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THE GORDON RESEARCH CONFERENCE ON ELECTRON SPECTROSCOPY

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HELD IN WOLFEBORO (U) ARGONNE NATIONAL LAB IL

J L DEHMER ET AL 18 JUL 86 AFOSR-TR-86-2023

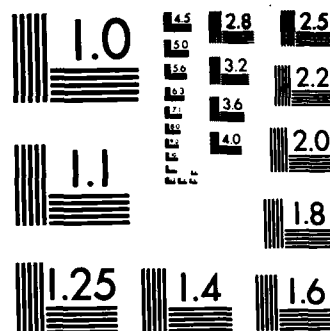
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AFOSR-86-0188

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MICROCOPY RESOLUTION TEST CHART
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8a. NAME OF FUNDING/SPONSORING ORGANIZATION AFOSR		8b. OFFICE SYMBOL (If applicable) NP		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER AFOSR-86-0188			
8c. ADDRESS (City, State and ZIP Code) Building 410 Bolling AFB, D.C. 20332-6448				10. SOURCE OF FUNDING NOS.			
				PROGRAM ELEMENT NO. 61102F	PROJECT NO. 2301	TASK NO. A4	WORK UNIT NO.
11. TITLE (Include Security Classification) "THE GORDON RESEARCH CONFERENCE ON ELECTRON SPECTROSCOPY"							
12. PERSONAL AUTHOR(S) Dr. Patricia Dehmer							
13a. TYPE OF REPORT FINAL		13b. TIME COVERED FROM 86/07/01 TO 86/1231		14. DATE OF REPORT (Yr., Mo., Day) 14-18 July 86		15. PAGE COUNT 15	
16. SUPPLEMENTARY NOTATION							
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)				
FIELD	GROUP	SUB. GR.					

FINAL REPORT OF
THE GORDON RESEARCH CONFERENCE ON ELECTRON SPECTROSCOPY
BREWSTER ACADEMY, WOLFEBORO, NEW HAMPSHIRE
14-18 JULY 1986

AFOSR-TR- 86 - 2023

J. L. Dehmer, Chairman
Argonne National Laboratory
Argonne, IL 60439

D. T. Pierce, Vice-Chairman
National Bureau of Standards
Gaithersburg, MD 20899

Submitted to:

Air Force Office of Scientific Research

Attn: Dr. Ralph E. Kelley

Grant Number: AFOSR-86-0188

Submitted by:

Name: Alexander M. Cruickshank
Signature: *Alexander M. Cruickshank*
Date: 10/2/86
Title: Director
Gordon Research Conferences

J. L. Dehmer
J. L. Dehmer
27 August 1986
Senior Physicist
Building 203
Argonne National Laboratory
Argonne, IL 60439
(312) 972-4194

Address: Gordon Research Center
University of Rhode Island
Kingston, RI 02881-0801
Telephone: (401) 783-4011, 783-3372



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FINAL REPORT

Gordon Research Conference on Electron Spectroscopy 14-18 July 1986, Wolfeboro, New Hampshire

The Gordon Research Conference on Electron Spectroscopy was held at Brewster Academy, Wolfeboro, NH during the week of 14-18 July 1986. The program, consisting of 20 invited speakers and 49 contributed posters, is attached. The invited talks were presented during morning and evening plenary sessions. Each session had a Chairman and Discussion Leader, as indicated on the program, and talks were limited to less than 45 minutes in order to reserve at least one-third of each session for discussion, which is the prime goal of Gordon Conferences. The posters were presented in two late afternoon sessions. The attendance at all sessions was excellent and the discussion was uniformly stimulating and at a high level. The organizers were very gratified by the quality and clarity of all 20 invited speakers, and comments from the attendees were very favorable.

The list of attendees is also attached showing that approximately 130 attended, including 37 conferees from 12 foreign countries. As in the case of the preceding meeting in 1984, the 1986 conference was fully subscribed. Furthermore, there was less than 50% overlap between the two, indicating the interest in and dynamic nature of the Gordon Conference on Electron Spectroscopy.

→ The scope of the electron spectroscopy Gordon Conference covers a range of modern techniques too numerous to mention, including various combinations of excitation sources (synchrotron radiation, laser radiation, electron beams, heavy ion beams, metastable atoms, etc.), targets (free atoms and molecules, adsorbed atoms and molecules, clusters, surfaces, solids, liquids and interfaces, etc.), and detectors (energy, ejection-angle, spin analyzers, often in coincidence with another observation channel, etc.). ~~Yet, the conference is not technique oriented. Rather,~~ it uses electron spectroscopy as common thread to draw together and focus diverse approaches to frontier research topics. Especially stimulating and fruitful exchanges occur across the gas phase/condensed matter boundary and between basic and applied sciences. The program for the 1986 meeting stressed a carefully selected subset of possible topics chosen to represent hot, rapidly evolving areas as well as major core areas within the broad scope of the meeting. The session titles in the attached program give a synopsis of the emphasized topics.

