

1982 CONFERENCE ON  
DIFFUSE REFLECTANCE  
SPECTROSCOPY

AUGUST 16 - 20, 1982  
WILSON COLLEGE CHAMBERSBURG, PA

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QUALITY EVALUATION LABORATORY RUSSELL RESEARCH CENTER, USDA-  
ARS  
ATHENS, GEORGIA

## 1982 CONFERENCE ON DIFFUSE REFLECTANCE SPECTROSCOPY

Date: August 16-20, 1982  
Place: Wilson College, Chambersburg, PA  
Cost: \$250.00 (registration, room, board & recreational activities)

Chemists, physicists, engineers, food scientists, and others interested in diffuse reflectance spectroscopy are invited to participate in the 1982 Conference on Diffuse Reflectance Spectroscopy.

Wilson College, located in the scenic Cumberland Valley, has been selected as the conference site. This rural setting provides an excellent atmosphere for scientists to meet informally in small groups away from the distractions of everyday life.

Sessions will be held in the mornings and evenings, Monday through Friday noon, with afternoons free for recreational activities, discussion groups, and other individual pursuits.

Each session will have a discussion leader, two principle speakers and three invited participants. The program would be composed of the following sessions:

Session 1	Physics:	James Aronson
2	Chemistry:	Tomas Hirschfeld
3	Instrumentation:	Edward Stark
4	Data Processing:	Karl Norris
5	Application Considerations:	Jack Hsia
6	Food Quality:	Gerald Dull
7	Remote Sensing:	Barrett Robinson
8	FTIR:	Peter Griffiths
9	Medical Applications:	Donald Henson

For additional information on this conference, please contact:

Gerald Birth  
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(404) 546-3527

Elaine Lanza  
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Attendance at the conference is limited to 125 participants. We need to know the number of people planning to attend the conference. If you plan to attend please complete the form below and send it to:

Wilbur Kaye  
Beckman Instruments, Inc. 2500 Harbor  
Blvd. Fullerton, CA 92634 (714) 871-  
4848

An informal poster session dealing with all areas of diffuse reflectance spectroscopy is being planned. Please indicate on the form if you would be interested in presenting a poster paper.

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Name; \_\_\_\_\_ Title; \_\_\_\_\_ Company: \_\_\_\_\_ Address: \_\_\_\_\_

\_\_\_\_\_ Telephone No.; \_\_\_\_\_

// Please register me for the Conference.

// I would like to present a poster session.

# **Conference on Diffuse Reflectance Spectroscopy**

August 16-20, 1982

## **Abstracts**

### Session 1:

Discussion Leader: James Aronson

The features observed in diffuse reflectance spectroscopy originate in electronic or vibrational transitions in a material. The optical constants which derive from transitions in the various materials, together with such physical parameters as particle sizes, volume fractions, surface roughness, etc., results in complex absorption and scattering processes that produce reflectance spectra. Models of the reflectance processes with supporting data will be presented. Examples will include laboratory powders, planetary surfaces and agricultural products.

### Session 2: Chemistry

Discussion Leader: Tomas Hirschfeld

Applications of diffuse reflectance to qualitative and quantitative chemistry will be reviewed in this session. Examples from cereal chemistry are included.

### Session 3: Instrumentation

Discussion Leader: Edward Stark

The principles applied in making diffuse reflectance measurements in the UV, visible, and near infrared will be described in detail. The advantages and disadvantages of the different methods of making measurements will be compared and related to the type of information desired. The sources of errors will be discussed along with procedures to minimize the errors and procedures will be described for evaluating the performance of the reflectance measuring instruments.

### Session 4: Data Processing

Discussion Leader: Karl Norris

Data processing procedures for predicting the composition of materials. Diffuse reflectance signals do not vary linearly with concentration of absorbers. Two conversions for linearity are commonly used: The Kubelka-Munk function,  $K/S$ , computed from  $((1-R)^2/2R)$  and  $\log(1/R)$  where  $R$  is the diffuse reflectance.

After conversion of the data to a linear or a quasi-linear variable, multi-term linear regression, curve fitting, factor analysis, and single-term regression with specialized functions such as derivative ratios are applied. Computer programs for performing the various data treatments will be described with examples from instruments being used in routine analyses.

Session 5: Application Considerations

Discussion Leader: Jack Hsia

Choice of spectral region and comparison with other methods of analyses. The selection of the optimum wavelength region for applying diffuse reflectance spectroscopy: visible, near infrared, and the infrared will be discussed. For a specific wavelength region, diffuse reflectance spectroscopy will be compared with other methods for determining the concentration or change in concentration of constituents in terms of speed, nondestructiveness and other factors.

Session 6: Food Quality

Discussion Leader: Gerald Dull

Certain parameters used to determine food quality can be measured by diffuse reflectance spectroscopy. Examples to be presented are automatic color sorting with detection of blemishes for citrus fruit, "Microcomputer Based Image Processing for Inspection" applied to shape and size recognition, measuring protein content of hard red spring wheat, nondestructive evaluation of the internal condition of fruit, and quality evaluation of meat.

Session 7: Remote Sensing

Discussion Leader: Barrett Robinson

Spectral reflectance measurements for remote sensing of earth surface subjects are influenced by the sun and view angle, polarization on first surface reflection, and other properties of scene constituents. Scientific results and technical procedures for several experiments spanning up to a decade are included. Data acquisition, calibration and the application of data from laboratory and field spectrometers to interpreting the data gathered by satellites will be discussed.

Session 8: Diffuse Reflectance Fourier Transform Spectroscopy

Discussion Leader: Peter Griffiths

Several aspects of Fourier transform spectroscopy are included; fast correlation transform applied to chemical analysis in the mid and near infrared, obtaining spectra of species, interactions causing correlation techniques to break down, study of surface species, spatial distribution of diffusely reflected light, the effect of specularly reflected radiation and instrumentation effects. Examples include coal chemistry, surface analysis, pharmaceutical analysis, protein chemistry and nutrient analysis with comments on projected applications.

Session 9: Medical Applications Discussion

Leader: Donald Henson

This session will be devoted to the application of diffuse reflectance for medical diagnosis.

# Conference on Diffuse Reflectance Spectroscopy

August 16-20, 1982  
Participants

## Conference Leadership

Dr. Gerald S. Birth	Chairman
Dr. Elaine Lanza	Vice-Chairman
Mr. Barrett Robinson	Treasurer
Dr. Mil bur Kaye	Attendance
Mr. Edward Stark	Consultant

## Discussion Leaders and Speakers

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