VARIAN, INC. Volume 1, Issue 3

The Cary Chronicles

Quarterly Newsletter published by the Western Region Optical Spectroscopy Instruments Team

VARIAN

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We hope you look forward to every issue of this newsletter. Please help us publish any noteworthy items! Your reward is a free, embroidered Varian, Inc. shirt. ***Thank You*** *for your continued interest.*

The Contributing Editors

Future Issues:

- New Cary Products & Promotions
- Biotech Applications
- The Power of Xenon
- Fibre Optics Applications
- Cary Insider's Service Tips
- Other Money Saving Ideas
- Customer Success Stories
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Introducing the new Cary Eclipse for Fluorescence

Varian, Inc. has recently introduced a new scanning Fluorescence spectrophotometer called the "Cary Eclipse." This instrument continues the Cary tradition of using superior quartz over-coated optics, flexible Windows 98/NT software and low limits of detection. The detection limits are so good that picomolar concentrations of fluoroscein are easily measured!

The collection modes are: Fluorescence, Phosphorescence, and Chemi/Bio Luminescence. One can capture a phosphorescence data point every microsecond and for steady state fluorescence kinetic data, you can collect 80 data points/second. The source is a Xenon flash lamp that has an exceptionally long lifetime, since it is only 'On' when actually taking a reading. This lamp is similar to our award-winning Cary 50 UV-Vis flash lamp except, with additional focusing optics and a narrow pulse width at half peak height of approximately 2 microseconds, it gives a peak power equivalent to 75 kW!

Another positive feature is the narrow 24" width that saves bench space without sacrificing sample compartment size, needed for critical accessories. Accessories like the Microplate reader, which is capable of reading up to 384 well microplate formats, and Peltier 4-cell changer make this instrument ideal for high throughput laboratories. The speed of the microplate reader is exceptional (96 well in <50 seconds or 384 wells in <90 seconds).

Cary spectrophotometers are the recognized market leader in DNA Thermal Melt systems. This tradition has been carried over to the fluorescence market place. Can you imagine doing multiple temperature ramps with multiple cells, using fluorescence? Please ask your Cary sales rep for more details.

The software is very intuitive. You can even have the results e-mailed to you automatically, after any run is complete. Furthermore, the Cary Eclipse has the best built-in instrument performance software to validate the instrument. This feature provides further confidence in your data and during audits!

As a **special promotion**, when you refer to this newsletter and ask your local Cary sales rep for an Eclipse instrument demo, you will receive a dozen Titlelist® Eclipse golf balls.

(Offer subject to limited availability, qualified prospects and good in the western US only.)

Article written by Russ Pong
(Cary Sales Rep - Southern California)

Cary 100 Helps Fight Cancer

How do you determine the structure of a large protein or nucleic acid? Not very quickly! Dr. Adrian Ferré-D'Amaré, a structural biologist at the Fred Hutchinson Cancer Research Center in Seattle, Washington, worked for six months to construct a three-dimensional map of a simple nucleic acid. Completed models of higher molecular weight molecules have taken six years!

Dr. Ferré-D'Amaré alters nucleic acids and determines how these changes affect the function of the nucleic acids in human cells. If the altered nucleic acids inhibit enzyme activity in diseased cells, then they are candidates for new cancer fighting drugs. The synthesized nucleic acids are crystallized and exposed to radiation in a process called X-ray crystallography. The interaction between the crystal and the X-rays produces an image of the molecule's structure. Knowing its structure suggests how the molecule will interact in a biological system.

The Cary-100 with the Peltier-Thermostatted, Multicell Holder, is used to determine the melting temperature of the synthesized nucleic acids. The acids are then subtly modified and analyzed to find their melting temperature. These melting temperatures correlate with the stability of the nucleic acid, and are used to identify the best candidate to crystallize. Dr. Ferré-D'Amaré's research requires very precise thermal melt data. He chose a Cary because of its stability and reliability. "The Cary-100 is the same day to day!"

In 1956, Dr. William Hutchinson created the Pacific Northwest Research Center to study heart surgery, cancer, and endocrine diseases. Dr. Hutchinson's brother Fred was a professional baseball pitcher who died of lung cancer in 1964. The following year Dr. Hutchinson dedicated the foundation's cancer division to the memory of his brother. Today, the Fred Hutchinson Cancer Research Center is composed of over 100 laboratories conducting a broad scope of cancer research. The "Hutch" is the world's largest bone marrow transplant center, and conducts the largest cancer prevention program with more that a half a million participants worldwide! The "Hutch" provides scientists from all over the world a place to collaborate with other leading cancer researchers. Dr. Ferré-D'Amaré promotes teamwork at the "Hutch" by allowing other labs to use his Cary-100!

More information about Dr. Ferré-D'Amaré's research and about the Fred Hutchinson Cancer Research Center may be found in *Ferre-D'Amare et al (1998) Nature, Volume 395, pp. 567-574* and at the web site ==> **http://www.fhcrc.org.**

Three-dimensional structure of a catalytic RNA from the human hepatitis delta virus determined by X-ray crystallography can be seen below:

This article was written by Dr. Ferré-D'Amaré with the assistance of Dave Cogan (Cary Sales Rep – Pacific Northwest).

