THE MATERIALS RESEARCH SOCIETY

1979 Annual Meeting

November 26-30
Hyatt Regency Cambridge
Cambridge, Massachusetts

PROGRAM & Registration Information
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I. Fundamental Mechanisms

Chairman: J.W. Corbett, SUNY/Albany
November 27, 1979
Tuesday Morning

Invited Talks
8:30 — “Coupling of Energy Beams to Solids,” M. von Allmen, Caltech and University of Berne, Switzerland

9:00 — “Comparison of Liquid and Solid Phase Epitaxy,” W.L. Brown, Bell Labs


Contributed Papers
10:00 — “Evidence for and Nature of a Non-thermal Mechanism of Pulsed Laser Annealing of Semiconductors,” J.A. van Vechten, IBM

10:15 — “Plasma Bottlenecks, Dynamics of Laser-Induced Plasmas,” E. Yoffa, IBM


10:45 — “Raman Measurements of Temperature during CW and Pulsed Laser Heating of Silicon,” A. Compaan and H.W. Lo, Kansas State University

11:00 — “Segregation at High Growth Velocities,” S.S. Lau and M. von Allmen, Caltech


11:30 — “Surface Accumulation of Impurities after Laser Induced Melting,” P. Baeri and M.G. Grimaldi, Istituto di Struttura della Materia, Catania, Italy

11:45 — “Segregation Effects in Laser Annealing of Ion Implanted Silicon,” D. Hoenhout and F.W. Saris, FOM Institute, the Netherlands

12:00 — LUNCH
II. Annealing and Recrystallization

Chairman: B.R. Appleton, ORNL
Tuesday Afternoon

Invited Talks


2:00 — "Laser Induced Reversible Order-Disorder Transitions in Silicon." R. TSU, R.T. HODGSON, J.E. BAGLIN and T.Y. TAN, IBM

Contributed Papers

2:30 — "Picosecond Laser Pulse Induced Melting and Resolidification Morphology on Silicon." F.L. LIU, R. YEN, N. BLOEMBERGEN, and R.T. HODGSON, Harvard University

2:45 — "Dynamic Behavior of pulse-Pulsed Laser Annealing in Ion Implanted Silicon." M. MURAKAMI, M. KAWAE, K. GAMO, S. NAMBA and Y. AYOYAGI, Osaka Univ., Japan


3:15 — "Limit of Electrically Active As in Ion-Implanted Pulsed Laser Annealed Si," J.E. BAGLIN, M.Y. TSAI, F.F. MOREHEAD and R. TSU, IBM

3:30 — "Impurity Capture During Crystallization by Laser Annealing," G.H. GILMER, H.J. LEAMY and K.A. JACKSON, Bell Labs


4:00 — "Silicon Surface Structure and Surface Impurities After Pulsed Laser Annealing." D.M. ZEHNER, C.W. OWNBY and C.W. WHITE, Oak Ridge National Laboratory


III. Elemental Semiconductors
Chairman: To be announced
November 28, 1979
Wednesday Morning

Invited Talks
8:30 — “Laser Pulse Effects on Implanted Impurities,” G. FOTI, Instituto di Struttura della Materia, Catania, Italy

Contributed Papers
9:15 — “Laser Annealing of High Dose P+, As+, B+, O+ and C+ Implanted Si,” M. TAMURA, Hitachi Central Research Laboratory, Japan
9:30 — “Complex Refractive Index of the Ion Implanted, Laser Annealed Surface Layer of Silicon,” H. ENGSTROM, Oak Ridge National Laboratory
10:00 — “Characterization of Silicon Layers Implanted by Low Speed Molecular Ions and Annealed by a Pulsed Laser,” J.C. MULLER, P. SIFFERT, CRN Phase, Strasbourg, France and J. MICHEL and E. FABRE, LEP, France
10:30 — “Scanning CW-Laser-Induced Crystallization of Silicon on Amorphous Substrates,” D.K. BIEGELSEN and N.M. JOHNSON, Xerox Palo Alto Research Center
11:00 — “Laser Annealed Polycrystalline Silicon Characteristics,” Y. WADA, M. TAMURA and T. TOKUYAMA, Hitachi Central Research Labs, Japan
11:15 — “Lattice Location of Arsenic in Laser Annealed Silicon,” WEI-KAN CHU, IBM Data Systems Division
11:45 — “Laser Annealing of Semiconductors,” M. BERTOLOTTI, L. STAGNI, G. VITALI and P.E. SPEAR, Universita di Roma, Italy
12:00 — “Characterization of Implanted Layers after Laser and Electron Beam Annealing,” G.G. BENTINI, R. GALLONI and F. ZIGNANI, Laboratorio LAMEL-CNR, Italy
IV. Thin Films, Deposited Layers and Contacts

Chairman: R.T. Young,
Oak Ridge National Laboratory

Wednesday Afternoon

Invited Talks

2:00 — “Laser and Ion Beam Induced Reactions,” S.S. LAU, J.W. MAYER and M. VON ALLMEN, Caltech

2:30 — “Overview of Ohmic Contact Formation on Compound Semiconductors by Laser Annealing,” G. ECKHARDT, Hughes Research Labs

Contributed Papers

3:00 — “Laser Annealing Fabrication of Ohmic Contact to $p$-Type InP,” Z.I. LIAU, N.I. DeMEO and J.P. DONNELLY, Lincoln Labs

3:15 — “Structure of Laser Produced Silicide Layers,” M. VON ALLMEN and S.S. LAU, Caltech, T.T. SHENG, Bell Labs and M. WITTMER, BBC, Baden, Switzerland

3:30 — “CW Laser-Induced Reactions for Silicides Formation,” T. SHIBATA, T.W. SIGMON and J.F. GIBBONS, Stanford Electronics Laboratory


5:00 — “Metal-Semiconductor Interfaces by Pulsed Electron Beam Processing,” P. YOUNGER, A. MELAS, J. MINNUCCI, A. KIRKPATRICK, and A. GREENWALD, SPIRE Corp. and M. MAENPPAA, Caltech

5:15 — “Pulsed Electron Beam Alloying of AuGe/Pt Ohmic Contacts to GaAs,” J.L. TANDON and B.M. WELCH, Rockwell International Electronics Research Center
V. Compound Semiconductors

Chairman: P.A. Barnes,
Bell Labs

Wednesday Evening

Invited Talks

7:30 — "Laser Annealing in Compound Semiconductors," F.H. EISEN, Rockwell International Electronics Research Center

Contributed Papers

8:00 — "Annealing of Implanted Layers in Compound Semiconductors by Localized Beam Heating Techniques," C.L. ANDERSON, H.L. DUNLAP, L.D. HESS,
R.A. MC FARLANE, G.L. OLSON and K.V. VAIYANATHAN, Hughes Research Labs

8:15 — "Laser Annealing of Implanted Acceptor Ions in GaAs," KULAR, SEALY, BADAWI, and STEPHENS, University of Surrey, UK

8:30 — "Annealing of Ion-Implanted GaAs with Pulsed Ruby Laser," S.G. LIU, C.P. WU and C.W. MAGEE, RCA Labs

8:45 — "Laser Annealing Effects in Ion-Implanted GaAs," K. CAMO, K. MURAKAMI, Y. YUBA, A.H. ORABY and S. NAMBA, Osaka University, Japan


9:30 — "Annealing of GaAs Ion Implanted Layers Using Pulsed Electron Beam of Large Dimension," G.M. MARTIN, C. VENGER, M. STEERS, and D.B. THEETEN, LEP, France


10:00 — "Photoluminescent Properties of Laser Annealed GaAs and GaAlAs," R.R. PARSONS and J.A. ROSTWOROWSKI, University of British Columbia, and A.J. SPRINGTHORPE and J.Y. DYMENT, Bell-Northern Research Labs

VI. Device Applications

Chairman: C.L. Anderson,
Hughes Research Labs

November 29, 1979
Thursday Morning

Invited Talks

8:30 — “Applications of Scanning Laser and Electron Beams to Silicon Device Technology,” J.F. GIBBONS, Stanford Electronics Laboratory

9:00 — “Device Applications of Laser Annealing,” T. TOKUYAMA, Hitachi Central Research Labs, Japan

Contributed Papers


11:00 — “A Comparison of Pulsed Laser and Electron Beam Annealed Ion Implanted Silicon Structures,” J. STEPHEN and B.J. SMITH, AERE Harwell, UK


11:30 — “Laser Annealed Silicon Solar Cells,” J. KATZEFF, Lockheed

11:45 — “Characterization of Ion Implanted and Pulse Laser Annealed Junctions: Application to Silicon Solar Cells,” J. MICHEL and E. FABRE, LEP, France and I. YAMADA, D. HOONHOUT and F. SARIS, FOM Institute, the Netherlands


