SPECTRAL ENGINES

APPLICATION NOTE

PORTABLE DEVICES

Portable NIR sensors expand business of NIR spectroscopy

Background

Near Infrared (NIR) is a proven technology for material identifications in central laboratories. The challenge in using laboratory instruments relates to their price, size and also the fact that they are used mainly by professional laboratory personnel. NIR portable analyzers have partly solved the challenge of using NIR spectroscopy in out-of-lab applications. Yet the outstanding challenges with these portable devices relate to their rather large size and their high price point, which limits the use of existing devices to only specific cases.

Spectral Engines has developed a lightweight, wireless, portable NIR device platform that combines powerful NIR spectroscopy and advanced cloud-computing techniques to increase the performance and quality of measurements. Spectral Engines technology brings truly laboratory-instrument performance into a pocket-size device. Near-Infrared (NIR) spectroscopy is powerful technology for the identification of unknown materials. Portable instrumentation is used in several different measurement applications, such as polymer classification, textile material quality inspection, and pharmaceutical raw material identification. All these applications have been evaluated with laboratory instruments to have proven NIR technology suitability for the measurement. Spectral Engines NIR**ONE** enables these measurements and analysis to be carried out in out-of-laboratory contexts at a fraction of the cost typical for laboratory equipment.

Spectral Engines' technology offering

Spectral Engines technology platform is based on mass producible spectral sensors. Though the size of NIR**ONE** wireless sensors is small, their performance is very well comparable with laboratory instrument performance. Spectral Engines utilized the so-called true NIR region from 1350 nm to 2450 nm in its measurement specification and this range offers very good selectivity and sensitivity in material inspection applications compared, e.g. to the broadly used shorter wavelength technology, such as with silicon sensor technologies.very good selectivity and sensitivity in material inspection applications compared, e.g. to the broadly used shorter wavelength technology, such as with silicon sensor technologies.

Spectral Engines wireless portable NIR analyzer fits very well to field inspection applications.

- Fast and reliable detection of counterfeits, illegal drugs, and explosives
- Rapid, non-destructive measurement without a need for sample preparation
- Affordable
- Connectivity and portability
- Easy-to-upgrade libraries via cloud-based tools

USE CASE

Raw material identification of pharmaceutical products

Raw material identification plays a crucial role in pharmaceutical production quality control procedures. It is essential to quickly check the chemical structure of raw materials. Raw material identification ensures the quality of the final products, reduces production waste, and saves time. NIR technology is already accepted and supported by the main Pharmacopoeias, such as the Japanese Pharmacopoeia (JP), the US Pharmacopoeia (USP), and the European Pharmacopoeia (EP).

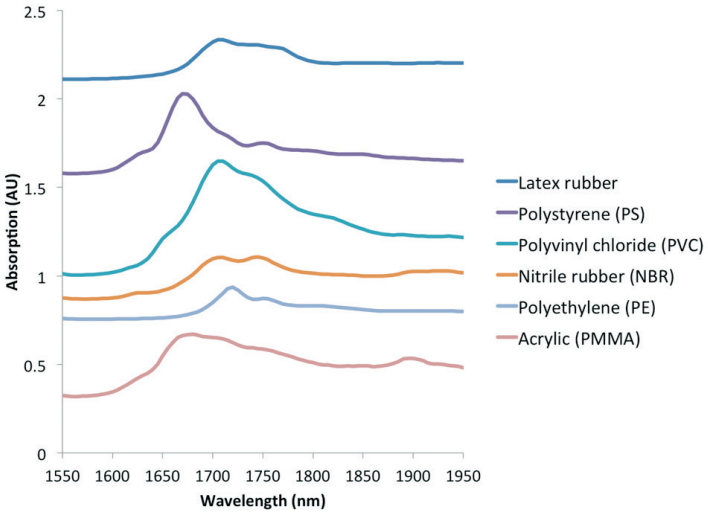
Spectral Engines portable NIR sensor is suitable for the quick analysis of raw materials. NIR technology does not require any sample preparation and as such, it is easy and fast for operators to use. Portable sensors can be connected to a Cloud library that provides access to spectral signature libraries for different materials, and which can be constantly updated.

USE CASE

Plastics material classification with Spectral Engines NIR sensor

Identification of plastics and polymers in general is necessary for the proper sorting of materials in recycling. Recycling and sorting requires fast, cost-effective, high-accuracy analyzers.

We measured a selection of typical plastics found in household appliances and consumer products. These included latex rubber, polystyrene (PS), polyvinyl chloride (PVC), nitrile rubber (NBR), polyethylene (PE), and acrylic or polymethyl methacrylate (PMMA). We used Spectral Engines NIR**ONE** 2.0 spectral sensors to measure the reflectance spectra in the 1550 to 1950 nm range. This range is excellent for the identification and classification of materials, thanks to C-H bonds that absorb IR radiation in this region. Each material has a unique spectral fingerprint, which enables the classification and identification of the materials.

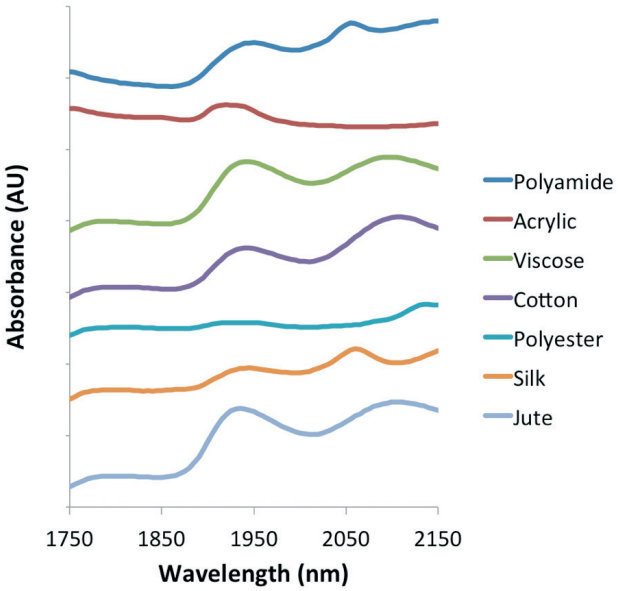


USE CASE

Fast verification of authenticity different materials and textiles

The fashion and clothing industry is a global multi-billion-dollar business. The textile industry has a massive number of players, including producers of counterfeit clothing and footwear. While customs agencies around the world are being given powers to seize and destroy fake goods, they also need methods to distinguish non-genuine items of clothing from genuine ones. Counterfeit clothes can look and feel almost exactly like genuine items.

Near-infrared (NIR) spectroscopy is used in the analysis of different textile types. The different chemical and physical characteristics result in differences in the spectral features of different materials. Based on these features, different textiles can be identified. A number of typically encountered fabrics and textiles were measured. We found that NIR**ONE** 2.0 and 2.2 sensors perform very well in the classification of textiles based on the spectral data.



Conclusion

Spectral Engines wireless sensor devices provide small, robust and fast measurement technology for field material sensing applications. Spectral Engines technology exploits the so-called true NIR region (1350-2450 nm), which gives very high accuracy and reliability in analyses. Affordable portable NIR sensors can be combined with advanced machine learning algorithms to increase the performance of NIR spectroscopy in demanding identification or classification use cases.

FOR MORE INFORMATION:
Matti Tammi
Application Expert, Spectral Engines
Matti.Tammi@spectralengines.com
+358 44 5281027