The conference budget of \$23,500 (\$10,500 from the Gordon Research Conferences, \$6,000 from the Air Force Office of Scientific Research, \$5,000 from the Office of Naval Research, and \$2,000 from the National Science Foundation) was used to pay the conference fee, which included room and board for the week, for the 20 invited speakers, 9 session chairs, 9 discussion leaders, the conference chairman, 4 graduate students, 6 foreign attendees, 1 postdoc, and 2 junior faculty. In addition, partial travel support was provided, according to need, to 20 speakers, 14 session chairs and discussion leaders, the conference chairman, and 5 other attendees. The success of the conference depended upon attracting the very best speakers, chairs, and discussion leaders. This would not have been possible without the supplemental financial support received from AFOSR, ONR, and NSF.

The next conference in this series will be held in 1988. The Chairman will be Dr. D. T. Pierce from the National Bureau of Standards and the Vice-Chairman will be Professor V. McKoy, Department of Chemistry, California Institute of Technology.

GORDON RESEARCH CONFERENCE ON ELECTRON SPECTROSCOPY

14-18 July 1986, Brewster Academy, Wolfeboro, NH

J. L. Dehmer, Chairman

D. T. Pierce, Vice-Chairman

Monday morning, July 14: "Photoemission and Inverse Photoemission"

Chairman **Y. Baer**
Discussion Leader **N. V. Smith**

Speakers

S. D. Kevan "Angle-Dependent Photoemission with High Resolution"
J. Bokor "Photoemission From Excited Surfaces"
P. D. Johnson "Inverse Photoemission from Clean and Adsorbate
 Covered Metal Surfaces"

Monday evening, July 14: "Soft X-Ray Induced Ionization, Double Ionization,
and Fragmentation of Molecules"

Chairman **J. A. R. Samson**
Discussion Leader **D. A. Shirley**

Speakers

I. Nenner "Selective Resonant Photoionization and Double
 Photoionization of Molecules"
E. W. Plummer "Fragmentation and Electron Emission from Core-Excited
 States of Free and Coordinated Molecules"

Tuesday morning, July 15: "Atomic and Molecular Studies"

Chairman **S. T. Manson**
Discussion Leader **V. McKoy**

Speakers

R. N. Compton "Photoionization and Autoionization of Highly
 Excited States"
Ch. Jungen "One-Photon and Multiphoton Ionization Processes
 in Molecules"
W. C. Lineberger "Photoelectron Spectroscopy of Anions and Small
 Cluster Ions"

Tuesday evening, July 15: "Autoionization and Auger Processes in Solids"

Chairman **L. C. Davis**
Discussion Leader **G. A. Sawatzky**

Speakers

S. D. Bader "Autoionization in Solids"
M. Landolt "Spin-Polarized Auger and Secondary Electron
 Spectroscopy"

Wednesday morning, July 16: "Scanning Tunneling Microscopy"

Chairman D. T. Pierce
Discussion Leader E. D. Williams

Speakers

J. E. Demuth "Scanning Tunneling Microscopy of Semiconductor Surfaces"
J. D. Tersoff "Theory of Scanning Tunneling Microscopy"

Wednesday evening, July 16: "Penning Ionization"

Chairman Y. Harada
Discussion Leader J. T. Yates, Jr.

Speakers

H. Morgner "Reactions of Metastable He Atoms with Molecules and Condensed Matter"
H. Metiu "Metastable Quenching Ionization Spectroscopy"

Thursday morning, July 17: "Electron Energy Loss Spectroscopy"

Chairman A. Herzenberg
Discussion Leader J. W. Gadzuk

Speakers

G. King "Inner-Shell Excitation of Atoms and Molecules by Electron Impact"
L. Sanche "Electron Spectroscopy of Condensed Atoms and Molecules"
L. Dubois "Time-Resolved Electron Energy Loss Spectroscopy: A New Approach to Surface Studies"

Thursday evening, July 17: "Magnetic Domain Imaging"

Chairman C. S. Fadley
Discussion Leader H. C. Siegmann

Speaker

J. Unguris "Investigation of Magnetic Microstructure Using Scanning Electron Microscopy with Polarization Analysis (SEMPA)"

Friday morning, July 18:

"Basic Properties and Applications of X-Ray Absorption Spectroscopies and Bremsstrahlung Isochromat Spectroscopy"

Chairman P. H. Citrin
Discussion Leader J. A. Horsley

Speakers

T. M. Hayes "'Hot' Electron Spectroscopies - Is Band or EXAFS Theory the Better Approach?"
J. Haase "SEXAFS and NEXAFS of Adsorbed Molecules"

MONDAY POSTER SESSION

- Posters put up on Monday after lunch
- Poster session 4:30 - 6:00 p.m. Monday
- Posters taken down before noon on Wednesday

