

MATERIAL VISION

Spring, 2007

Dear Customer,

We are pleased to welcome you to the latest edition of Material Vision.

This edition informs you of the latest Standard and Advanced Training Modules, sampling techniques, product and services information as well as points of contact.

We hope you enjoy Material Vision. From everyone at PerkinElmer we wish you a Merry Christmas and a Happy New Year.

Molecular Spectroscopy Training Modules

During the months of August and September, PerkinElmer conducted the first in a series of Standard Molecular Spectroscopy Training Modules for UV/Vis and FTIR throughout Australia.

The objective of the Standard Training Module is to increase the competence of existing spectrometer users.

The Standard Training Module focused on best practices for sampling techniques with a workshop conducted by Dr Wei-Boon Teo using the Lambda 25 and Spectrum

100 UATR systems.

From the 130 spectroscopists that attended we would like to acknowledge the positive feedback given which will help improve the Standard Training Module.

In addition, we now have firm plans to introduce an Advanced Training Module which will focus on reflectance, microscopy, Raman and interpretation techniques...[registration of interest for 2008 can be submitted on-line. Details are available on page 4.](#)



Dispersive Raman Compliments FTIR

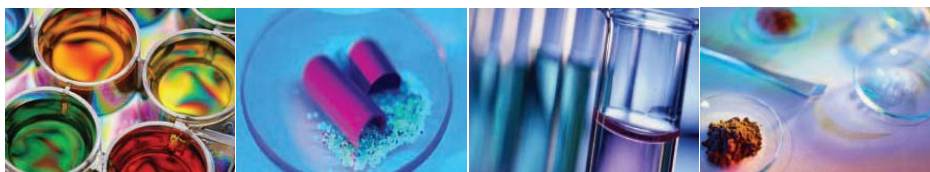
The new revolutionary bench-top RamanStation™ 400 spectrometer is efficient, easy to use and consistently accurate. Now your laboratory can get fast, highly reproducible results with the level of throughput and productivity you need.

Raman spectroscopy of-

fers a high-resolution spectrum that yields rich information about the molecular structure of a sample. Raman can stand alone as an analytical technique or be used in conjunction with existing instrumentation to provide complementary information to that obtained from

Mid-IR and Near-IR spectroscopy.

The RamanStation 400 does not require specific Raman expertise. At the touch of a button, you get auto-focused spectral acquisition, baseline removal and library searching...[attachment 1.](#)



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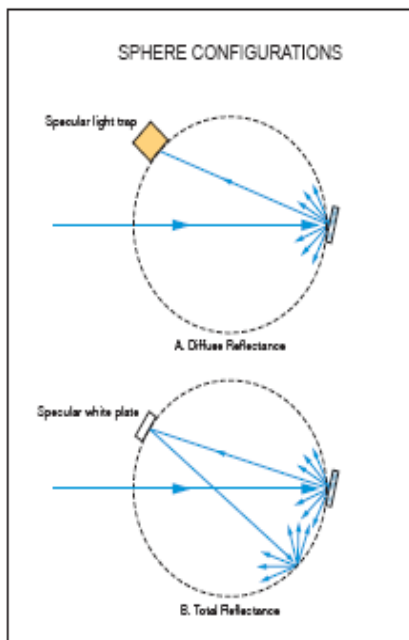
In the Next Edition

- Sampling Techniques
- Color Software
- Reflectance
- UATR & Microscopy
- DMA

Case Studies

If you have an interesting case study and would like to share it with others we would be happy to feature it.

Applications and use of Integrating Sphere



Selection Criteria for UV/Vis/NIR:

Current and future applications

Performance criteria

Sampling flexibility

Accessories that meet your needs

Higher productivity and ease of use

Software designed to follow best practices

Quality maintenance and service

Integrating spheres, in combination with UV/Vis and UV/Vis/NIR spectrophotometers, are extremely versatile accessories for high precision reflectance and scattered transmittance measurements on virtually any solid or liquid.

Application areas range from surface characterization of solids to the photometric analysis of turbid, colloidal, transparent and translucent samples. Typical uses encompass quality assurance testing and product development measurements on textiles, dyes, paper and glass.

Optical design and sampling configurations

The PerkinElmer 150 mm integrating sphere optical design is shown above. The transmittance sample holder at the entrance of the sphere enables the measurement of light scattering solutions or solids more efficiently than in a standard focusing UV/Vis spectrometer with a conventional detector arrangement. In the latter configuration, light will be lost before it reaches the

detector, resulting in significant photometric errors and uncontrolled variation between samples. The integrating sphere, however, collects all the light which has passed through the sample. For reflectance measurements, samples are mounted in the rear sample mount. Either total reflectance or diffuse reflectance only can be measured by placing either a light trap or Spectralon™ plate at the specular reflectance angle. This is represented in the figure opposite.