12:30 — LUNCH
VII. Metals and Other Materials

Chairman: S.T. Picraux,
Sandia Laboratory

Thursday Afternoon

Invited Talks
2:00 — “Metastable Phase Formation by Rapid Energy Deposition,” J.M. POATE, Bell Labs

Contributed Papers
4:00 — “Laser Surface Melting of Copper Alloys,” C.W. DRAPER, Western Electric ERC
4:30 — “Constitution and Microstructure of Ag-Cu Alloys Produced by Continuous Laser Melt Quenching,” D.G. BECK, S.M. COLEY, and M. BASS, Univ. of Southern California
4:45 — “Wear Resistant Surfaces by Laser Processing,” J. MAZUMDER, USC Center for Laser Studies
5:00 — “Solidification Microstructure and Microsegregation of Laser-Processed Ni-Al-Ta and Ni-Al-Cr Dendritic Monocrystals,” I. KATTAMIS, Univ. of Connecticut
VIII. Panel Discussion

Chairman: P.S. Peercy,
Sandia Laboratories

Thursday Evening

Invited Talks

8:00 — “DARPA Sponsored Research for Directed Energy Processing,” A.L. BEMENT, DARPA

Panel Moderator: P.S. Peercy, Sandia Laboratories

Members: W.L. Brown, Bell Labs
R.T. Young, Oak Ridge National Laboratory
L.D. Hess, Hughes Research Labs
J.E. Baglin, IBM
M. Von Allmen, Caltech
J.F. Gibbons, Stanford Electronics Laboratory
G.K. Celler, Western Electric ERC
S.T. Picieux, Sandia Laboratories
S. Namba, Univ. of Osaka, Japan

(Related panel members will be announced)

IX. Electrical Properties

and Defects*

Chairman: K.N. Tu, IBM

Friday Morning
November 30, 1979

Invited Talks

8:30 — “Defects in Laser Processed Semiconductors,”
L.C. KIMMERLING, Bell Labs

9:00 — “Crystallinity and Electrical Characterization of Silicon Produced by Graphoepitaxy,” M.W. Geis, D. ANTONIADIS, D.C. FLANDERS, and H.I. SMITH, Lincoln Labs

9:30 — “Structural Defects in Laser and Electron Beam Annealed Semiconductors,” J. NARAYAN, Oak Ridge National Laboratory

Contributed Papers

10:00 — “Hydrogen Dressing of Defects in Pulsed-Laser Annealed a-Si,” H.J. STEIN and P.S. PEERCY, Sandia Laboratories


11:00 — “Electronic Properties of Ion-Implanted Silicon Annealed with Microsecond Dye-Laser Pulses,” D.R. MYERS, P. ROIKMANN, S. MAYO and D. HOROWITZ, NBS


11:45 — “Positron Annihilation in Ion Implanted, Laser Annealed Silicon,” F.H. HSU, Georgia State University and C.W. WHITE, Oak Ridge National Laboratory


*Jointly sponsored with Symposium C on “Advances in Defect Characterization in Semiconductor Materials and Devices” (Chairman: P. Petroff, Bell Labs)

SYMPOSIUM B
SURFACE MODIFICATION OF MATERIALS BY ION IMPLANTATION

SYMPOSIUM CHAIRMEN
J.K. Hirvonen C.M. Preece
Naval Research Laboratory Bell Laboratories
Washington, D.C. 20375 Murray Hill, NJ 07974

November 30, 1979
Friday Morning


9:45 — “Implantation Studies of Impurity Immobilization Mechanisms,” S.M. MYERS, Sandia Laboratories, Albuquerque, NM

10:15 — POSTER SESSION (participants listed below)

12:00 — “The Effect of Ion implantation on the Aqueous Corrosion Behavior of an Austenitic Stainless Steel,” V. ASHWORTH, A.R. MOHAMMED and R.P.M. PROCTER, University of Manchester, Institute of Science and Technology, Manchester, UK, and W.A. GRANT, University of Salford, Salford, UK

12:30 — LUNCH
Friday Afternoon


2:30 — "Mechanical Properties of Ion Implanted Alloys," R.A. KANT, Naval Research Laboratory, Washington, DC


3:30 — POSTER SESSION (participants listed below)

5:00 — DIRECTED DISCUSSION (with wine and cheese)

Poster Session Papers:


"Surface Hardness and Abrasive Wear of Ion Implanted Steels," R.H. BOLSTER and L.L. SINGER, Naval Research Laboratory, Washington, DC

"A Study of Alloy Corrosion Mechanisms in Pt-Implanted Ti," B. LICHTER, Vanderbilt University, Nashville, TN

"Electrical Conductivity of Ion Implanted SrTiO₃," K. SUGAWARA, E.B. HALE and R. GERSON, University of Missouri-Rolla, Rolla, MO


"Modification of Surface Sensitive Properties of Cu and Fe by Ion Implantation," CHARLES BURR, SUNY/Binghamton, NY, H. BAKHRU and W. GIBSON, SUNY/Albany, NY


"X-Ray Diffraction Characterization of Aluminum Ion Implanted Copper Crystals," STEPHEN SPOONER, Georgia Institute of Technology, Atlanta, GA

"The Effect of Aluminum Ion Implantation on the Fatigue Crack Initiation of Copper," ADOSOLA KUJORE, EDGAR A. STARKE, JR., KEITH LEGGE and SAGHANA B. CHAKRABORTHY, Georgia Institute of Technology, Atlanta, GA

"Characterization of Lithium Implanted Nickel," K. SESHAN, P.P. PRONKO, P.M. BALDO and H. WIEDENSICHI, Argonne National Laboratory, Argonne, IL

"Ion-Induced Interface Mixing as an Ultrafast Quenching Technique for Metastable Alloy Formation: The Au-Si System," B.Y. TSAUR and J.W. MAYER, Caltech, Pasadena, CA
SYMPOSIUM C
ADVANCES IN DEFECT
CHARACTERIZATION IN
SEMICONDUCTOR MATERIALS
AND DEVICES

SYMPOSIUM CHAIRMAN
P.M. Petroff
Bell Laboratories
Murray Hill, NJ 07974

SESSION 1
November 29, 1979
Thursday Morning

9:00 — “DLS and EPR Correlation in Defect Studies in Silicon,” G. WATKINS, Lehigh University (Invited)


10:00 — “Deep Level Defect States in II-VI Semiconductor Heterojunctions,” P. BASOMI and B.W. WESSELS, Northwestern University

10:25 — COFFEE BREAK

10:45 — “Phonon Optics in Semiconductors: The Case of Deep Levels in GaAs,” V. NARAYANAMURTI, Bell Laboratories (Invited)

11:30 — END OF SESSION

SESSION 2
Thursday Afternoon

2:00 — “Recent Uses and Analysis of Rutherford Back-Scattering in Semiconductors,” T. SEIDEL, Bell Laboratories (Invited)

2:45 — “Strain and Strain Relaxation in Tantalum Sputtered Silicon Substrates,” S. WEISSMAN, Rutgers University

3:10 — “Interface Luminescence in GaAs:AlAs Heterojunctions,” P.M. PETROFF and R.A. LOGAN, Bell Laboratories

3:30 — COFFEE BREAK

3:45 — “Electron Imaging Techniques with Resolution Better than 10 nm,” H. FOLL, IBM (Invited)

4:30 — END OF SESSION
SESSION 3*
November 30, 1979
Friday Morning
A common session
with Symposium A
Invited Talks

8:30 — “Defects in Laser Processed Semiconductors,”
L.C. KIMMERLING, Bell Labs

9:00 — “Crystallinity and Electrical Characterization of
Silicon Produced by Graphoepitaxy,” M.W. GEIS, D.
ANTONIADIS, D.C. FLANDERS, and H.J. SMITH, Lin-
coln Labs

9:30 — “Structural Defects in Laser and Electron Beam
Annealed Semiconductors,” J. NARAYAN, Oak Ridge
National Laboratory

Contributed Papers

10:00 — “Hydrogen Dressing of Defects in Pulsed-Laser
Annealed a-Si,” H.J. STEIN and P.S. PEERCY, Sandia
Laboratories

10:15 — “A New Silicon Defect Associated with Laser
Annealing: Doubly Twinned Crystal Regions,” T.Y.
TAN, R. TSU and J. LANKARD, IBM