- M1 Photoelectron Spectroscopy of Laser Excited Silicon
James P. Long, M. N. Kabler, J. C. Rife, and R. T. Williams (Naval Research Laboratory)
- M2 Two-Photon Photoelectron Spectroscopy of Pd(111) and H/Pd(111)
Glenn D. Kubiak (Sandia National Laboratories)
- M3 Low Energy Electron Transmission Through Cu/Ni Quantum Wells
Qi-Gao Zhu, Yunong Yang, Ellen D. Williams, and Robert L. Park (University of Maryland)
- M4 4f-Multiplet Splitting in BIS Spectra of Light Rare Earth Compounds
W. Grentz, C. Laubschat, C. Xue, and G. Kaindl (Freie Universität Berlin)
- M5 Schottky Barrier Formation Studies by Temperature-Dependent HREELS
M. K. Kelly, G. Margaritondo (University of Wisconsin-Madison),
L. Papagno, and G. J. Lapeyre (Montana State University)
- M6 Comparison of Measured and Calculated Appearance-Potential Spectra of 3d Metals
N. E. Erickson, C. J. Powell, and D. E. Ramaker (National Bureau of Standards)
- M7 Separation of Initial and Final State Effects by Combination of Electron Spectroscopy and Auger Electron Spectroscopy
G. Hohlneicher (Universität zu Köln)
- M8 Resonance Auger Spectra of Silicon Compounds
S. Aksela, O.-P. Sairanen, (University of Oulu), *K. H. Tan, G. M. Bancroft* (University of Western Ontario), and *H. Aksela* (University of Oulu)
- M9 Ion Production from CS₂ by Radiation in the Neighborhood of the C 1S and S 2P Edges
Robert G. Hayes (University of Notre Dame)
- M10 Double Photoionization of H₂
G. Dujardin, H. Le Rouzo, L. Hellner, M. J. Besnard (Université de Paris-Sud) and *Y. Malinovich* (The Hebrew University of Jerusalem)
- M11 Carbon K-Shell Excitation Spectra of Gaseous and Condensed Cyclic Hydrocarbons
A. P. Hitchcock, D. C. Newbury, I. Ishii (McMaster University),
J. A. Horsley, R. D. Redwing (Exxon Research and Engineering Company), *J. Stöhr* (IBM), *A. L. Johnson* (National Bureau of Standards), and *F. Sette* (AT&T Bell Laboratories)

- M12 Autoionization from the Lone Pair Orbitals of Molecules Containing Iodine
T. A. Carlson, P. Gerard (Oak Ridge National Laboratory),
B. P. Pullen (University of Southeastern Louisiana), *F. A. Grimm*
 (University of Tennessee), and *M. O. Krause* (Oak Ridge National
 Laboratory)
- M13 Resonance Structure in the Vibrationally Resolved Photoelectron Branching
 Ratios and Angular Distributions of the $2\pi^{-1}$ Channel of NO
S. H. Southworth (Los Alamos National Laboratory), *A. C. Parr*,
J. E. Hardis (National Bureau of Standards), and *J. L. Dehmer*
 (Argonne National Laboratory)
- M14 A Variable Energy Photoelectron Study of the Valence Levels and I 4d Core
 Levels of CF_3I
B. W. Yates, K. H. Tan, G. M. Bancroft (University of Western
 Ontario), and *J. S. Tse* (National Research Council of Canada)
- M15 A 4th Order Green's Function Approach to the Calculation of Satellite
 Lines
W. von Niessen, P. Tomasello (Technische Universität Braunschweig),
 and *J. Schirmer* (Universität Heidelberg)
- M16 An Interchannel-Coupled Shape Resonance Observed by Dispersed
 Fluorescence
E. D. Poliakoff, M.-H. Ho (Boston University), *G. E. Leroi* (Michigan
 State University), and *M. G. White* (Brookhaven National Laboratory)
- M17 Molecular Photoionization Calculations with Numerical Continuum
 Wavefunctions
F. P. Larkins and J. A. Richards (University of Tasmania)
- M18 Photoelectron Spectroscopy of Short-Lived Molecules in the Vapor Phase
J. M. Dyke (The University of Southampton)
- M19 Fragmentation of Nitrous Oxide by Monochromatic Soft X-Rays
J. Murakami, M. C. Nelson, S. L. Anderson, and D. M. Hanson (State
 University of New York-Stony Brook)
- M20 Interference Between Vibrational Levels in the Core-Hole Decay of NO
T. X. Carroll, S. E. Anderson, L. Ungier, and T. D. Thomas (Oregon
 State University)
- M21 Final State Multiplet Structures in Photoionization of the Inner-Valence
 Shells of NH_3 and PH_3
M. N. Piancastelli (2nd Univ. of Rome), *C. Cauletti* (1st Univ. of
 Rome), and *M. Y. Adam* (LURE, Univ. Paris-Sud)
- M22 Dynamics of the Double Photoionization Near Threshold in Argon, Studied
 by Coincidence Technique
Pascal Lablanquie, Irene Nenner, Paul Morin (LURE, Université de
 Paris Sud), *John H. D. Eland* (Oxford Physical Chemistry Laboratory),
M. J. Hubin-Franskin, and J. Delwiche (Université de Liege)
- M23 Photoemission and Inverse Photoemission of Metal-Metal Interfaces
J. G. Tobin, B. J. Knapp, J. C. Hansen, and J. A. Benson (University
 of Wisconsin-Madison)

