sisu CHEMA *Chemical Imaging Analyzer*

SisuCHEMA is a chemical imaging analyzer, characterized by speed, simplicity and superior performance. SisuCHEMA employs a pushbroom imaging technology providing several advantages for the user: high speed, low heat load from illumination and flexibility to most sample shapes and sizes. Applying pushbroom imaging sisuCHEMA is also first step towards on-line process control.

›› NEAR INFRARED CHEMICAL IMAGING IN FEW SECONDS ‹‹

SisuCHEMA combines NIR spectroscopy with high resolution imaging. It provides detailed information on the chemical components, their quantities and distributions within the sample. It is invaluable information for the characterization and quality assurance of advanced materials, where the functionality of the material is dependent on its chemical and physical structure.

HOW SISUCHEMA WORKS

SisuCHEMA is a complete chemical imaging analyzer. User places samples into specially designed sample trays, then using the Breeze software, the spectral image is acquired and saved in seconds. Finally, spectral image is being analyzed with easy-to-use Breeze software.

MANY APPLICATIONS

The SisuCHEMA is ideal for pharmaceutical, geological and acricultural applications where high spatial resolution is required and samples are small. In the SisuCHEMA the maximum sample size is 200 x 300 x 45 mm. The system can image samples of 10 mm or smaller at a very high pixel resolution of 30 microns, and offers flexible settings to coarser resolutions.

PUSHBROOM IMAGING

SisuCHEMA employs pushbroom imaging, acquiring the image one line at a time while scanning the sample on a moving sample tray. Each line has a 320 - 1 312 pixel field of view. In the scanning dimension the number of lines is dependent on the selected scanning length. The variable scanning length allows

Applications

Geology
Tablet analysis
Blister package inspection
Blend uniformity
Granule Size and Size Distribution
Food and Dairy
Agricultural Material Screening
Forensics
Life Sciences
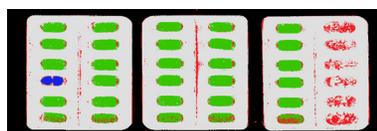
Blister package inspection. Red indicates empty blister, Green indicates normal blister and Blue indicates false product.
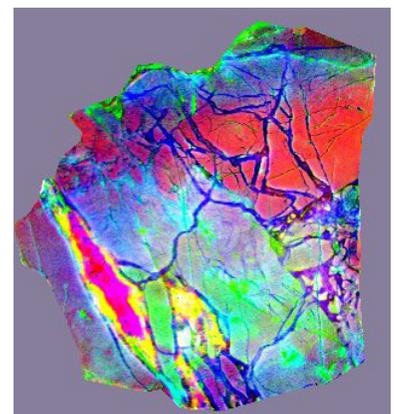
Visualization of MNF bands 2,3 and 4 of a rock sample showing the inherent variability of the material. The full hyperspectral image (data cube) with 320 x 360 spatial pixels and 256 spectral bands in the range 1 000 - 2 500 nm was acquired in less than 6 seconds.

the user to image longer samples, or multiple sequential samples, in a single linear scan. The maximum scanning length is 300 mm.

## PERFORMANCE, EFFICIENCY AND EASE OF USE

SisuCHEMA is based on SPECIM's Spectral Cameras operating in the near infrared range with high spectral resolution. Light throughput is 10 to 20 times higher than in similar instruments that implement tunable filters. The result is considerably faster imaging under similar illumination conditions. Furthermore, push-broom imaging only requires line illumination on the sample, which significantly reduces the heat load on the sample. SPECIM's unique line illumination technique optimizes the imaging of various surfaces and textures. SisuCHEMA is a stand-alone instrument, which is user friendly and easy to set up and maintain. SisuCHEMA is operated using pre-installed Breeze software.

FROM LAB TO PROCESS

SPECIM's SisuCHEMA is the only chemical imaging technique offering a direct application path from laboratory to real-time process. Using a push-broom hyperspectral camera, SisuCHEMA works like a high speed linescan camera. It acquires and builds the spectral image of a moving sample line by line, and simultaneously acquires all wavelengths for each line. This imaging technique is ideal solution for on-line process monitoring, where samples are in continuous motion. This provides another significant advantage to the SisuCHEMA user. The applications that are developed for sample analysis in laboratory and near production lines can be directly transferred to the real time world of on-line process and quality control. There is no need to adapt and invest in different technologies for online monitoring.

SisuCHEMA performance specifications

Optical and technical characteristics	VNIR	NIR	SWIR
Operation mode	High speed push-broom hyperspectral		
Spectral range	400 - 1 000 nm	900 - 1 700 nm	1 000 - 2 500 nm
Spectral sampling / pixel	0.78 - 6.27 nm	4 nm	6.3 nm
Spectral resolution FWHM	2.8 nm	6 nm	10 nm
# spatial pixels/ line	1 312	320	384
Pixel size on sample	38 - 152 μm	30 - 600 μm	24 - 600 μm
Field of view on sample	50 - 200 mm	Scalable from 10 to 200 mm	
Maximum sample size	200 x 300 x 45 mm (WxLxT)		
Scanning rate	100 hyperspectral line images/ s (max), corresponding to - 3 mm/s with 30 micron pixel - 30 mm/s with 300 micron pixel - 60 mm/s with 600 micron pixel		
Typical scanning time	< 7 s for single 320 x 320 pixel image capture with 256 spectral bands		
Illumination	SPECIM's diffuse line illumination unit		
Data format	BIL file format, Breeze and ENVI compatible		
Instrument calibration	Instrument is delivered with spectral calibration. Image data is automatically calibrated to reflectance by measuring an internal standard reference target before each sample scan.		
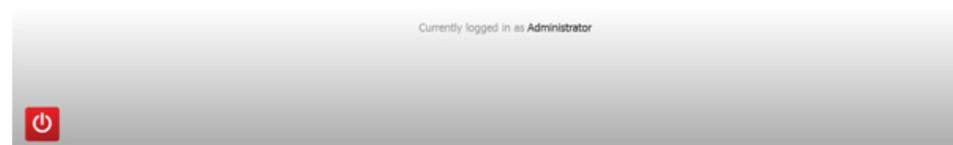
Breeze software (by Prediktera)

This combined user interface data acquisition and analysis tool is delivered with SisuCHEMA.