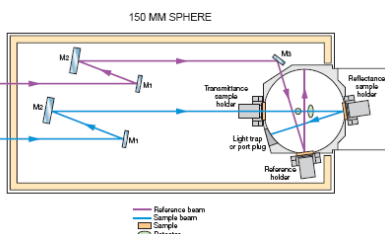
Measurement on irregularly-shaped solids such as solar cells, textiles, prisms and lenses is also possible using the center-mount option in which the sample is suspended in the middle of the sphere. The center-mount port, complete with positioning wheel for reproducible sampling, is shown being lifted out of the sphere in the figure below. The transmittance and reference ports are also shown. The reflectance port is located under the light blue cover on the right-hand side of the ac-

cessory. Even very large samples, for example sheets of glass, can be brought up to the reflectance port for analysis.

Additionally, for small samples or to sample small areas on larger samples, a small spot kit is available to focus the beam at the entrance, reflectance or center-ports of the sphere.

Interchangeable sampling modules

In a busy lab, instruments are more valuable if they can be rapidly reconfigured to run different analyses. The LAMBDA™ 650/850/950 family was designed with this in mind. The 60 mm and 150 mm integrating spheres are mounted in intelligent sampling modules located in the huge sampling area which is an integral part of the design. The large sample area provides maximum accessibility for accurate sample positioning and allows larger samples to be easily accommodated...[attachment 2](#).



Choosing a high performance UV/Vis or UV/Vis/NIR

While UV/Vis and UV/Vis/NIR spectroscopy are well established analytical techniques being effectively applied across a broad spectrum of well-known industries, high performance UV/Vis spectroscopy has expanded into new applications, especially in the life sciences. Traditional application areas such as materials characterization, optics, coatings, glass, phar-

maceutical QA/QC, and color control, UV/Vis spectroscopy has become more sophisticated, providing higher quality results faster and easier than ever.

In choosing a UV/Vis system or one with added NIR capabilities, there are many considerations. Traditional specifications such as wavelength range or sensitivity are critically important. Yet other ele-

ments such as ease of operation, speed of analysis, sampling flexibility, maintenance and long-term durability may be important in meeting current and future needs.

The remainder of this document examines these issues and presents available options that can provide a stronger foundation for choosing your next system...[attachment 3](#).

A Quick Guide to FTIR Sampling — Part 1

Defining the problem you need to solve is often not as straight forward as first perceived. The single most important parameter is understanding the nature of your sample.

FTIR sampling is based on whether your samples are:

- Solid, liquid or gas
- Film or Powder
- Major or minor components
- Size and thickness

- Contaminates
- Amount of samples

Solid samples can be ground and mixed with KBr to form a disk under pressure. This disk can be used to obtain the transmission spectrum of the sample as shown opposite.

Also in transmission liquid samples can be analyzed using a demountable cell where the path length is fixed using spacers.

With gases the path

length needs to be much longer as the density is much lower than solids and liquids. Typically path lengths of 10m to 20m are used.

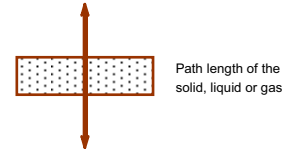
Applications include:

Solids – films, powders – organics and inorganics but not metals.

Liquids – pure liquids, mixtures, solutions, viscous liquids

Gases – pure and mixtures

Transmission



Tooling parts and hydraulic press required to form a KBr disk for the FTIR



Demountable cell for liquid analysis highlighting the fixed path length spacer.

Expanding the Spectrum

The Spectrum 400 is an all-new, Far-IR/Mid-IR/ Near-IR system that combines the latest developments in design, sampling and data-handling. Incorporating sophisticated automated range switch-over, this amazing instrument provides you with fully optimized performance across the entire measurement range. This tremendous versatility gives you the freedom to select the best combination of measurement range and sampling accessory for a given task.

The Spectrum 400 is ide-

ally suited to a wide range of applications in product development, product and process troubleshooting, and method development environments.

Rapid characterization of new materials, formulations and processes benefits from

- **Fast scanning** enabling reaction mechanisms and manufacturing processes to be studied

- **Mid-IR and Near-IR** imaging options providing rapid characterization of product formulations and additive distribution.