WEDNESDAY POSTER SESSION

- Posters put up on Wednesday after lunch
- Poster session 4:30 - 6:00 p.m. Wednesday

- W1 Spin-Polarized Inverse Photoemission Study of Ni(001) and its Chemisorption
L. E. Klebanoff, R. K. Jones, D. T. Pierce, and R. J. Celotta
(National Bureau of Standards)
- W2 Surface Magnetism and Dipole-Allowed Electronic Excitation in EuS by Polarized Electron Scattering
S. F. Alvarado (Institut für Festkörperforschung, Jülich)
- W3 Stoner Excitations in Ferromagnets as Revealed by Exchange Processes in Inelastic Spin-Polarized Electron Energy Loss Spectroscopy
J. Kirschner, S. Suga, and D. Venus (Institut für Grenzflächenforschung und Vakuumphysik, Jülich)
- W4 Experimental Analysis of Band Symmetry and Hybridization in Non-Magnetic Solids via Spin-Polarized Momentum-Resolved Photoemission with Circularly Polarized Synchrotron Radiation
J. Kirschner, H. P. Oepen, D. Venus, J. Garbe, S. Suga, C. Schneider, and K. Hünlich (Institut für Grenzflächenforschung und Vakuumphysik, Jülich)
- W5 Spin Polarized Photoelectron Diffraction: A New Probe of Surface Magnetic Order
B. Sinković, B. Hermsmeier, J. Osterwalder, and C. S. Fadley
(University of Hawaii)
- W6 Electronic Resonances in Spin-Resolved Photoemission from Physisorbed Atoms
G. Schönhense (Universität Bielefeld)
- W7 Photoelectron Spectrometry of Atomic Mercury in the 17-40 eV Photon-Energy Range
B. H. McQuaide, M. S. Banna (Vanderbilt University), *P. Gerard, and M. O. Krause* (Oak Ridge National Laboratory)
- W8 Differential Electron Scattering Cross Sections for the First Optically Forbidden and Resonance Transitions in MgII, ZnII, and CdII
R. J. Mawhorter, I. D. Williams, and A. Chutjian (Jet Propulsion Laboratory)
- W9 $L_{2,3}$ - and $M_{2,3}$ -Shell Electron Energy Loss Spectra of Atomic Ca
J. Väyrynen and M. Harkoma (University of Oulu)
- W10 He, Ne, and Ar Photoelectron Satellites at Threshold
P. A. Heimann, U. Becker, H. G. Kerkhoff, B. Langer, D. Szostak, R. Wehlitz, D. W. Lindle, T. A. Ferrett, S. H. Liu, and D. A. Shirley
(Lawrence Berkeley Laboratory and University of California-Berkeley)

- W11 Autoionization of the Kr 3d + np Resonances
D. W. Lindle, P. A. Heimann, T. A. Ferrett, M. N. Piancastelli, and D. A. Shirley (Lawrence Berkeley Laboratory and University of California-Berkeley)
- W12 Absolute Cross-Section Measurements of Metallic Vapours
Agneta Svensson (Daresbury Laboratory, England)
- W13 Autoionization Resonances in Hg-6s² Photoionization
P. Gerard, M. O. Krause, T. A. Carlson (Oak Ridge National Laboratory), *B. McQuaide*, and *S. Banna* (Vanderbilt University)
- W14 Local Structure Determination of the Ti/Si System by SEELFS and EAPFS
Yves U. Idzerda, Ellen D. Williams, T. L. Einstein, and R. L. Park (University of Maryland)
- W15 Experimental and Theoretical Studies on Polarized XANES Spectra of Square-Planar Complexes: CuCl₄²⁻ and Ni(CN)₄²⁻
Nobuhiro Kosugi (The University of Tokyo)
- W16 Highly Resolved Electron Energy Loss Spectroscopy Versus Surface Reconstruction
J. Szeftel (CEN, Saclay)
- W17 Near Edge Structure of C₂H₂, C₂H₄, C₂H₆ on Cu (100): Fluorescence and Electron Yield Detection at the C-K Edge
D. Arvanitis, K. Baberschke, L. Wenzel (Freie Universität Berlin), *U. Döbler* (SIETEC, Berlin), and *J. Stöhr* (IBM)
- W18 Near Edge X-ray Absorption Fine Structure of O on Cu: Comparison of Experiment and a Full Multiple Scattering Calculation
U. Döbler (SIETEC, Berlin), *K. Baberschke* (Freie Universität Berlin), *D. D. Vvedensky*, and *J. B. Pendry* (Imperial College)
- W19 Photoemission Studies Using Synchrotron Radiation on the Catalytic Role of Alkali Metals as Efficient Promoters of Semiconductor Oxidation
P. Soukiassian (University of Wisconsin-Madison), *M. H. Bakshi*, *Z. Hurych* (Northern Illinois University), and *T. M. Gentle* (Dow-Corning Co.)
- W20 Symmetry and Surface Chemistry in Angle Resolved UV Photoemission: Five-Membered Ring Systems on Rh(111)
F. P. Netzer, A. Goldmann, G. Rosina and E. Bertell (Universität Innsbruck)
- W21 Surface Structures for the Oxygen/Ni(001) System from c(2×2)O to Saturated NiO
R. Saiki, A. Kaduwela, M. Sagurton, D. Cyr, C. S. Fadley (University of Hawaii), and *C. R. Brundle* (IBM)
- W22 Study of Outermost Surface Layers of Organic Solids by Penning Ionization Electron Spectroscopy
Yoshiya Harada (The University of Tokyo)

