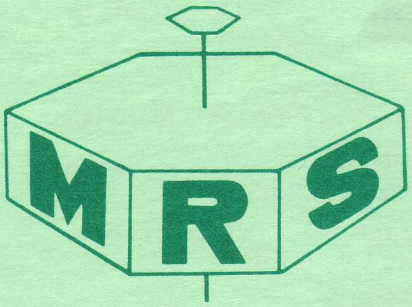
MATERIALS RESEARCH SOCIETY
102C Materials Research Laboratory
University Park, PA 16802

THE MATERIALS RESEARCH SOCIETY

1981
ANNUAL
MEETING

NOVEMBER 16 - 19
THE BOSTON PARK PLAZA HOTEL
BOSTON, MASSACHUSETTS



PRELIMINARY
PROGRAM
&
REGISTRATION INFORMATION

CONTENTS

INSIDE VIEW OF BOSTON FOR SPOUSES

If you've never taken your spouse to a conference, the annual meeting in Boston will be the ideal time and place. For spouses who like their tours guided, the following tours are available. Please check those tours which appeal to you so that tentative plans may be formulated to include the tours with the most interest shown.

_____ Historical Homes on Famous Beacon Hill

_____ Museum and Gallery Tour with Lunch

_____ Sightseeing Tour of Boston

_____ Science Museum and Planetarium Show

_____ Metropolitan Center and Symphony Hall

_____ John F. Kennedy Library

_____ Mass. State House and Boston City Hall

_____ Faneuil Hall and Quincy Market

_____ Cambridge: Harvard University and its Famous Museums

_____ Salem (The Witch City)

_____ Concord and Lexington

_____ Antiquing Spree

_____ Shopping Tours:

- _____ Newbury Street's Fashionable Boutiques
- _____ Downtown, including Filenes Basement
- _____ Designer Shopping with Discount Prices

Prices range from $8.00 - $22.00 per Tour

Space is limited. Send this form with your registration to facilitate tour planning. Tours will be filled on a first come first served basis.

GENERAL INFORMATION

1. **Schedule.** The Activities Locator appears as the centerfold. It indicates time periods and places for all the symposia and meeting events.

2. **Registration.** The Registration Form is part of the centerfold. Advance registration is encouraged by a discount of $5.00, and it will speed you through the registration process. Registration will take place in the hotel mezzanine on Sunday evening from 6:00 to 10:00, and daily thereafter from 8:00 a.m. to 5:00 p.m. The registration fee for the 1981 meeting is $95.00, which includes a membership for one year in the Materials Research Society. Payment of the Registration Fee allows the participant to attend all symposia. The Registration Fee for all students is $40.00

   Attendees of the Symposium on Nuclear Waste Management must be registered for Symposium D. The registration fee for this symposium, which includes a copy of the proceedings to be published in 1981, is: Regular $125.00; student $70.00.

3. **Room Accommodation.** The host hotel, the Boston Park Plaza (617-426-2000), has reserved a block of rooms for meeting attendees (see reservation card attached). These rooms will be held up to one month prior to the conference, after which requests will be handled on a space available basis. When making reservations by phone, be sure to ask for rooms held for the Materials Research Society meeting.

   Other hotels in the area include: Colonade Hotel (617-261-2800) and Copley Square Hotel and Motor Inn (617-536-9000) and the Copley Plaza (617-225-7654).

4. **Proceedings.** Symposia A, B, C, D, E, F, G, L and N intend to publish their proceedings individually in book form. Copies of the proceedings of Symposia A, B, E, F, G. L and N can be purchased by participants at the special conference rate of $15.00 for the first copy. Additional copies of the same proceedings or copies of proceedings from different symposia can be purchased at the rate of $30.00 per copy (see Registration Form in Centerfold). The Registration Fee for Symposium D ($125.00) includes one copy of the Symposium Proceedings. Proceedings of Symposia C and K will be published as special journal issues.

* * * *

1981 ANNUAL MEETING
PROGRAM CO-CHAIRMEN

C. W. White — Oak Ridge National Laboratory
H. J. Leamy — Bell Laboratories
P. A. Montano — West Virginia University

PLENARY SESSION

GLOBAL THEORIES OF MATERIAL PROPERTIES

November 16, 5:30 p.m.
East Ballroom

The growing wealth of data on materials demands correspondingly broader and more sophisticated theories of microscopic structure and its functional relation to material properties. During the last decade quantum and statistical theories have been developed which provide immediate contact with materials science on a global scale. While these theories cannot be regarded as substitutes for the sophistication attainable through decades of research in a special area, they do consolidate a vast range of experience in a way that can act as a useful guide to beginners entering a new field. The basic concept behind these global theories will be reviewed by each speaker from his own viewpoint; the materials discussed will include metallic alloys, semiconductors, and amorphous and glassy solids.

Chemical Bonding and Structural Diagrams
A. N. Bloch
Exxon Research and Engineering, Linden, NJ 07036

Chemical & Topological Models of Non-Crystalline Solids
J. C. Phillips
Bell Laboratories, Murray Hill, NJ 07974

SYMPOSIUM A

LASER AND ELECTRON BEAM INTERACTIONS WITH SOLIDS

Chairmen
B. R. Appleton, Oak Ridge National Laboratory
G. K. Celler, Bell Laboratories

November 16–19, 1981

SESSION I.