10:30 — “Structural Studies of P-Implanted and Laser-
Annealed Si,” D.K. SADANA and J. WASHBURN,
Lawrence Berkeley Laboratory, and G.R. BOOKER,
University of Oxford, England

10:45 — “A Comparison of Ion-Implantation Induced
Deep Levels in Scanning Electron Beam and CW Laser
Annealed Silicon,” N.M. JOHNSON and D.J.
BARTELINK, Xerox Palo Alto Research Center and J.F.
GIBBONS, K.N. RATNAMAR and J.L. REGOLINI,
Stanford Electronics Laboratory

11:00 — “Electronic Properties of Ion-Implanted Silicon
Annealed with Microsecond Dye-Laser Pulses,” D.R.
MYERS, P. ROITMAN, S. MAYO, and D. HOROWITZ,
NBS

11:15 — “Defect Luminescence in Laser Annealed
Silicon,” R.A. STREET and N.M. JOHNSON, Xerox Palo
Alto Research Center

11:30 — “EPR Studies of Laser Annealed Silicon,” K.L.
BROWER and P.S. PEERCY, Sandia Laboratories

11:45 — “Positron Annihilation in Ion Implanted, Laser
Annealed Silicon,” F.H. HSU, Georgia State University
and C.W. WHITE, Oak Ridge National Laboratory

12:00 — “Impurity Segregation in Laser Annealed Silicon
Studied by Transmission Electron Microscopy,” A.G.
CULLIS, H.C. WEBBER, D.V. MCCAUGHAN and N.G.
CHEW, Royal Radar Establishment, Malvern, England
and J.M. POATE, Bell Labs

*Jointly sponsored with Symposium A on “Laser and
Electro. Beam Processing of Materials” (Co-Chairmen:
C.W. White, ORNL and P.S. Peercy, Sandia Laboratories).
SYMPOSIUM D
SEMICONDUCTOR INTERFACES

SYMPOSIUM CHAIRMEN
K.N. Tu
IBM Research Center
Yorktown Heights, NY 10598

J.W. Mayer
Dept. of Electrical Engineering
Caltech
Pasadena, CA 91109

SESSION A
Interface Structure
November 27, 1979
Tuesday Morning

9:00 — “High Resolution Electron Microscopic Study of Semiconductors Interfaces,” O. KRIVANEK, Berkeley

9:45 — “Backscattering-Channeling Studies of Si Interfaces,” L.C. Feldman, Bell


11:15 — “Structural Modeling of α-Si/Theta Interfaces,” F. SPAEPEN, Harvard

12:00 — LUNCH

SESSION B
Interface Properties
Tuesday Afternoon

2:00 — “Electronic Structure of Stacking Fault and Twin Boundary in Si,” S.G. LOUIE, University of Pennsylvania

2:45 — “Chemical Bonds and Reactions at the Metal-Silicon Interfaces,” G.W. RUBLOFF, IBM

3:30 — “Properties of the Semiconductor-Conductor Interface,” J.O. McCALDIN, Caltech

4:15 — “Metal Contacts to Semiconductors and the Influence of Absorbed Layers,” R.H. WILLIAMS, Ulster and Xerox

SESSION C
Interface Reactions
November 28, 1979
Wednesday Morning

9:00 — “The Thermal Oxidation of Silicon,” W.A. TILLER, Stanford

9:45 — “Shallow Silicide Contact,” K.N. TU, IBM

10:30 — “Parallel Silicide Contacts,” I. OHDOMARI, Waseda

11:15 — “The Use of Radioactive 31Si as a Marker for Studying Thin-Film Interaction,” R. PRETORIUS, Southern Universities Nuclear Institute

12:00 — LUNCH
SESSION D
Interface Analysis
Wednesday Afternoon
2:00 — “Microanalysis by Scanning Transmission Electron Microscopy,” P.E. BATSON, IBM
2:45 — “Metal-Semiconductor Interfaces — Sputtering, XPS and Channeling Analysis,” J.M. MAYER, Caltech
3:30 — “Interface Analysis by Auger Electron Spectroscopy,” P.S. HO, IBM

SYMPOSIUM E
MATERIAL PROBLEMS IN MICROSTRUCTURE FABRICATION
SYMPOSIUM CHAIRMEN
R.W. Keyes
IBM Research Center
Yorktown Heights, NY 10598
J.M. Ballantyne
Cornell University
Ithaca, NY 14853

SESSION A
Resists And Processes
Chairman: R.S. Horwath, IBM Research Center
Yorktown Heights, NY 10598
November 29, 1979
Thursday Morning
8:45 — “Materials and Processes for Deep UV Printing of Submicron Images,” S. OHNO, Okki Electric Corp., Japan
9:20 — “A New Materials Approach to High Resolution Negative Resists for Lithography Involving a Radiation-Induced Charge-Transfer Process,” FRANK B. KAUFMAN, STEVE KRAMER and DON C. HOFER, IBM Research Center, Yorktown Heights, NY 10598
9:55 — COFFEE BREAK
10:45 — “Plasma Enhanced Oxidation of Silicon,” T. SUGANO, University of Tokyo, Tokyo, Japan
11:20 — “Silicon Surface Modification for Solar Cells,” C. JOHNSON, IBM, East Fishkill, NY 12533
SESSION B
Materials Problems in Superconducting Devices
Chairman: R.A. Buhrman, Cornell University
Ithaca, NY 14853

Thursday Afternoon
2:20 — "Properties of Lead Alloy and Niobium Josephson Tunnel Junctions," C.J. KIRCHER, IBM Research Center, Yorktown Heights, NY 10598
2:55 — COFFEE BREAK
3:45 — "Nb-Nb Oxide-Pb Alloy Josephson Junctions," S.J. RAIDER, IBM Research Center, Yorktown Heights, NY 10598

SESSION C
GaAs Microstructures for High Performance Electron Devices
Chairman: L.F. Eastman, Cornell University
Ithaca, NY 14853

November 30, 1979
Friday Morning
8:45 — "France-U.S. Workshop on GaAs Microstructures and High Performance Devices — A Review," L.F. EASTMAN, Electrical Engineering Department, Cornell University, Ithaca, NY 14850
9:55 — COFFEE BREAK
10:10 — "Novel Doping and Contact Studies by MBE," C.E.C. WOOD, D. DeSIMONE, R. STALL, G. METZE, and J. DEVLIN, Electrical Engineering Department, Cornell University, Ithaca, NY 14853
10:45 — "Integrated Monolithic Receivers on Gallium Arsenide for Millimeter and Submillimeter Wave Applications," B.J. CLIFTON and R.A. MURPHY, M.I.T. Lincoln Laboratories, P.O. Box 73, Lexington, MA 02173
11:20 — "Application of Electron Beam Lithography for GaAs Integrated Circuits," F. OZDEMIR and C. KRUMM, Hughes Research Laboratory, Malibu, CA 90265
SYMPOSIUM F
NONDESTRUCTIVE OPTICAL
TECHNIQUES FOR INTERFACE
AND THIN-FILM ANALYSIS

SYMPOSIUM CHAIRMAN
David E. Aspnes
Bell Laboratories
Murray Hill, NJ 07974
November 30, 1979
Friday Morning

9:00 — “Use of Ellipsometry to Investigate Locked-in
Layers and Thin Films,” E.A. TAFT, General Electric

9:40 — “Optical Characterization of Thin Films by Visible
and UV Cathodoluminescence,” E.D. PALIK, Naval
Research Laboratory

10:20 — BREAK

10:35 — “Optical Reflection Spectroscopy of Thin Films
and Interfaces,” J.D.E. McIntyre, Bell Laboratories

11:15 — “Raman Study of Oxide-Semiconductor Inter-
facial Reactions,” G.P. Schwartz, Bell Laboratories

11:55 — LUNCH

Friday Afternoon

2:00 — “Combined Spectroscopic Ellipsometric/Reflec-
tance Studies of Solid-Liquid Interfaces,” B. Cahalan,
Case Western Reserve

2:40 — “The Optical Characterization of Materials
Deposited on Highly Porous Substrates,” S. Garoff,
Exxon Research

3:00 — “In-Situ Studies of the Oxidation of Copper and
Copper Alloys Using Differential Reflectometry,” R.E.
Hummel and J. Finnegan, University of Florida

3:20 — BREAK

3:35 — “Infrared Characterization of GaAs Epitaxial Films
on GaAs Substrates,” R.T. Holm and E.D. Palik,
Naval Research Laboratory

3:55 — “Infrared Interference-Fringe Analysis of Silicon
Implanted with High-Energy Nitrogen and Phosphorous,” G.K. Hubler and P.R. Malmberg,
Naval Research Laboratory, W.G. Spitzer and C.N.
Waddell, University of Southern California

