAVE Sepctrometer



Measurement 1. Transmission measurements of FB3330-150 and FB4260-105 IR Bandpass filters with 20 ms exposure time



Measurement 2. Transmission measurements of FB3250-500, FB3330-150 and FB4260-105 IR Bandpass filters with 2 ms exposure time

KEY OBSERVATIONS

With NLIR's MIDWAVE Spectrometer, transmission measurements of optical coatings can be performed across different time scales. The top plot on the left (Measurement 1) shows data from two commercially available optical bandpass filters from Thorlabs - FB3330-150 and FB4260-105. Each filter was measured by capturing 10 spectra at 20 ms exposure time and averaging the results. This demonstrates that high-quality spectra can be obtained in under 500 ms.

Full spectra with the same spectral resolution can also be captured in just a few milliseconds. In the setup shown on the top right plot (Measurement 2), a spinning wheel carries three different bandpass filters - FB3250-500, FB3330-150, and FB4260-105. With an exposure time of only 2 ms, the plot displays raw, single-shot data – no post-processing applied. Key characteristics such as FWHM, edge steepness, transmission level, and center wavelength can be extracted live, even while the wheel is rotating. In a production environment, this enables continuous monitoring of critical parameters during the coating process.

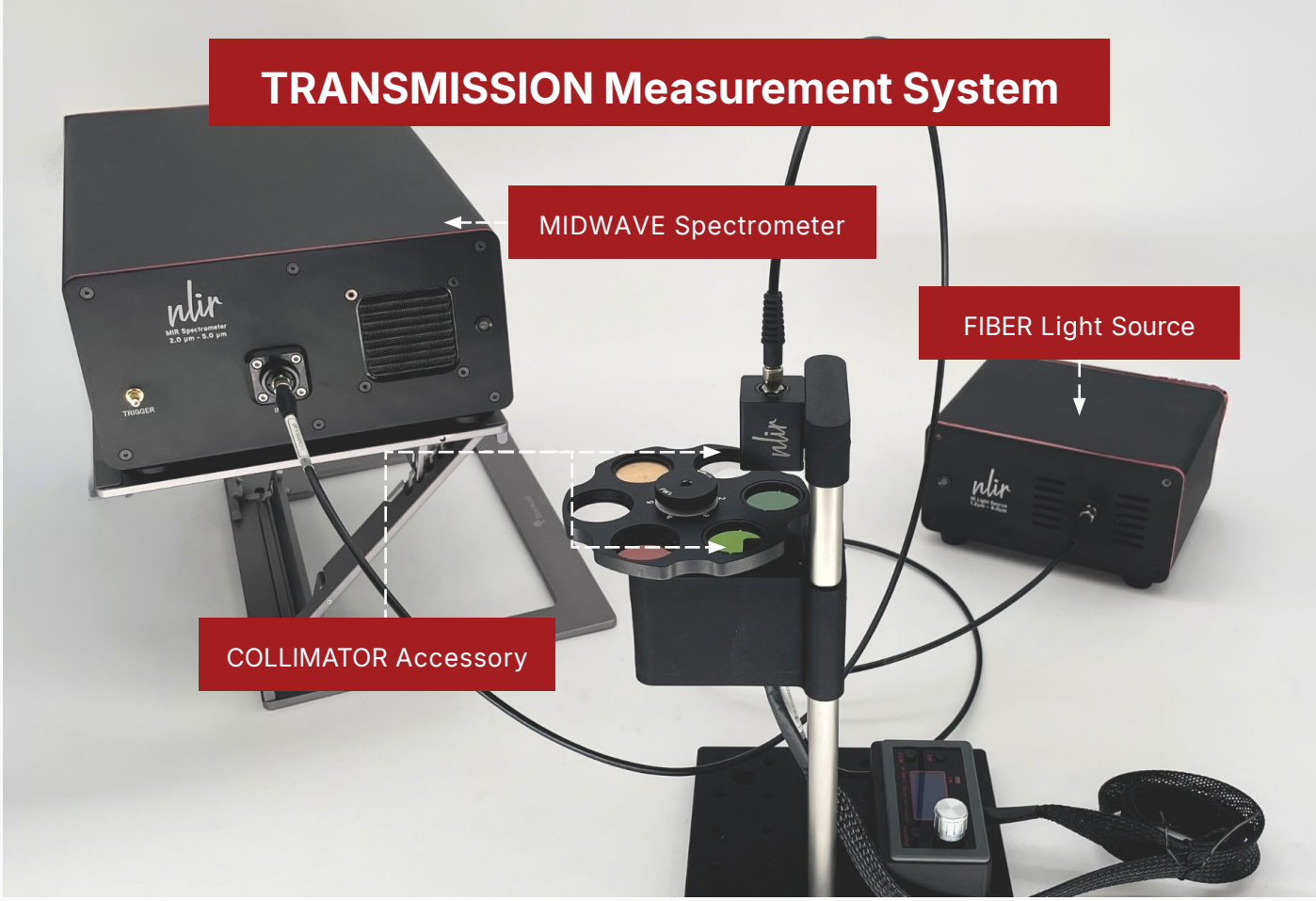
MEASUREMENT SET-UP

To perform fast mid-infrared transmission measurements of optical coatings on a spinning sample wheel, we have set-up NLIR's MIDWAVE Spectrometer, FIBER Light Source and two COLLIMATOR Accessories with the rotating wheel situated in between (see picture below). This set-up insinuates real-time measurements of optical filters at a production environment.

Early insights at the produciton allows you to:

- Detect coating variations instantly.
- Ensure product quality in every batch.
- Shorten feedback loops for process optimization.

Setup for Optical Coating Measurements Using NLIR Equipment



Would you like to optimize your optical coating production?

If you are looking to optimize your optical coatings' characterization at an industrial level, our MIR spectroscopy solutions can bring your production line to new speed. Offering cutting-edge mid-infrared sensing solutions NLIR can help you monitor the production of IR filters, windows, and other IR precision optics in real time .

Contact us: info@nlir.com +45 7174 7870