- W23 Photoemission Study of Cu-MnO System as a Catalyst Model
V. Di Castro and G. Polzonetti (University "La Sapienza")
- W24 The Growth of Amorphous SiO_x on Si-H and Si-H on SiO_x Studied by High Resolution Core Level Spectroscopy
D. Sondericker, B. Abeles, W. Eberhardt, H. Stasiewski, and L. Yang (Exxon Research and Engineering Company)
- W25 Spin-Resolved Photoemission of *in situ* Grown Epitaxial Fe Layers on W(110)
R. Kurzawa, K. P. Kämper, W. Schmitt, and G. Güntherodt (Universität Köln)
- W26 Bonding of CO and Nitriles on W(100)-(5×1)-C: NEXAFS and HREELS Studies
C. M. Friend, E. K. Baldwin, J. G. Serafin (Harvard University), and Paul Stevens (Stanford University)

GORDON RESEARCH CONFERENCES

ELECTRON SPECTROSCOPY

JULY 14-18, 1986
Brewster Academy, Wolfeboro, New Hampshire

CONFERENCE CHAIRMAN: J.L. DEHMER
VICE-CHAIRMAN: D.T. PIERCE

REGISTRATION LIST

Aksela, Dr. Seppo University of Oulu Dept. of Physics Oulu, FINLAND 90570	Bearce 11	Bokor, Dr. J. AT&T Bell Laboratories Communications Sciences Research Crawfords Corner Road Holmdel, NJ 07733	Estabrook 14
Alvarado, S.F. IFF- KFA Jülich Jülich D-5170 WEST GERMANY	Bearce 12	Bozek, Mr. John D. University of Western Ontario Department of Chemistry London, Ontario, CANADA	Estabrook 1 N6A 5B8
Baberschke, Dr. Prof. K Institut F. Atom. U Festkörperphysik Fu Berlin Arnimallee 14 BERLIN33 D1000	Bearce 1	Busby, Molly 770-152 Box 8361 S. Charleston, WV 25303	Estabrook Rd. 1
Bader, Dr. Samuel D. Argonne National Laboratory MST-223 9700 S. Cass Avenue Argonne, IL 60439	Sargent B 5	Cabrera, Dr. Alejandro Air Products & Chemicals, Inc. Science Center Box 538 Allenton, PA 18105	Chamberlain 2
Baer, Dr. Yves Institut De. Physique A.L. Breguet 1 2000 Neuchatel SWITZERLAND CH-2000	Estabrook 8	Carrol, Dr. Thomas X Oregon State University Department of Chemistry Corvallis, Oregon 97331	Estabrook 2
Bakshi, Mira H. 725 Schneider Dr. Synchrotron Rad. Center (Affl. NIU) Stoughton, WI 53589	Estabrook RD. 2	Carlson, Dr. Thomas A. Oak Ridge National Lab. Chemistry Division P.O. Box X Oak Ridge, TN 37831	Sargent 110
Banna, Dr. Salin Vanderbilt University Department of Chemistry Box 1822, Station B Nashville, TN 37235	Estabrook. 6	Castner, Dr. David G. Chevron Research Company 576 Standard Ave. Room 10-1210 Richmond, CA 94802	Brown 2
Benbow, Dr. Ralph L Northern Illinois University Physics Department DeKalb, IL. 60115	Estabrook 2	Chen, Dr. Chien-Te AT&T Room A103 600 Mountain Avenue Murray Hill, NJ 07974	Brown 2
Best, Dr. Philip E. University of Connecticut Department of Physics 2152 Hillside Road Storrs, CT. 06268	Sargent B6	Compton, Dr. Robert N. Oak Ridge National Laboratory Health and Safety Research Division P.O. Box X Oak Ridge, TN 37831	Brown 5

Crowell, Dr. John E. Sargent 110
University of Pittsburg
Department of Chemistry
Pittsburg, PA. 15250

Davis, Dr. Craig Estabrook 1
Ford Motor Co.
RM. S3020, Science Lab.
P.O. Box 2053
Dearborn, MI 48121

Dehmer, Dr. Joseph Sargent 109
Argonne National Laboratory
Building 203
Argonne, IL 60439