4:15 — “Analysis of the Layer Structure of Anodic Oxides
on GaAs by Spectroscopic Ellipsometry,” D.E. Aspnes,
G.P. Schwartz, G.J. Gualtieri, and B. Schwartz,
Bell Laboratories

4:35 — “High Temperature Optical Characterization of
Thin Film Reflector and Absorber Layers,” M.R.
Jacobson and R. Lamoreaux, University of
Arizona

4:55 — END OF SYMPOSIUM
SYMPOSIUM G

SCIENTIFIC BASIS FOR
NUCLEAR WASTE
MANAGEMENT

SYMPOSIUM CHAIRMAN
C.J. Northrup
Sandia Laboratories
Albuquerque, NM

ABOUT THE SYMPOSIUM
The purpose of this symposium is to provide an inter-disciplinary forum for discussion of the scientific aspects of nuclear waste management. This will include discussions of waste stream processing, partitioning and transmutation, storage and disposal, waste forms, engineered barriers, nuclide migration, relevant topics in the geosciences, and new concepts for an integrated approach to fuel reprocessing and waste management. Modeling and risk assessment will be considered in terms of the presentation of new models, sensitivity analyses, validation, and important directions for experimental programs. In addition, various specific waste management repositories will be reviewed from the standpoint of both the current technical understanding and the principal scientific questions that need to be further addressed. The emphasis will be on the presentation and discussion of work which addresses the important scientific foundations underlying these and associated topics. Papers will be presented in the following subject areas.


III. Solid Waste Hosts (Preparation and Characterization, Leaching, etc.).

IV. Engineered Barriers (Canisters, Overpacks).

V. Radioactive Wastes in the Geologic Media.


PROCEEDINGS AND ABSTRACTS
Arrangements are being made to publish the proceedings of the Symposium by direct reproduction of camera-ready copy. Abstracts of the papers will be available at the conference.
SESSION A
The Solid Waste Form — Basic Properties

Presiding
J.G. Moore
Oak Ridge National Lab
Oak Ridge, TN

C. Sombret
Centre de Marcoule
France

November 27, 1979
Tuesday Morning

8:15-11:30
Greetings and Opening Remarks — C.J. Northrup

A1* "Survey of Nuclear Waste Forms;" HANS W. LEVI,
Hahn Meitner Institut, Berlin, Germany

A2 "Crystalline Chemistry and Phase Equilibria in the
Synthetic Minerals of Ceramic Waste Forms: Fluorite
and Monazite Structure Phases," G.J. McCARTHY,
Dept. Chemistry & Geology, North Dakota State Univ.,
Fargo, ND; JOHN G. PEPI, D. DAVIS and D.
PFOERTSCH, Materials Research Laboratory, Penn
State University, University Park, PA

McCLANAHAN, M. BAYNE, W. GRAY, Battelle Pacific
Northwest Laboratory, and C. HINMAN, Hanford
Engineering Development Laboratory

9:50-10:10 COFFEE

A4 "Monazite and Other Lanthanide Orthophosphates as
Alternate Actinide Waste Forms," L.A. BOATNER and
G.W. BEALL, Oak Ridge National Laboratory, Oak
Ridge, TN

A5 "Structure and Chemical Stability of Incinerated α
Waste Products," R. De BATIST, W. TIMMERMANS,
and J. VANGEEL, S.C.K./C.E.N., B-2400 MOL, Belgium,
and E. De GRAVE, University of Gent, B-9000, GENT,
Belgium

A6 "Influence of Ionizing Irradiation on the Properties of
Aluminosilicate Minerals of Radioactive Wastes
Depositories," V.I. SPITSYN, Institute of Physical
Chemistry, Academy of Sciences, Moscow, USSR

* Invited Paper
SESSION B
Characterization of Nuclear Waste Forms

Presiding

C.J. Northrup
Sandia Laboratories
Albuquerque, NM

W. Lutze
Hahn Meitner Institute
Berlin, West Germany

Tuesday Afternoon

1:00-3:30

B1 “Long Term Extrapolation of Laboratory Glass Leaching Data For the Prediction of Fission Product Release Under Actual Groundwater Conditions,” F.B. WALTON, Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, Canada; and W.F. MERRITT, Chalk River Nuclear Laboratory, Chalk River, Ontario, Canada


B6 “Long Term Leaching of Irradiated Spent Fuel,” Y.B. KATAKAMA and D.J. BRADLEY, Pacific Northwest Laboratory, Richland, WA

B7 “Effect of Radiation Damage on SYNROC Minerals,” A.E. RINGWOOD and V. OVERSBY, The Australian National Univ., Research School of Earth Sciences, Canberra, Australia
POSTER SESSION C
The Solid Waste Form —
Processing and Characterization

Presiding
S.V. Topp
Savannah River Laboratory
Aiken, SC

J. Mendel
Battelle Pacific Northwest Labs
Richland, WA

Tuesday Afternoon

4:00-5:00

C1-A "Atomic Displacements & Radiation Damage in Glasses Incorporating HLW," M. ANTONINI, P. CAMAGNI, F. LANZA, and A. MANARA, Joint Research Centre, Varese, Italy


C1-E "The Behavior of Actinides in a Doped Classes as Regard to the Long Term Disposal of High Level Radioactive Materials," CLAUDE SOMBRET, R.A. BONNIAUD and N.R. JACQUET-FRANCILLON, Commissariat a l'Energie Atomique, Centre de Marcoule, France


C1-J "Phase-Separating Glasses in Thermal Gradients;" R.W. HOPPER, Lawrence Livermore Lab, Livermore, CA
C1-K "Vitrification of High Alumina Nuclear Waste," J.R. BROTZMAN, Exxon Nuclear, Inc., Idaho Falls, ID


4:30-5:30


C2-T "Improved Glass Compositions for Immobilization of SRP Waste," M.J. PLODINEC, Savannah River Laboratory, E.I. du Pont de Nemours & Co., Aiken, SC

C2-U "A Microscopic Approach For the Simulation of Radioactive Waste Storage in Glass," J.C. DRAN, M. MAURETTE, and J.C. PETIT, Laboratoire Rene Bernas, Orsay, France


SESSION D
Radionuclide Transport in Geomedia

Presiding

E.A. Bryant
Los Alamos Scientific Lab
Los Alamos, NM

S. Fried
Argonne National Lab
Argonne, IL

November 28, 1979
Wednesday Morning

8:15-11:30

D1 “The Study of Radionuclide Transport, Why and How,”
E.A. BRYANT, Los Alamos Scientific Laboratory, Los
Alamos, NM

D2 “Chemical Reactions in the Bedrock-Groundwater
System of Importance for the Sorption of Actinides,”
B. ALLARD and G.W. BEALL, Transuranium Research
Laboratory, Oak Ridge National Laboratory, Oak
Ridge, TN

D3 “Parameters Affecting Radionuclide Migration in
Geologic Media,” B.R. ERDAL, B.P. BAYHURST, W.R.
DANIELS, S.J. DeVILLIERS, F.O. LAWRENCE, J.L.
THOMPSON, E.N. VINE, and K. WOLFSBERG, Los
Alamos Scientific Laboratory, Los Alamos, NM

D4 “Radionuclide Transport in a Dolomite Aquifer,”
R.G. DOSCH and A.W. LYNCH, Sandia Laboratories, Albu-
ququerque, NM

D5 “Preliminary Rate Expressions for Analysis of
Radionuclide Migration Resulting from Fluid Flow
Through Jointed Media,” K.L. ERICKSON, Sandia
Laboratories, Albuquerque, NM

D6 “Transport Through Deep Aquifers of Transuranic
Nuclides Leached from Vitrified High Level Wastes,”
A. AVOGADRO, C.N. MURRAY and A. DePLANO, Com-
misson of European Communities — Joint Research
Centre, Ispra Establishment 21020 ISPRA, Varese, Italy

D7 “W, Pb and Ru Migration Around the Oklo Natural
Fission Reactors,” A.J. GANCARZ, C.A. COWAN, and
D.B. CURTIS, Univ. of California, Los Alamos Scientific
Lab, Los Alamos, NM, and W.J. MAECK, Idaho National
Engineering Lab, Allied Chemical Corp., Idaho Falls, ID
Radioactive Wastes in the Geologic Setting

Wednesday Afternoon


E3 "Surface Chemistry Changes of Granite & Dissolution Rates of 'Harvest' Borosilicate Glasses Under Repository Hydrothermal Conditions of Pressure and Temperature." N.A. CHAPMAN and D. SAVAGE, Institute of Geological Sciences, Environmental Pollution Section, Harwell Laboratory, Harwell, Oxfordshire, UK


