1982 CONFERENCE ON DIFFUSE REFLECTANCE SPECTROSCOPY

AUGUST 16 - 20, 1982

WILSON COLLEGE

CHAMBERSBURG, PA

SPONSORED BY THE

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
Russell Research Center
USDA, P. 0. Box 5677
Athens, GA 30613
(404) 546-3527

Elaine Lanza
USDA, Nutrient Composition Lab
Building 161, Room 101, BARC-East
Beltsville, MD 20705
(301) 344-2314

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.

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. Wil bur Kaye	Attendance
Mr. Edward Stark	Consultant

Discussion Leaders and Speakers

*(1) Dr. James R. Aronson
Arthur D. Little, Inc.
Acorn Park
Cambridge, MA 02140
(617) 864-5770

(6) Mr. Nicolas Bedworth
Microtex Company
800 Trowbridge Street
Cambridge, MA 02138
(617) 491-2874

(7) Larry Biehl
Lab for Applications of
Remote Sensing
Purdue Industrial Park
Purdue University
West Lafayette, IN 47906

(1,6) Dr. Gerald S. Birth
Russell Research Center
USDA, P. 0. Box 5677
Athens, GA 30613
(404) 546-3527

(9) Dr. Adam Bruckner
Dept. of Aeronautics and
Astronautics
Mail Stop FL-10
University of Washington
Seattle, Washington 98195
(206) 543-6143

(1) Dr. Roger G. Burns
Dept. of Earth and
dPlanetary Science
Mass Instrument Technology
Cambridge, MA 02139
(617) 253-1906

(9) Dr. James Callis
Chemistry Department
Mail Stop GS-10
University of Washington
Seattle, Washington 98195
(206) 543-1208

(8) Dr. John Casper
IBM Instruments Inc.
Orchard Park
P. 0. Box 332
Danbury, Conn. 06810
(203) 796-2383

(6) Dr. Gerald G. Dull
Russell Research Center
P. 0. Box 5677
Athens, GA 30613
(404) 546-3320

(7) Harold Gausman
USDA-ARS
P. 0. Box 267
Weslaco, TX 78956
(512) 968-5533

(5,8) Dr. Peter Griffiths
2226 East Copper Avenue
Tucson, Arizona 85719

*Session number

(1) Dr. Bruce Hapke
Dept. of Geology
University of Pittsburgh
Pittsburgh, PA 71260

Dr. N, J. Harrick
Harrick Scientific Corp.
Croton Dam Road
Box 867
Ossining, NY 10562
(914) 762-0020

(1) Dr. Harry Hecht
Chemistry Dept.
South Dakota University
Brookings, SD 57007
(605) 688-5151

(9) Dr. Donald Henson
National Cancer Institute
Room HC19
Landow Building
Bethesda, MD 20205
(301) 496-6718

(2,5) Dr. Tomas Hirschfeld
L-325, University of California
Lawrence Livermore Laboratory
P. 0. Box 808
Livermore, CA 94550

(8) David Honigs
Dept. of Chemistry
Indiana University
Bloomington, Indiana
47405 (812) 337-7905

(4) Dr. William Hruschka
Instrumentation Research Lab
BARC-West, USDA
Bldg. 002
Beltsville, MD 20705
(301) 344-3650

(5) Dr. Jack Hsia
National Bureau of Standards
Room B306, Bldg. 220
Washington, DC 20234
(301) 921-2453

(4) Mr. John F. X. Judge
Technicon Industrial Systems
511 Benedict Avenue
Tarrytown, NY 10591
(914) 631-8000

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

(8) Dr. K. Krishnan
Digilab
237 Putnam Avenue
Cambridge, MA 02139
(617) 868-4330

Dr. Elaine Lanza
BARC-East
Bldg. 308, Room 225
Beltsville, MD 20705
(301) 344-2314

(6) Douglas B. MacDougall
Agricultural Research Council
Meat Research Institute
Langford, Bristol BS187DY
England, UK
44-0934-852661

(4) Harold Martens
Norwegian Food Research Institute
Mail Box 50
N1432 AAS
Norway

(8) Stephen Lowry
Nicolet Instruments
5225 Verona Road
Madison, Wisconsin
53711 (608) 271-3333

(4) Mr. Ronald Moen
2431 Linden Lane
Silver Spring, MD 20910
(301) 589-5211

(3,4,5) Mr. Karl Norris
Instrumentation Research Lab
BARC-West, USDA
Bldg. 002, Room 103
Beltsville, MD 20705
(301) 344-3650

(6) Paul Paddock
Sunkist Research Center
760 Sunkist Street
Onatrio, CA 91761
(714) 983-9811

(7) Mr. Barrett Robinson
Lab for Applications of Remote Sensing
Purdue Industrial Park
Purdue University
West Lafayette. IN 47906
(317) 494-6305

(9) Edward A. Sickles
Dept. of Radiology
M-396
University of California
San Francisco, CA 94143
(415) 666-1723

(3) Mr. Edward Stark
Technicon Industrial Systems
511 Benedict Avenue
Tarrytown, NY 10591

(7) Stephen Ungar
Goddard Institute for Space Studies
2880 Broadway
New York, NY 10025
(212) 678-5511

(7) Dr. Vern Vanderbilt
Lab for Applications of
Remote Sensing
Purdue Industrial Park
Purdue University West
Lafayette, IN 47906
(317) 494-6305

(3,5) Dr. William Venable
Hunter Associates Lab, Inc.
11495 Sunset Hills Road
Reston, VA 22090
(703) 471-6870

(2) Dr. Clifford Watson
Chief, R & D Branch
USDA, FGIS
Richards-Gebaur Air Force Base
Bldg. 221
Grandview, MO
64030 (816) 348-
2871

(4) Mr. Mark Westerhaus
Pond Lab
Penn State University
University Park, PA 16802
(814) 863-0779

(2) Dr. David Wetzel
Dept. of Grain Science
Shellenberger Hall
Kansas State University
Manhattan, Kansas 66505
(913) 532-6161

(6) Dr. Philip C. Williams
Analytical Development Division
Grain Research Lab
1404-303 Main Street
Winnipeg, Manitoba
R3C 3G9 Canada