TECHNOLOGY
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RECENDT
RESEARCH CENTER NON DESTRUCTIVE TESTING

# Customer Specific Low-Cost NIR-Spectroscopy Solutions

## Fast, compact and low-cost – new insights by NIR-spectroscopy

**In recent years, MEMS-based near-infrared (NIR) microspectrometer technology has immensely advanced and proven to be one of the best choices for many NIR measurement applications in both science and industry. Its main advantages include very compact size (cm-scale), high robustness (no moving parts) and low price (below € 3000 and expected to significantly decrease in the near future). Due to these properties and the ability for wireless communication, this technology is not only highly suitable for classical PAT-applications, but also for compact handheld devices.**

NIR-spectroscopy, especially in combination with multivariate data analysis, allows for detection and classification of most materials, as well as quantification of many material properties. With the advent of MEMS-based microspectrometers (Fig.1), NIR-spectroscopy has now become affordable which opens up many new application possibilities including cost-efficient and compact handheld devices. The non-destructive nature of NIR-spectroscopy together with the possibility for fast and contactless inline measurements also allows for easy and safe monitoring of both sensitive and toxic materials. The RECENDT GmbH was amongst the first to successfully apply this technology and has already proven its high potential in many different applications including polymer layer thickness measurements, melamine and phenol resin production, hyperspectral imaging, moisture measurements in cellulose fibers, monitoring of polymer curing and bioprocess monitoring. Many conventional wet chemical measurements can be replaced by NIR-spectroscopy, thereby saving time and equipment costs while at the same time significantly reducing maintenance efforts. The RECENDT GmbH not only provides profound expertise in the development of customer-specific sensors based on microspectrometer technology but also offers long-term experience in chemometric model development, including modern machine-learning based approaches.

*Fig. 1 Photograph of two exemplary microspectrometers, one featuring fibre coupling (left) and one featuring free-space coupling using collimation optics (right). € 2 coin added for scale.*

### Facts/Key-Values/ Features & Benefits

- Contact free and non-destructive measurement
- Fast measurements and easy maintenance
- Versatile and very cost efficient (< € 3000, expected to decrease further)
- Can replace conventional wet chemical measurements
- Small size and wireless communication enables use in compact handheld devices
- Due to its contact free nature ideal for toxic substances

### Potential Users & Fields of Application

- Material characterization and quantification
- Process analytics (PAT) and monitoring
- Bioprocess monitoring
- Moisture/water content determination
- Quality control (food, pharmaceuticals, fibers, polymers, ...)

### Status – what do we offer?

- Customer specific measurement solutions using low-cost NIR spectrometer technology – from preliminary measurements to demonstration units
- Multivariate data analysis and chemometric modelling
- Chemometric model maintenance for prolonged and high measurement accuracy

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