DeMuth, Dr. J. E. Sargent 107
IBM Research
P.O. 218
Yorktown Heights, NY 10598

DiCastro, Dr. Valeria Sargent 209
University "La Sapienza"
Department of Chemistry
Zale Aldo Moro 5
Roma, ITALY 00185

DiCenzo, Dr. Stephanie B. Admissions 3
AT&T Bell Laboratories
RM. 1E 450
600 Mountain Avenue
Murray Hill, NJ 07974

Dubois, Dr. Lawrence H. Sargent 101
AT&T Bell Laboratories
600 Mountain Avenue
RM. 1D-245
Murray Hill, NJ 07974

Dujardin Bearce 12
48 Av. Roger Salengro
Chûkeney Malabry FRANCE

Dyke, Dr. J.M. Estabrook 17
Southampton University
Department of Chemistry
Southampton, ENGLAND S09 5NH

Fadley, Charles
Dept. of Chemistry
Univ. of Hawaii, 2545 THF MAU
Honolulu, HAWAII

Feigerle, Dr. Charles S. Sargent B6
University of Tennessee
Department of Chemistry
Knoxville, TN 37996-1600

Firment, Dr. Lawrence E. Bearce 9
E.I. Dupont De Nemours & Co
Experimental Station E228/143
Central Research & Dev. Wilmington, DE 19898

Frankel, David J. Chamberlain 3
Dept. of Physics
Montana State Univ.
Bateman, MT 59717

Frommer, Dr. Myron OFF CAMPUS
Philips Laboratories
North American Philips Corp.
345 Scarborough Road
Briarcliff Manor, NY 10510

Gadzuk, Dr. J. W. Hanes 3
National Bureau of Standards
Surface Science Division
Building 222
Gaithersburg, MD 20899

Garrett, Dr. Richard Bearce 2
National Synchrotron Light Source
Building 510E
Brookhaven National Laboratory
Upton, NY 11973

Gerard, Patrick Kimball 1
X-19 3700 Sutherland Ave.
Knoxville, TN 37915

Gil, Dr. Tomasz Sargent B5
Indiana University
Dept. Chemistry
Bloomington, IN 47405

Grimm, Dr. F.A. Sargent B4
University of Tennessee
Department of Chemistry
Knoxville, TN 37996-1600

Gruzalski, Dr. Greg R. Chamberlain 1
Oak Ridge National Laboratory
Solid State Division
P.O. Box X
Oak Ridge, TN 37831

Haase, Dr. Jochen Sargent 104
Fritz-Haber-Institu Der MPG
Dept. of Surface Physics
Faradayweg 4-6
Berlin 33 WEST GERMANY D-1000

Hanson, Dr. David M. Sargent 104
State University of New York
Department of Chemistry
Stony Brook, NY 11794

Harada, Dr. Yoshiya Sargent B3
The University of Toyko
College of Arts and Sciences
Komaba, Meguro
Toyko, JAPAN 153

Hayes, Dr. Robert Sargent B2
University of Notre Dame
Dept. of Chemistry
Notre Dame, IN 46556

Hayes, Dr. Timothy Brown 6
Physics Department
Colorado School of Mines
Golden, CO. 80401

Heiman, Dr. Philip A. Sargent 102
Lawrence Berkeley Laboratory
RM 1115, BLDG. 70A
1 Cyclotron Road
Berkeley, CA. 94720

Herzenberg, Dr. Arvid Brown 7
Yale University
Applied Physics
P.O. Box 2157
New Haven, CT. 06520

Hohlneicher, Dr. G. OFF CAMPUS
University of Cologne, Germany
Lehrstuhl Fir Theoretical Chemie
Greinstr 4
Koln, WEST GERMANY

Horsley, Dr. John A. Sargent B 1
Exxon Research & Engineering Company
Corporate Research Science Laboratories
Annandale, NJ 08801

Hulbert, Dr. Steve Sargent 208
Brookhaven National Laboratory
NSLS 510E
Upton, NY 11973

Hurych, Zdenak OFF CAMPUS
Physics Dept.
N. Ill. Univ.
DeKalb, Illinois, 60115

Idzerda, Dr. Yves U. Estabrook 7
University of Maryland
Dept. of Physics & Astronomy
College Park, MD 20742

Johnson, Peter D. Estabrook 18
Physics 510 B, Brookhaven National Lab.
Upton, NY 11973

Jones, Dr. Robert Kimball 5
National Bureau of Standards
B206/220
Gaithersburg, MD. 20899

Jugnet, Dr. Yvette Estabrook RD. 3
Institut De Physique Nucleaire
Universite Claudebernard Lyon 1
43 BD DU Novembre
Villeurbanne Cedex, FRANCE F69622

Jungen, Ch. Estabrook 5
Laboratoire de Photo physique Moléculaire
91400) ORSAY FRANCE 91400

Kelly, Dr.M.K. Estabrook 7
University of Wisconsin-Madison
Synchrotron Radiation Center
Stoughton, WI 53589