E5 "Brine Chemistry Effects on the Durability of a Simulated Nuclear Waste Glass." J.W. BRAITHWAITE, Sandia Labs, Albuquerque, NM

E6 "In-Situ Experiments to Support Development of the Waste Isolation Pilot Plant (WIPP)." A.R. SATTLER, H.C. WALKER and T.O. HUNTER, Sandia Laboratories, Albuquerque, NM

E7 "Physico-Chemical Processes in Rock Salt During Irradiation." V.I. SPIRTSIN, S.A. KABAKCHI, and L.I. BARSOVA, Institute of Physical Chemistry, Academy of Sciences, Moscow, USSR
POSTER SESSION F
Nuclear Wastes —
Processing, Radionuclide Transport and Geologic Interactions

Presiding
R.G. Dosch
Sandia Laboratories
Albuquerque, NM

D. Brookins
University of New Mexico
Albuquerque, NM

Wednesday Afternoon

4:00-5:00


F1-D “Ruthenium Volatility Behavior During HLW-Vitrification in a Liquid Fed Ceramic Melter,” S. WEISENBURGER and K. WEISS, Karlsruhe Nuclear Research Centre, 7500 Karlsruhe 1, Federal Republic of Germany

F1-E “Interaction of Radionuclides with Geomedia from the Nevada Test Site,” A.W. LYNCH and R.G. DOSCH, Sandia Laboratories, Albuquerque, NM

F1-F “Nuclide Tracer Tests Performed in the Field for WIPP in Southeastern New Mexico,” D.D. GONZALEZ and L.R. HILL, Sandia Laboratories, Albuquerque, NM

F1-G “Continued Radionuclide Sorption Studies of Abyssal Red Clays,” K.L. ERICKSON, Sandia Laboratories, Albuquerque, NM


F1-J “Characterization of Geological Discontinuities in the Stripa Granite — Time Scale Experiment,” R. THORPE, Lawrence Berkeley Laboratory, University of California

F1-L “Canister Compatibility with Carlsbad Salt,” W.N. RANKIN, Savannah River Laboratory, E.I. du Pont de Nemours & Co., Aiken, SC


4:30-5:30


F2-O “The Role of Large-Scale Permeability Measurements in Fractured Rock and Their Application at Stripa,” P.A. WITHERSPOON, C.R. WILSON, J.C.S. LONG, R. GALBRAITH, Lawrence Berkeley Lab., Univ. of Calif., J.E. GALE, Univ. of Waterloo, and M. McPHERSON, Univ. of Nottingham, UK

F2-P “Rock Instrumentation Problems for Large Scale In-Situ Heater Tests,” E.P. BINNALL, A.O. DuBOIS, Lawrence Berkeley Laboratory, Univ. of Calif., and R. LINGLE, TerraTek

F2-Q “The Importance of Isotopic and Geochemical Groundwater Data for Waste Isolation — The Stripa Experience,” P. FRITZ, J. BARKER, and J.E. GALE, Univ. of Waterloo, Waterloo, Ontario


B7-S “Processing of High Temperature Simulated Waste Glass in a Continuous Ceramic Melter,” S.M. BARNES and M.S. HANSON, Battelle Memorial Institute, Pacific Northwest Laboratory, Richland, WA

F2-T “Advances in the Fluorocarbon Absorption Process for Decontamination of Reprocessing Plant Off-Gas,” B.E. KANAK, Union Carbide Corp., Nuclear Division, Oak Ridge, TN


SESSION G

Overviews

Presiding

R.L. Schwoebel
Sandia Laboratories
Albuquerque, NM

D. Ferguson
Oak Ridge National Laboratory
Oak Ridge, TN

Wednesday Evening

7:30-10:30

G1 “General Criteria for Radioactive Waste Disposal,”
MARGARET N. MAXEI, Univ. of Detroit, LAURENCE I. MOSS, Energy/Environment Consultant, BURDON C. MUSGRAVE, INEL, and GOLDIE B. WATKINS, New York State Dept. of Health

G2 “The Environmental Effects Associated with the Transportation of Radioactive Materials,” R.B. POPE, R.E. LUNA, H. RICHARD YOSHIMURA, and J.D. MCCUReE, Transportation Technology Center, Sandias Laboratories, Albuquerque, NM

G3 “Radioactive Waste Disposal in Geological Formations: Research Activities and Programmes of the Commission of European Communities,” F. GIRARDI, M. BRESESTI, S. ORLOWSKI, and M. VENET, Commission of European Communities

G4 “Development of Solid Radionuclide Waste Forms in the U.S.A.,” JOHN CRANDALL, Savannah River Laboratory, Aiken, SC


SESSION H
Waste Isolation
Performance Assessment

C. Burkholder
Battelle Memorial Institute
Columbus, OH

J. Mather
Harwell Laboratory
Oxfordshire, England

November 29, 1979
Thursday Morning

8:15-11:30
H1 “Waste Isolation Performance Assessment — A Status Report,” H.C. BURKHOLDER, Office of Nuclear Waste Isolation, Battelle Memorial Institute, Columbus, OH
H4 “Modeling of Brine Migration in Halite,” H. CHEUNG, M.E. FULLER, Lawrence Livermore Laboratory, Livermore, CA, and E.S. GAFFNEY, Pacifica Technology, Del Mar, CA
H5 “Computer Modeling of Nuclear Waste Storage Canister Corrosion,” W.D. LUDEMANN and R.D. McCRIGHT, IL, Lawrence Livermore Laboratory, Livermore, CA

SESSION I
Backfill Barriers

G.J. McCarthy
North Dakota State University
Fargo, ND

T. Westermark
Royal Institute of Technology
Stockholm, Sweden

Thursday Afternoon

1:00-3:30
12 "Clay Minerals Suitable for Overpack in Waste Repositories: Evidence from Uranium Deposits," D.G. BROOKINS, Dept. of Geology, Univ. of New Mexico, Albuquerque, NM

13 "The Backfill as an Engineered Barrier for Nuclear Waste Management," E.J. NOWAK, Sandia Laboratories, Albuquerque, NM

14 "SUPEROVERPACK: Tailor-Made Mixtures of Zeolites and Clays," S. KOMARNENI and RUSTUM ROY, Materials Research Laboratory, Penn State Univ., University Park, PA


16 "Control of Radionuclide Migration in Soil by the Application of DC Electric Current," F.N. CASE, N.H. CUTSHALL, Oak Ridge National Laboratory, Oak Ridge, TN

POSTER SESSION J
Nuclear Waste
Performance Assessment
and Backfill Barriers

Presiding
P. Gnirk,
Pres., RE/SPEC, Inc.
Rapid City, SD

C. Clairborne
Oak Ridge National Laboratory
Oak Ridge, TN

D. Roy
Penn State Univ.
University Park, PA

Thursday Afternoon

4:00-5:30


J1-F “Sensitivity Studies of the SWIFT Radioactive Transport Model,” J.E. CAMPBELL, B.S. LANGKOFF, R.L. IMAN, Sandia Laboratories, and MARK REEVES, IN-TERA Environmental Consultants, Houston, TX


J1-I “Far Field Thermal Calculations for the WIPP Site in SERM,” S.B. PAHWA, INTETRA Environmental Consultants, Inc., and J.R. WAYLAND, Sandia Laboratories, Albuquerque, NM

J1-J “Probabilistic Aspects of the Estimates of Faulting in Anisotropic Media,” R.M. CRANWELL, Sandia Laboratories, and F.A. DONATH, Univ. of Illinois


4:30-5:30


J2-O “Kinetic Effects on Radionuclide Transport by Groundwater,” H.S. LEVINE, Sandia Laboratories, Albuquerque, NM


SESSION K
Radiolysis Effects and Nuclear Waste Performance Criteria

W. Schulz
Rockwell International
Hanford, WA

R. Roy
Penn State University
University Park, PA

November 30, 1979
Friday Morning

8:15-11:30
K2 "Radiolytic Gas Generation in Concrete Made with Incinerator Ash Containing Transuranium Nuclides," N.E. BIBLER, Savannah River Laboratory, Aiken, SC
K3 "Gas Generation from Transuranic Waste Degradation," M.A. MOLECKE, Sandia Laboratories, Albuquerque, NM

9:50-10:10 COFFEE
K5 "Repository Modeling from a Systems Basis," S.F. SCHREURS, U.S. Nuclear Regulatory Commission

