



SMMS
1000 nm - 1900 nm
Fraunhofer
IPMS

Scanning Mirror Micro Spectrometer (SMMS)

*Fiber-coupled scanning
mirror micro spectrometer
with a spectral range of
1000 nm – 1900 nm*

The new scanning mirror micro spectrometer (SMMS) platform developed at Fraunhofer IPMS is based on a single-axis MEMS (micro electro-mechanical system) scanning mirror. It aims for applications in the near infrared (NIR) spectral range up to a wavelength of 1900 nm, 2200 nm or 2500 nm, respectively. With a focus on field applications, it is intended to be a compact and cost-effective alternative to more expensive line sensor-based bench-top instruments.

Technology

The newly developed spectrometer is designed as a very compact, modular scanning Czerny-Turner spectrometer. Light entering the spectrometer through an entrance slit is collimated, then directed onto the MEMS scanning mirror and subsequently hits a fixed diffraction grating. The grating is arranged in a near Littrow configuration so that the diffracted light is back reflected to the scanning mirror.

After descanning the diffracted light is refocused onto the exit slit. The light passing through it is detected by a photo diode placed behind the slit. By rotating the MEMS mirror the optical spectrum is scanned across the exit slit and recorded by the photo diode.

Applications

NIR spectral analysis is favorable for the evaluation of organic matter. This includes food and beverage, cloth, plastic materials or pharmaceuticals but also living cells.

Applications may be found in the fields of nutrition, health or medical, life sciences but also in material processing or quality monitoring for plastics, petrochemical, recycling or other measurement tasks which benefit from reliable, non-destructive analysis in the field.

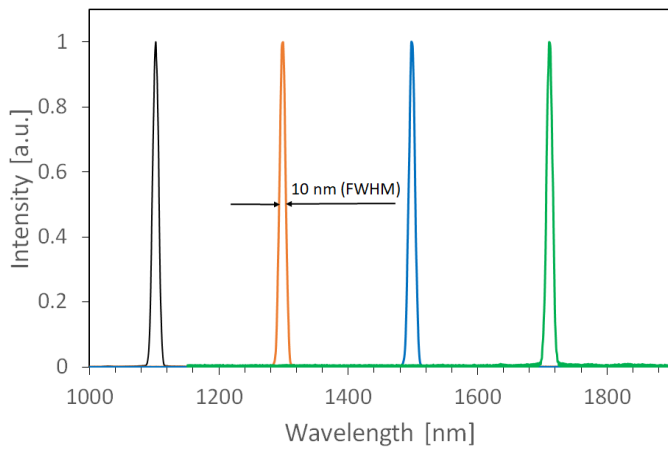
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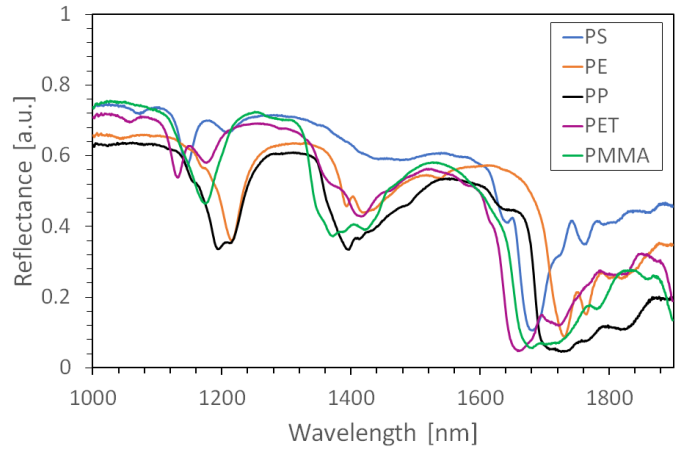
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Instrumental profile of SMMS: Optical characterization demonstrates a spectral range from 1000 nm to 1900 nm with a spectral resolution of 10 nm (FWHM)



Reflection spectra of common plastic materials measured with SMMS

Spectral Range and Resolution

The standard configuration of the spectrometer has a spectral range from 1000 nm to 1900 nm. The spectral resolution across the whole spectral range is ≤ 10 nm (FWHM, full width at half maximum), which is usually sufficient for the analysis of organic matter.

Options

The latest Fraunhofer IPMS micro scanner technology offers the ability to provide several different spectrometer configurations. The spectral range and the spectral resolution can be customized within certain limits.

For example, in addition to the standard configuration with spectral range from 1000 nm to 1900 nm, a spectral range from 1100 nm to 2200 nm can be realized by choosing a different diffraction grating and detector. Resolution can be adapted by selecting an entrance slit and/or an exit slit with a suitable slit width.

The table below shows some preconfigured options available upon request as a customer evaluation kit.

Advantages

- Cost-effective due to single element InGaAs-detectors
- Small size modular spectrometer platform
- Suitable for field applications
- Choice between several configurations



Different spectrometer configurations available as a customer evaluation kit upon request

	Spectral Range [nm]	Spectral Resolution [nm], (FWHM)*	TE-cooled detector	Fiber-coupled
Option 1	1000 – 1900	10	No**	Yes
Option 2	1100 – 2200	10	Yes	Yes
Option 3	1250 – 2500	12	Yes	Yes***

* Resolution can be adapted by choosing different slit widths

** TE cooling available upon request

*** Fluoride fiber with reduced transmittance below 2000 nm