Kevan, Dr. S. D. Sargent 101
University of Oregon
Physics Department
Eugene, Oregon 97403

Kim, Dr. Kwang Chamberlain 3
Exxon Research & Engineering Co.
Route East, Clinton Township
Annandale, NJ 08801

King, Dr. George Brown 8
Manchester University
Schuster Laboratory
Department of Physics
Manchester, ENGLAND M13 9PL

Kirschner, Dr. Jurgen Sargent 108
KFA Julich
Julich, GERMANY D-5170

Klebanoff, Dr. Leonard E. Bearce 8
National Bureau of Standards
B206/22U Gaithersburg, MD. 20899

Kosugi, Dr. Nobuhiro Sargent B 2
The University of Toyko
Department of Chemistry
Hongo, Bunkyo-Ku
Toyko, JAPAN 113

Krause, Dr. Manfred Kimball 7
ORNL
Box X, BLDG. 4500N
Oak Ridge, TN 37831

Kubiak, Dr. Glenn D. Sargent B 4
Sandia National Laboratories
Div: 8343
Livermore, CA 94550

Kurtz, Dr. Richard L. Sargent B 3
National Bureau of Standards
Surface Science Division
BLDG. 222/B248
Gaithersburg, MD 20899

Lablanque, Dr. Pascal Kimball 3
CNRS
LUREBatiment 2 090
Universite Paris SUD
ORSAY FRANCE 91405

Landolt, Dr. Estabrook 12
HPF- C2
ETH-Honggerberg
ZURICH, SWITZERLAND CH- 8093

Larkins, F.P. Kimball 4
University of Oregon
E1 Chemical Physics
Eugene, OR 97403-1274

Larson, Paul Sargent 206
Perkin-Elmer Corporation
6509 Flying Cloud Drive
Eden Prairie, MN 55344

Lindau, I. Chamberlain 4
Stanford University
Stanford Electronics Lab.
McCullough 336
Stanford, CA 94305

Lindle, Dennis Sargent 102
Lawrence Berkeley Lab
MMRD, Building 70A, Rm. 1115
Berkeley, CA 94720

Lineberger, W. Carl Brown 9
JILA
University of Colorado
Campus Box 440
Boulder, CO 80309

Long, James P. Kimball 2
Naval Research Laboratory
Code 4606
4555 Overlook Ave.
Washington, D.C. 20375

Manson, Steven Sargent 108
Georgia State University
Dept. of Physics and Astronomy
Atlanta, GA 30303

Mason, Gary Kimball 7
Corporate Research Laboratories
Eastman Kodak Company
1669 Lake Ave.
Rochester, NY 14650

Mawhorter, Richard Kimball 4
Jet Propulsion Lab
Mail Stop 183-601
4800 Oak Grove Drive
Pasadena, CA 91109

Mertens, Frederick Sargent 201
Texaco Refining and Marketing, Inc.
Port Arthur Research Laboratory
P.O. Box 1608
Port Arthur, TX 77641

Metiu, Horia Estabrook 15
University of California
Department of Chemistry
Santa Barbara, CA 93106

Morgner, Harald Estabrook 9
Universitat Freiburg
Hermann Herder-Str. 3
Freiburg, Germany D-7800'

McConville, C.F. Estabrook 18
University of Warwick
Department of Physics
Coventry, U.K. CV47AL

McCurdy, William Bearce 10
Ohio State University
Department of Chemistry
140 W. 18th Ave.
Columbus, OH 43210

McKoy, Vincent Kimball 3
California Institute of Technology
Dept. of Chemistry 127-72
Pasadena, CA 91125

Netzer, Falko Kimball 2
University of Innsbruck
Inst. of Physikal Chemie.
Innrain 52 A
Innsbruck Austria 6020

Orel, Ann Estabrook Rd. 2
The Aerospace Corporation
M5/754
P.O. Box 92957
Los Angeles, CA 90009

Piancastelli, Maria Novella Admissions 1
Department of Chemistry
University of Rome
Rome, Italy 00173

Pierce, Daniel Brown 3
National Bureau of Standards
Bldg. 220, Rm. B206
Gaithersburg, MD 20899

Plummer, Ward Off Campus
University of Pennsylvania
Dept. of Physics
209 S. 33rd Street
Philadelphia, PA 19104-6396

Poliakoff, Erwin Haines 1
Boston University
Department of Chemistry
590 Commonwealth Ave.
Boston, MA 02215

Polzonetti, Giovanni Sargent 205
University "La Sapienza"
Department of Chemistry
P. le A. Moro 5
Rome, Italy 00185

Powell, Cedric Sargent 203
National Bureau of Standards
Chemistry B-248
Gaithersburg, MD 20899

Ramsey, Michael Sargent 103
University of New South Wales
School of Physics
P.O. Box 1
Kensington, N.S.W.
Australia, 2033

Rescigno, Thomas Bearce 10
Lawrence Livermore Lab
P.O. Box 808, L-487
Livermore, CA 94550