Cary 500 measurements in the Textile Industry

The Textile Technology Centre in Saint-Hyacinthe, Quebec recently purchased a Cary 500 with a 150mm-integrating sphere to perform a wide range of measurements, ranging from Sun Protection Factor to anti-reflectance of camouflage material. The instrument is destined to become the work-horse for all spectroscopic applications associated with a very busy textile research facility.

In a previous issue of "The Cary Chronicles," there was an article covering the measurement of the transmission of sun-glasses. Similar measurements can be made on fabrics to test how well they filter out harmful UVA and UVB light. Known as Sun Protection Factor measurements (SPF), they are performed using a scanning spectrophotometer and an integrating sphere.

Currently, the Varian SPF software covers three standards from the USA, Australia/New Zealand and Britain. The measurement requires the use of a fabric sample holder with a built-in fluorescence filter placed at the transmission port of the integrating sphere. Many fabrics are treated with chemicals to enhance the color brightness in sunlight or artificial light. These chemicals are usually fluorescent and this fluorescence would give erroneous results for the calculated SPF, if allowed to enter the sphere for measure-ment. All three standards require that the sample be measured in at least two positions typically 0^0 and 90^0. To remove any variations in the material multiple samples are also run.

Diffuse Transmission of Fabric is measured over UVA (315-380nm) and UVB (290-315nm)

The %T results at each wavelength are used as follows:

$$SPF = \frac{\Sigma\, S(I) * E(I)\, d(I)}{\Sigma\, S(I)*E(I)*T(I)d(I)}$$

where:

S(I) = The strength of the noon sun
E(I) = The human skin (erythemal) response
T(I) = The fraction of light transmitted by sample

The Cary WinUV software for SPF factor calculation will prompt the user to insert the fabric in the measurement position with the appropriate number of times and positions (based on the standard being used). The software automati-cally takes the collected scattered transmission data and a report is generated giving the SPF factor. An example of the report is shown below.

The following results were calculated using the methods described in the Australian/New Zealand Standard AS/NZS 4399:1996, Appendix A. Solar Spectral Irradiance was measured at noon on 17 January 1990 for Melbourne (38°S).

Specimen #	SPF	UVA Avg (%)	UVB Avg (%)
White 1	18.920	6.038	4.878
White 2	21.069	5.456	4.381
White 3	18.007	6.656	5.090
White 4	16.406	7.895	5.635
White 5	17.691	6.491	5.257
White 6	14.389	8.080	6.485
White 7	17.602	6.497	5.332
White 8	16.407	7.069	5.642

Mean SPF:	17.6
Std Dev:	2.0
Std Error:	2.4
Calculated SPF:	15.1

SPF Rating 15: This fabric provides Good protection

Another important application in the textile industry is the reflectance measurement of Camouflage material. This measurement is done over the NIR-Vis-UV wavelength range and must fall within very specific limits. The limits can be placed on the PC screen by importing the limit data in . CSV format. The collected data can immediately be checked for in-limit specifi-cations by over laying on the same graph.

Known as Sun Protection Factor measurements (SPF), they are performed using a scanning spectro-photometer and an integrating sphere.

The 150mm sphere also has a centre mount holder, which allows the sample to be placed in the centre of the sphere so that "Transflectance" measurements can be made. Because the sample is inside the sphere, the measurement made is the sum of the transmitted and reflected light. The sample can be rotated for measurements at various angles.

The Cary 500 is a versatile, flexible instrument which can be used for any number of different applications in the textile industry.

This article was written by:
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Cary 50 on a Cart Captures Kudos

Los Alamos, NM - When Los Alamos National Laboratory researcher, Amy Wong, needed a new UV-Vis instrument to perform product certification for space exploration applications in her lab, she chose a Cary. "We needed a spectrophotometer that has higher performance-stability, flexibility, and output than other instruments we have," said Amy, "and we needed to make remote measurements using a fiber optic interface in a highly contaminated and harsh glovebox environment. Oh, and one more thing...the instrument system needed to be relatively compact and mobile so that it could be placed next to a glovebox."

The solution, for making this type of high-performance measurements on their Plutonium-238 samples in the glovebox environment where she works, was a Cary 50 UV-Vis Spectrophotometer. This Cary was installed with computer, flat-screen monitor, printer, and fiber-optic interface on a sturdy stainless steel laboratory cart! The high performance Cary 50, with its pulsed Xe lamp source and dual-beam technology, is especially well suited for making fiber-optic measurements. And, with the instrument and all its accessories mounted on a highly mobile cart, Amy and her colleagues now have the flexibility to use the system anywhere inside of the glovebox with the fiber-optic interface.

Performance, flexibility, and mobility...the Cary 50 was the logical choice. Thanks Amy!

Article written by Herb Potthoff (Cary Sales Rep – Rocky Mountain area). Photo with Ted Martin (Cary Service Rep)