CLOSE OF SYMPOSIUM
PROGRAM COMMITTEE
C.J. Northrup, Sandia Laboratories, USA (Chairman)
E.A. Bryant, Los Alamos Scientific Laboratory, USA
H.C. Burkholler, Battelle Memorial Institute, Columbus, USA
J.J. McCarthy, North Dakota State University, USA
J.G. Moore, Oak Ridge National Laboratory, USA
R.W. Potter, U.S. Geological Survey, USA
W. Shulz, Rockwell International, Hanford, USA
S.V. Topp, Savannah River Laboratory, USA

STEERING COMMITTEE
R.L. Schwoebel, Sandia Laboratories, USA (Chairman)
W. Carbiener, Battelle Memorial Institute, Columbus, USA
D. Ferguson, Oak Ridge National Laboratory, USA
W. Heimerl, DWK, Mol, Belgium
W. Lutze, Hahn Meitner Institut, Berlin, W. Germany
J.D. Mather, Institute of Geological Sciences, Harwell, UK
G. Oertel, Department of Energy, USA
R. Roy, Pennsylvania State University, USA
C. Sombret, Centre d'Etudes Nucleaires, Marcoule, France
V.I. Spitsyn, Academy of Sciences, Moscow, USSR
D.B. Stewart, U.S. Geological Survey, USA
W.D. Weart, Sandia Laboratories, USA
T. Westermark, Royal Institute of Technology, Stockholm, Sweden

SYMPOSIUM H
COAL: MATERIAL PROPERTIES
AND CONVERSION

SYMPOSIUM CHAIRMAN
Pedro A. Montano
Department of Physics
West Virginia University
Morgantown, WV 26506

Aerodyne Research Inc.
Crosby Drive
Bedford, MA 01730

Peter R. Solomon
United Technologies
Research Center
East Hartford, CT 06108

November 27, 1979
Tuesday Morning

Chairman: P.A. Montano

9:00 — “Elemental Distribution in Coals,” HAROLD J.
GLUSKOTER, Exxon Production Research Co.,
Houston and JOHN K. KUHN, Kentucky Institute for
Mining and Minerals Research, Kentucky

9:30 — “Microstructural-Chemical Characterization of
Coal by Combined Scanning Electron Microscope and
Wavelength and Energy Dispersive X-ray Analysis,”
RAYMOND T. GREER, Iowa State University, Ames,
Iowa 50011

10:00 — “Mineral Matter Transformations During Car-
bonization and Combustion,” F.E. HUGGINS, G.P.
HUFFMAN and R.J. LEE, U.S. Steel Corp., Monroeville,
PA 15146
10:30 — BREAK

10:45 — "Trace Elements in Coal: Can we get the lead out?" ROBERT B. FINKELMAN, USGS, Reston, VA 22092

11:15 — "TEM Characterization in Coal Liquefaction," L.A. HARRIS and C.S. YUST, Oak Ridge National Laboratory, Oak Ridge, TN

12:00 — LUNCH

Tuesday Afternoon

Chairman: P.R. Solomon

2:00 — “Optical Microscopy as a Means of Characterizing Coal Rank, Composition and Behavior,” ALAN DAVIS, The Pennsylvania State University, University Park, PA 16802

2:30 — “Macromolecular Structure of Coal,” J.W. LARSON, The University of Tennessee, Knoxville, TN 37916

3:00 — BREAK

3:15 — “Rearrangement and Fragmentation of Hydroaromatic Free Radicals During Coal Hydroliquefaction,” JAMES A. FRANZ and DONALD M. CAMAIONI, Pacific Northwest Laboratory operated by Battelle Memorial Institute, Richland, WA

3:45 — “Donor Solvent Kinetics and Coal Liquefaction Modeling,” T. GANGWER, Department of Energy and Environment, Brookhaven National Laboratory, NY 11973

4:15 — “Factors Affecting Form Coking,” A.C.D. CHAKLADER, The University of British Columbia, Vancouver, B.C., Canada

4:45 — “Physical and Chemical Characterization of High Ash Brazilian Coal,” CARLOS A. LUNGO, Department of Physics and Energy Group, UNICAMP, Campinas, Brazil

November 28, 1979

Wednesday Morning

Chairman: G.W. Stewart

9:00 — “Chemical Structures in Coals as Inferred from High Resolution Solid State Carbon and Proton NMR, and Fourier Transform IR Spectroscopy,” BERNARD C. GERSTEIN, P. DUBOIS MURPHY, L.M. RYAN, T. TAKI, T. SOGABE, Iowa State University and P.R. SOLOMON, United Technologies Research Center, East Hartford, CT 06108

9:30 — “Organic Structure of Coal from FT Infrared Analysis,” P.R. SOLOMON, United Technologies Research Center, East Hartford, CT 06108

10:00 — “Porosity and Surface Area in Coal and Changes Upon Pyrolysis and Gasification,” P.L. WALKER, JR., The Pennsylvania State University, University Park, PA 16802

10:30 — BREAK

10:45 — “The Pyrolysis Stage of Coal Particle Combustion,” DAVID W. BLAIR, Corporate Applied Research, Exxon Research and Engineering Company, P.O. Box 8, Linden, New Jersey 07036
11:15 — “Chemical and Physical Properties of Coal which Influence Liquefaction,” D.D. WHITEHURST, Mobile Research and Development Corp., Central Research Division, P.O. Box 1025, Princeton, NJ 08540

11:45 — “Mineral Effects in Coal Liquefaction,” BARRY GRANOFF, Sandia Laboratories, Albuquerque, NM 87185

12:30 — LUNCH

Wednesday Afternoon

Chairman: P.A. Montano

2:00 — “The Vaporization of Mineral Constituents During Pulverized Coal Combustion,” ADEL F. SAROFIM, C.A. MIMS, M. NEVILLE, R. SHUCK, and R. QUANN, Massachusetts Institute of Technology, Cambridge, MA 02139


3:30 — BREAK

3:45 — “The Characterization of High Temperature Compounds of Importance to Energy Technologies,” JAMES GOLE, Georgia Institute of Technology, Atlanta, GA 30332

4:15 — “Thermochemical and Kinetic Data Requirements for Computer Modeling of Coal Conversion Streams,” C.E. KOLB, Center for Chemical and Environmental Physics, Aerodyne Research, Inc., Bedford, MA 01730
SYMPOSIUM I

COAL CONVERSION CATALYSIS

CHAIRMEN

T.P. Kobylinski
Gulf Research & Development Company
P.O. Drawer 2038
Pittsburgh, PA 15230

M.A. Vannice
Pennsylvania State University
University Park, PA 16802

November 29, 1979
Thursday Morning

8:30 — Plenary Lecture: “Coal Liquefaction, Catalysis, Its Problems and Future.” HAROLD BEUTHER, GR&DC


9:45 — “Reaction Kinetics — Reaction Networks and Active Sites in Hydrodenitrogenation,” J.R. KATZER, Dept. of Chem. Eng., University of Delaware

10:15 — BREAK


11:15 — “Hydrogenation Reactions of Model Titanium Compounds,” C. SPITLER, M. TREBLOW and F.R. BROWN, Dept. of Energy, Pittsburgh Energy Technology Center

11:45 — LUNCH

Thursday Afternoon

1:30 — “Coal Liquefaction by Slurry Catalysts,” A. SOOD and T.P. KOBYLINISKI, GR&DC

2:00 — “Free Radicals in Coal Liquefaction,” L. PETRAKJE and D.W. GRANDY, GR&DC

2:30 — “The Role of Catalysis in Coal Gasification,” K. OTTO and M. SHELEF, Ford Motor Company


3:20 — BREAK


SYMPOSIUM J
CATALYST PREPARATION
TECHNIQUES AND
MAINTENANCE OF
CATALYST ACTIVITY

SYMPOSIUM CHAIRPERSONS

D.J.C. Yates
Exxon Research and
Engineering
P.O. Box 45
Linden, NJ 07036

K.C. Taylor
General Motors Research
Laboratories
Physical Chemistry Dept.
Warren, MI 48090

Chair: D.J.C. Yates

Tuesday Morning
November 27, 1979

8:45 — “Review of the Scientific Principles of Catalyst Preparation,” L.L. MURRELL, Exxon Research and Engineering Company

9:45 — “Adsorption of Metal Complexes on Alumina,” M.J. D'ANIELLO, JR., General Motors Research Laboratories

10:20 — BREAK


11:20 — “Thermal and Photolytic Activation of Supported Transition Metal Complexes,” DENNIS A. HUCUL, THOMAS H. ARNOLD and ALAN BRENNER, Wayne State University