Ritter, Alfred Estabrook 6
Virginia Tech
Blacksburg, VA 24061

Roberts, R.H. Sargent 103
University of Newcastle
Physics Department
N.S.W., Australia 2308

Robins, John Sargent 204
National Bureau of Standards
c/o Dr. C.J. Powell
Surface Science Division
Gaithersburg, MD 20899

Rocca, Mario Sargent 105
University of Genova
Dipartimento di Fisica
Didecaneso 33
Genova, Italy 1-16124

Rohrbaugh, Wayne Off Campus
Mobil R&D Corporation
Research Dept.
Billingsport Rd.
Paulsboro, NJ 08066

Rosseel, Thomas Kimball 1
Oak Ridge National Lab
4500S, C-158
P.O. Box X
Oak Ridge, TN 37831

Sairanen, Olli-Pekka Bearce 11
University of Oulu
Dept. of Physics
Oulu 57 Finland 90570

Samson, James Off Campus
University of Nebraska
Physics Dept.
Lincoln, NE 68588-0111

Sanche, Leon Estabrook 16
University of Sherbrooke
CHUS
Stoke Road
Sherbrooke, Canada J1H 5N4

Sawatsky, G.A. Estabrook 13
University of Groningen
Physical Chemistry Dept.
Nijenborgh 16
Groningen, The Netherlands 9747AG

Schoenhense, Gerd Sargent 104
University of Bielefeld
Fakultat Physik
Bielefeld, West Germany D-4800

Schowengerdt, F.D. Off Campus
Colorado School of Mines
HEAD, Physics Dept.
Golden, CO 80401

Shih, Arnold Haines 1
Naval Research Laboratory
Code 6832 Surface Physics Branch
4555 Overlook Avenue
Washington, D.C. 20375-5000

Shirley, David Estabrook 3
Lawrence Berkeley Laboratory
Bldg. 70A, Room 1115
One Cyclotron Rd.
Berkeley, CA 94720

Siggel, Michele Admissions 2
Oregon State University
Dept. of Chemistry
Corvallis, OR 97330

Siegmán, H.C. Sargent B-1
ETH
Honggerberg
Zurich 8049 Switzerland

Smith, N.V. Off Campus
AT&T Bell Labs
Murray Hill, NJ 07974

Soler, Jose Brown 1
Universidad Autonoma de Madrid
IBM Watson Research Center
Box 218
Yorktown Heights, NY 10598

Sondericker, Dale Estabrook Rd. 3
Brookhaven National Laboratory
NSLS Bldg. 5105
Upton, NY 11973

Soto, Maribel Estabrook Rd. 1
Pennsylvania State University
Chemistry Dept.
152 Davey Lab
University PK, PA 16802

Soukiassian, Patrick Chamberlain 4
602 Edgewood Ave.
Madison, WI 53711

Southworth, Stephan Kimball 6
Los Alamos National Lab
NSLS, 725A, U3
Brookhaven National Lab
Upton, NY 11973

Stika, Katherine Admissions 1
E.I. Dupont
Experimental Station E 323/113
Wilmington, DE 19898

Szeftel, J. Sargent 105
CEN Saclay SPAS
Gif-Sur-Yvette, France 91191

Tersoff, Jerry Sargent 107
IBM Watson Research Center
P.O. Box 218
Yorktown Heights, NY 10598

Tobin, James Haines 2
University of Wisconsin
Dept. of Chemistry
1101 University Ave.
Madison, WI 53706

Tohji, Kazuyuki Sargent 106
SUNY at Stony Brook
Dept. of Chemistry
Stony Brook, NY 11794

Trela, Walter Off Campus
137 San Juan
Los Alamos, NM 87544

Tse, John Kimball 2A
National Research Council of Canada
Montreal Rd. , Ottawa KIA OR9
Division of Chemistry
Ottawa, Ontario K1A OR9 Canada

Thomas, Darrah Haines 2
Oregon State University
Dept. of Chemistry
Corvallis, OR 97331

Unguris, John Kimball 5
National Bureau of Standards
Bldg. 220
Gaithersburg, MD 20899

von Niessen, W. Brown 1
Technical University of Braunschweig
Institute fo Physical and Theor. Chemistry
Hans-Sommer-Strasse 10
Braunschweig, West Germany D-3300

Weimer, Jeffrey Chamberlain 2
University of Maine
LASST
9 Barrows Hall
Orono, ME 04469

Westwood, N. Estabrook 17
University of Guelph
(GWC) Dept. of Chemistry
Guelph, Ontario N1G 2W1 Canada

Williams, Ellen Estabrook Rd. 4
University of Maryland
Dept. of Physics
College Park, MD 20742

Yates, John Estabrook 4
University of Pittsburgh
Dept. of Chemistry
Pittsburgh, PA 15260

Xüe, Changquin Sargent 202
Freie Universität Berlin
Institut für Atom und Festkörper Physik
Arnimallee 14
Berlin 33 D-1000 West Germany

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