- **Software flexibility** including automatic spectral interpretation, library searching and the unique COMPARE algorithms, allowing materials to be identified quickly and easily...[attachment 4](#).



Sampling Criteria:

FT-IR and FT-NIR

Performance and resolution

Sampling flexibility

Accessories that meet your needs

Higher productivity and ease of use

Software designed to follow best practices

Quality maintenance and service

Seeing is Believing

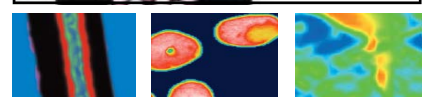
The Spotlight 400 has the ability to collect 170 high-quality spectra per second, allowing you to obtain higher quality images faster than ever before.

This translates to superior insights in the research lab; improved diagnostic and trouble-shooting results in analytical labs and, ultimately, a better understanding of products, materials and tissues.

Often viewed as a limitation of imaging the Spotlight's unprecedented performance and reliability reflect a number of innovations, including the first Linear Detector Array for Infrared Imaging Microscopes. Enhanced by superior control electronics, these breakthroughs enable the fastest, high quality spectral acquisition times available on the market today.

The Spotlight 400 allows pixel sizes of 6.25 μ , 25 μ and 50 μ . Application capabilities are further enhanced by the Attenuated Total Reflectance (ATR) Imaging Accessory that takes spatial resolution beyond the physical limitation of traditional IR imaging by providing an effective pixel size of 1.56 μ ...

[More information is available on request.](#)



The Power of HyperDSC



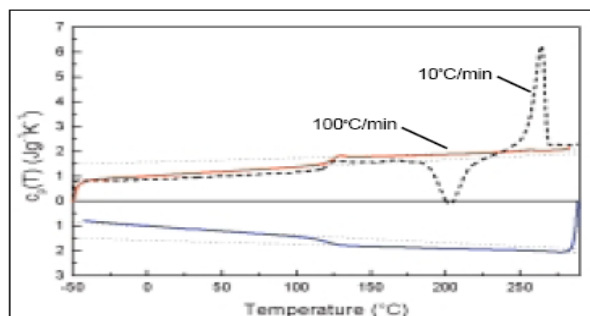
The PerkinElmer-exclusive HyperDSC method delivers unparalleled sensitivity and new insights into materials processes that cannot be obtained with existing DSC methods. By providing sample information within seconds, HyperDSC significantly increases throughput in the polymer and pharmaceutical industries.

The HyperDSC method is only possible with the power-compensation Diamond DSC because it allows measurements with controlled scanning rates

from 0.01 °C to 500 °C/minute. Unlike other DSC methods, HyperDSC offers true materials analysis while either eliminating or reducing changes such as re-crystallization, melting, and decomposition, which may be induced

when using slower scanning rates.

The example below highlights how crystallinity in the raw material can be investigated using HyperDSC. [Other examples are available in attachment 5.](#)



Thermal Analysis Criteria:

Polymorphism studies

High heating rates (500 K/min)

Controlling crystallinity

Simultaneous TGA-DSC

Degradation studies

SaTurn™ sensor development

Productivity through automation

Evolved gas analysis using FTIR, MS or GC.

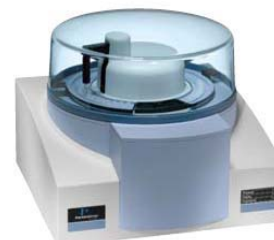
STA6000

The STA 6000 Simultaneous Thermal Analyzer offers excellent performance, reliability and productivity.

Designed with routine and research applications in mind, the STA 6000 applies leading edge sensor technology to yield higher accuracy and quality results. The patent pending SaTurnA™ sensor and proven compact furnace allows for better temperature control, more consis-

tent measurements and fastest cool-down times. Key benefits include:

- Weight change and heat flow measurements on the same sample.
- Integrated mass flow control and gas switching.
- A fully integrated 45 position autosampler option.
- Can be combined with a mass spectrometer (MS) or a molecular spectrometer (IR).. [attachment 6.](#)



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Training Dates and Events

Australia / New Zealand

Spectroscopy & Thermal Analysis

Standard & Advanced Training Modules

Registration of interest at

www.las.perkinelmer.com

Or fax back [attachment 7.](#)

ACCM20, Perth, 10 Feb - 15 Feb 2008

www.microscopy.org.au/ACMM20

APS30, Melbourne, 30 Nov - 4 Dec 2008

www.30aps.org.au

ACOV8-8, Melbourne, Sept/Oct 2009