12:00 — LUNCH

Chair: K.C. Taylor

Tuesday Afternoon

1:00 — “Review of the Parameters Controlling Rhodium Dispersion,” D.J.C. YATES, Exxon Research and Engineering Company


3:20 — BREAK


4:20 — “Synthesis and Properties of Catalytic Nickel Produced from Atomized Pro-Eutectic Aluminum Alloys,” C.S. BROOKS, G.S. GOLDEN and F.D. LEMKEY, United Technologies Research Center

5:30-7:30 — Wine and Cheese
SYMPOSIUM K
GLASSY METALS

CHAIRMAN
B.C. Giessen
Northeastern University
Boston, Massachusetts 02115

SESSION 1
Formation and Some
Electronic Properties of
Glassy Metals

Chairmen
B.C. Giessen
Materials Science Division
Institute of Chemical
Analysis
Northeastern University
Boston, MA 02115

N.J. Grant
Department of Materials
Science and Engineering
MIT
Cambridge, MA 02139

November 27, 1979
Tuesday Morning

9:00 — "Formation of Metallic Glasses," D. TURNBULL,
Division of Engineering and Applied Physics, Harvard
University, Cambridge, MA 02138 (invited)

9:45 — "Electronic Structure and Transport Properties of
Metallic Glasses." S. NAGEL, James Franck Institute,
University of Chicago; 5640 South Ellis Avenue,
Chicago, IL 60637 (invited)

10:30 — COFFEE BREAK

10:40 — "Phase Diagram Calculations as Applied to
Metallic Glass Formation," L.E. TANNER, Manlabs,
Inc., 21 Erie Street, Cambridge, MA 02139

11:00 — "On the Formation of Ni-Fe Metallic Glasses: Liq-
uid Quenching vs. Irradiation Techniques," R.O.
ELLIOTT and D.A. KOSS, University of California, Lr.
Alamos Scientific Laboratory, Los Alamos, NM 87545.
and B.C. GIessen, Materials Science Division, Institute
of Chemical Analysis, Northeastern University,
Boston, MA 02115

11:20 — "Electronic and Lattice Properties of Pd-Si and Pd-
Si-Cu Alloys," T.B. MASSALSKI, Department of
Metallurgy and Materials Science and Physics,
Carnegie-Mellon University, Schenley Park, Pitts-
burgh, PA 15213; and U. MIYAZAKI, Department of
Applied Physics, Faculty of Engineering, The Univer-
sity of Nagoya, Nagoya 464, Japan (invited)

11:40 — "Superconductivity in Amorphous Equi-
Electronic Metal Alloys," C.C. KOCH, Metals and
Ceramics Division, Oak Ridge National Laboratory,
Oak Ridge, TN 37830; B.C. GIessen, Materials Science
Division, Institute of Chemical Analysis, Northeastern
University, Boston, MA 02115; and D.M. KROGER
and J.O. SCARBROUGH, Metals and Ceramics
Division, Oak Ridge National Laboratory, Oak Ridge,
TN 37830

37
SESSION 2
Thermal and Mechanical Properties of Glassy Metals I

Chairmen
Kear
United Technologies Research Center
Silver Lane
East Hartford, CT 06108

F. Spaepen
Division of Engineering and Applied Physics
Harvard University
Cambridge, MA 02138

Tuesday Afternoon

2:00 — “Glass Transition, Relaxation and Crystallization Temperatures of Metallic Glasses,” B.C. GIENON, Materials Science Division, Institute of Chemical Analysis, Northeastern University, Boston, MA 02115 (invited)


3:05 — “Influence of Composition on the Stabilities of Fe-, Ni- and Co-Based Metallic Glasses,” I.W. DONALD and H.A. DAVIES, Department of Metallurgy, University of Sheffield, United Kingdom

3:25 — COFFEE BREAK

3:40 — “Preparation, Electrical, Thermal and Mechanical Properties of Some Refractory Glassy Alloys,” S. WHANG, S. MAHMUD and B.C. GIENON, Materials Science Division, Institute of Chemical Analysis, Northeastern University; Boston, MA 02115; M. FISCHER, Brown-Boveri Company, Baden, Aargau, Switzerland; and D.E. POLK, 3341 Dent Place, NW, Washington, D.C. 20007

4:00 — “Metallic Glasses in the Fe-Mo-B, Ni-Mo-B and Co-Mo-B Systems with High Tensile Strengths and High Crystallization Temperatures,” R. RAY, Department of Chemistry, Northeastern University, Boston, MA 02115 and L.E. TANNER, Manlabs, Inc., Cambridge, MA 02139 (*based on research carried out at the Corporate Development Center, Allied Chemical Corporation, Morristown, NJ 07960)

4:20 — “Athermal and Time-Dependent Nucleation of Crystallization in Metal-Metalloid Glasses,” U. KOSTER and U. HEROLD, Institut fur Werkstoffe, Ruhr-Universitat Bochum, Bochum, West Germany

4:40 — “Formation and Properties of Glass-like Metallic Organotin Films,” E. KNY, W.I. JAMES and L.L. LEVENSON, Graduate Center for Materials Research, University of Missouri-Rolla, Rolla, MO 65401; and R.A. AUERBACH, Lord Corporation, Erie, PA 16512
SESSION 3
Thermal and Mechanical
Properties of Glassy Metals II

Chairmen
H.S. Chen  D.E. Polk
Bell Telephone Labs  3341 Dent Place NW,
Murray Hill, NJ 07974  Washington, DC 20007

November 28, 1979
Wednesday Morning

9:00 — “Elastic and Inelastic Properties of Metallic
Glasses,” F. SPAEPEN, Division of Engineering and
Applied Physics, Harvard University, Cambridge, MA
02138 (invited)

9:45 — “Flow and Fracture of a Ni-Fe Metallic Glass,”
L.A. DAVIS and Y.T. YEOW, Corporate Development
Center, Allied Chemical Corporation, Morristown, NJ
07960

10:05 — “Ultra-High-Strength Ferrous Metallic Glasses,”
R. RAY, Department of Chemistry, Northeastern
University, Boston MA 02115 (*based on research
carried out at the Corporate Development Center,
Allied Chemical Corporation, Morristown, NJ 07960)

10:25 — COFFEE BREAK

10:40 — “Maximum Values of the Thermal Stability and
Mechanical Properties of Binary Glassy Alloys
Measured as Functions of Composition,” S. WHANG,
H. HWANG and B.C. GIENEN, Materials Science
Division, Institute of Chemical Analysis, Northeastern
University, Boston, MA 02115

11:00 — “Effect of Metalloidal Elements on the Aging
Embrittlement of Iron-Base Glasses,” M. NAKA, The
Research Institute for Iron, Steel and Other Metals,
Tohoku University, Sendai 980, Japan; H.S. CHEN, Bell
Telephone Laboratories, Murray Hill, NJ 07974; and T.
MASUMOTO, The Research Institute for Iron, Steel
and Other Metals, Tohoku University, Sendai 980,
Japan

11:20 — “The Structure and Properties of Rapidly-
Quenched Near-Eutectic Melts, W.M.T.
GALLERNEAULT and R.W. SMITH, Metallurgical
Engineering Department, Queen's University,
Kingston, Ontario, Canada

11:40 — “The Relation of the Electrical Resistivities of
Some Ca-Base Alloy Glasses to their Elastic Properties
and Pair Correlation Functions,” J. HONG, F. LU, L.T.
KABACOFF and B.C. GIENEN, Materials Science
Division, Institute of Chemical Analysis, and
Department of Chemistry, Northeastern University,
Boston, MA 02115; and D. CHIPMAN and L. JEN-
NINGS, Army Mechanical and Materials Research
Center, Watertown, MA 02172
SESSION 4
Magnetic Properties of Glassy Metals

Chairmen
D. Graham, Jr.
Dept. of Metallurgy and Materials Science
University of Pennsylvania
Philadelphia, PA 19104

F. E. Luborsky
G.E. Research Laboratories
Schenectady, NY 12301

Wednesday Afternoon
2:00 — "Use of Magnetic Amorphous Alloys in Power Devices," L. JOHNSON, G.E. Research Laboratories, Schenectady, NY 12301 (invited)
2:45 — "Applications of Metallic Glasses in Electronic and Various Magnetic Devices," HANS WARMONT, Vacuumschmelze A.G., Hanau, West Germany (invited)
3:30 — COFFEE BREAK
4:00 — "Magnetic Properties of Fe-B-Si-C Metallic Glasses," N. DeCRISTOFARO, A. FREILICH and D. NATHASINGH, Corporate Development Center, Allied Chemical Corporation, Morristown, NJ 07960
4:20 — "Magnetic, Electrical, Thermal and Mechanical Properties of Cenm/Al and Pree/Al Glasses," L.T. KABACOFF, E.R. WONG and B.C. GIESSEN, Materials Science Division, Institute of Chemical Analysis, and Department of Chemistry, Northeastern University, Boston, MA 02115; and W.A. HINES, Department of Physics, University of Connecticut, Storrs, CT 06268
4:40 — "Critical Properties of Rapidly Quenched Crystalline Superconductors," J. BEVK, Division of Applied Science, Harvard University, Cambridge, MA 02138

SESSION 5
Corrosion and Electrochemical Properties of Glassy Metals

Chairmen
R.B. Diegle
Battelle-Columbus Laboratories
505 King Avenue
Columbus, OH 43201

R.M. Latanison
Department of Materials Science and Engineering
MIT
Cambridge, MA 02139

November 29, 1979
Thursday Morning
9:00 — "Corrosion Research on Metallic Glasses," R.M. LATANISON, Department of Materials Science and Engineering, MIT, Cambridge, MA 02139 (invited)
9:45 — “Localized Corrosion on Glassy Metal Surfaces.”
R.B. DIEGLE, Battelle-Columbus Laboratories, 505
King Avenue, Columbus, OH 43201 (invited)

10:30 — COFFEE BREAK

10:45 — “Electrochemical Properties of Metalloid-Free
Amorphous Alloy Coatings,” R. WANG and M.E.
MERZ, Battelle Pacific Northwest Laboratory,
Richland, WA 99352

11:00 — “Influence of Structure in the Corrosion
Resistance of Amorphous Zr-Cu Alloys.” J. TURN and
R.M. LATANISION, Department of Materials Science
and Engineering, MIT, Cambridge, MA 02139

11:20 — “The Influence of Surfaces and Interfaces on
Crystallization of Metallic Glasses,” U. HEROLD and
U. KOSTER, Institut fur Werkstoffe, Ruhr-Universitat
Bochum, Bochum, West Germany

11:40 — “Hydrogen Absorption Isotherms of Amorphous
and Crystalline Pd-Si Alloys,” T. FLANAGAN,
Department of Chemistry, University of Vermont,
Burlington, VT 05401; and R. FINOCCHIARO and B.C.
GIESSEN, Department of Chemistry, Northeastern
University, Boston, MA 02115

SESSION 6
Technology of Glassy Metals

Chairmen
C. Cline
Lawrence Livermore Lab.
Code L369
Livermore, CA 94550

J.J. Gilman
Corporate Development Ctr.
Allied Chemical Corp.
Morristown, NJ 07960

Thursday Afternoon

2:00 — “Technologically Useful Rapid Quenching
Methods,” R. MARINGER, Battelle Memorial In-
stitute, Columbus, OH 43201 (invited)

2:45 — “Applications for Glassy Metal Alloys,” C. CLINE,
Lawrence Livermore Laboratory, Code L369, Liver-
more, CA 94550 (invited)

3:30 — COFFEE BREAK

Cooling Rates in Amorphous Transition Metal Alloys.”
D.M. KROEGER, C.C. KOCH, D.S. EASTON and J.O.
SCARBROUGH, Metals and Ceramics Division, Oak
Ridge National Laboratory, Oak Ridge, TN 37830

4:00 — “High Speed Casting of Metallic Foils by the Dou-
ble Roller Quenching Technique,” V.V. MURTY and
R.P.I. ADLER, GTE Laboratories, Inc., 40 Sylvan Road,
Waltham, MA 02154

4:20 — “The Production and Compaction of Amorphous
Cu_{60}Zr_{40} Powder,” S.A. MILLER and R.J. MURPHY,
Mechanical Engineering Department, Northeastern
University, Boston, MA 02115

4:40 — “METGLAS Ribbon Reinforced Composites,”
Y.T. YEOW, Corporate Development Center, Allied
Chemical Corporation, Morristown, NJ 07960
SYMPOSIUM L
EXAFS IN MATERIALS
RESEARCH: PAST, PRESENT
AND FUTURE

SYMPOSIUM CHAIRMEN
Boon K. Teo
Bell Laboratories
Murray Hill, NJ 07974

David C. Joy
Bell Laboratories
Murray Hill, NJ 07974

EXAFS: History, Theory, Practice
Chairman: B.K. Teo
November 28, 1979
Wednesday Morning
9:00 — “History of EXAFS,” E.A. STERN
9:10 — “EXAFS: Current and Future Experimental
Techniques,” P. EISENBERGER
9:45 — “EXAFS Theory: Recent Progress and Future
Problems,” P.A. LEE
10:15 — “Many-body Effects in EXAFS,” E.A. STERN
10:45 — BREAK

Chairman: D.C. Joy
11:00 — “Electron Energy-loss EXAFS,” B.M. KINCAID
11:30 — “Core Edge Fine Structure in Electron Energy Loss
Spectra,” R. LEAPMAN
11:50 — “EXAFS Studies in an Electron Microscope,” D.
JOHNSON
12:10 — LUNCH

Radiation Sources for
Materials Research
Chairman: D.C. Joy

Wednesday Afternoon
2:00 — “Materials Research Utilizing Synchrotron
Radiation,” A. BIEENSTOCK
2:35 — “CHESS (Cornell High Energy Synchrotron
Source),” B. BATTERMAN
3:00 — “Synchrotron Light Source at BNL,” C. FRAZER
3:20 — BREAK
3:30 — “The Synchrotron Radiation Center at Univ. of
Wisconsin,” E. ROWE
3:50 — “Materials Science at NBS — SURF II,” R.
MADDEN
4:05 — “Comparison of Electron and Photon Beams for
EXAFS Studies,” M. ISAACSON
4:25 — General Discussion Session: Chairpersons —
D.C. JOY & B.K. TEO

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EXAFS and Catalysis
Chairman: J. Reed
November 29, 1979
Thursday Morning
9:00 — "EXAFS and Edge Spectroscopic Investigations of Metal Catalysts," F. LYTLE
9:30 — "Applications of EXAFS to Dispersed Metal Catalysts," J. SINFELT
10:00 — "EXAFS Study of H₂, O₂, and CO₂ Adsorption on Supported Platinum," J. KATZER
10:20 — "EXAFS Studies of Homogeneous Catalysts," R. STULTS
10:40 — BREAK

EXAFS and Materials
Chairman: H.S. Chen
11:00 — "EXAFS and Metallurgy," P. EISENBERGER
11:25 — "EXAFS of Dilute Solutions and Impurities," J. HASTINGS
11:50 — LUNCH
Thursday Afternoon
2:00 — "EXAFS Studies of Glassy Solids," J. WONG
2:20 — "EXAFS of Amorphous Alloys," S. HUNTER
2:40 — "X-ray Absorption Studies of Polymeric Conduction," D. SAYERS
3:00 — "Structural Studies of Superionic Conduction," T. HAYES
3:20 — BREAK
3:45 — "Disorder Effects in the EXAFS of Metals and Semiconductors in the Solid and Liquid State," D. CROZIER
4:05 — "Structural Evidence for Solutions from EXAFS Measurements," D. SANDSTROM
4:25 — CLOSE
SYMPOSIUM M
ADHESION TO POLYMER-SOLID INTERFACES
AND GENERAL PAPERS

SYMPOSIUM CHAIRMAN
Harold Schonhorn
Bell Laboratories
Murray Hill, NJ 07974

November 28, 1979
Wednesday Morning

9:00 — “Locus of Failure in Adhesive Bonding.” ROBERT J. GOOD, SUNY-Buffalo (invited paper)

9:45 — “The Effect of Surface Treatments on Aluminum Alloys.” DAVID A. JABLONSKI, United Technologies Research Center, East Hartford, CT

10:15 — “Adhesion, Wetting and Barrier Properties of Interpenetrating Polymer Networks.” H.L. FRISCH, K.C. FRISCH, Department of Chemistry, SUNY-Albany, and D. KLEMPNER, Polymer Institute, University of Detroit.

10:45 — “Adhesion of Nickel Films on Graphite.” J.R. SNYDER, M. SMITH, and L.L. LEVENSON, Graduate Center for Materials Research, University of Missouri-Rolla

11:15 — “Ion Beam Surface Modification: Characterization by ESCA and SEM.” DAVID W. DWIGHT, Department of Materials Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA
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1979 Annual Meeting

Program Chairpersons

J.M. Poate, Bell Laboratories
B.C. Giessen, Northeastern University
K.C. Taylor, General Motors Res. Labs.
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VON HIPPEL AWARD RECEPTION — Wine and Cheese
Presidents' Ballroom 5:30-7:30

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