FUNDAMENTAL MECHANISMS

Chairman: D. Turnbull, Harvard University

Monday Morning, November 16 – Georgian Room

8:30–******Fundamentals of Energy Transfer Between Picosecond Laser Pulses and Surfaces of Metals and Semiconductors,* **N. Bloembergen, H. Kurz, J. M. Liu** and **R. Yen,** Harvard University, Cambridge, MA

9:00–******Synchrotron X-ray Study of the Structure of Silicon During Pulsed Laser Processing,* **B. C. Larson,** Oak Ridge National Laboratory, Oak Ridge, TN

9:30–*Silicon Melts During Pulsed Laser Annealing,* **B. Stritzker, A. Pospieszczyk** and **J. A. Tagle,** Institut fur Festkorperforschung, KFA, Julich, FRG

9:45–*Emission of Charged Particles from Laser Irradiated Silicon,* **J. M. Liu, R. Yen, H. Kurz** and **N. Bloembergen,** Gordon McKay Laboratory, Harvard University, Cambridge, MA

10:00–*Optical Properties of Si and GaAs Under Intense Laser Excitation: Evidence for a Self-Confined Plasma,* **A. Compaan, A. Aydinli, H. W. Lo** and **M. C. Lee,** Kansas State University, Manhattan, KS

10:15– BREAK

10:30–******The Gentle Electronic Nature of Pulsed Beam Annealing, or Does It Really Go Superconducting?* **J. A. Van Vechten,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

11:00–******Microstructural Model of Laser Annealing,* **J. C. Phillips,** Bell Laboratories, Murray Hill, NJ

11:30–*Nonlinear Dynamic Temperature Characterization of High Power Laser Annealed Semiconductor Material,* **D. L. Kwong, Dae M. Kim, Rajiv R. Shah** and **D. L. Crosthwait,** Rice University, Houston, TX

11:45–*Time Resolved Opitcal Reflectivity During Pulsed Ruby Laser Annealing,* **M. O. Lampert, M. Toulemonde, R. Regal, M. Hage-Ali** and **P. Siffert,** Centre de Recherches Nucleaires - Phase, Strasbourg, France

12:00–*A Test for Non-Thermal Annealing of Si Using Pulsed Ion Beams,* **J. E. E. Baglin, W.-K. Chu, R. T. Hodgson, J. M. Neri** and **D. A. Hammer,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

12:15– LUNCH

*Invited Talk

SESSION II.
FUNDAMENTAL MECHANISMS

Chairman: W. L. Brown, Bell Laboratories

Monday Afternoon, November 16 — Georgian Room

1:45—******Nonequilibrium Crystal Growth Resulting From Pulsed Laser Annealing,* **C. W. White,** Oak Ridge National Laboratory, Oak Ridge, TN

2:15—*Dynamics of Picosecond Laser Induced Phase Transformation in Silicon,* **R. Yen, J. Liu, H. Kurz** and **N. Bloembergen,** Bell Laboratories, Holmdel, NJ and Harvard University, Cambridge, MA

2:30—*Photoemission Results for Laser Annealed Si and Ge (111) Crystals,* **F. J. Himpsel, D. E. Eastman, P. Heimann, B. Reihl, C. W. White** and **D. M. Zehner,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY and Oak Ridge National Laboratory, Oak Ridge, TN

2:45—*Determination of Oxygen in Laser Annealed/Cleaned Silicon,* **Han Westendorp, Zhong-Lie Wang** and **Frans Saris,** FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

3:00—*Phenomenon and Mechanism of Oxygen-Trapping and Oxidation Induced by Laser Irradiation in Silicon,* **Yung S. Liu, Shin-Wu Chiang, William Katz** and **Frederick Bacon,** General Electric Company, Corporate Research and Development, Schenectady, NY

3:15—*Dynamic Behavior of Nano Second Pulsed Nd: Glass Laser Annealing in Ion Implanted Silicon,* **M. Takai, Y. Sato, K. Murakami, K. Gamo, T. Minamisono** and **S. Namba,** Osaka University, Toyonaka, Osaka, Japan and The Institute of Material Science, University of Tsukuba, Ibaraki, Japan

3:30— BREAK

3:45—******Computer Modelling of Laser Annealing,* **P. Baeri,** Istituto di Struttura della Materia, Catania, Italy

4:15—*Melting of Amorphous Silicon by cw Laser Heating,* **S. A. Kokorowski, G. L. Olson, J. A. Roth** and **L. D. Hess,** Hughes Research Laboratories, Malibu, CA

4:30—*Surface Electronic Properties of Ion Implanted-Laser Annealed Si(111),* **D. E. Eastman, P. Heimann, F. J. Himpsel, B. Reihl, D. M. Zehner** and **C. W. White,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY and Oak Ridge National Laboratory, Oak Ridge, TN

4:45—*The Characterization of Laser and Electron Beam Annealed Silicon by Infrared Spectrophotometry,* **M. Pawlik,** The General Electric Company, Ltd., Hirst Research Centre, Wembley, England

5:00—*Amorphous Germanium Crystallization Processes in Multi-Pulse Low Power Laser Irradiation,* **M. Bertolotti, G. Vitali, U. Zammit** and **M. Marinelli,** Universita di Roma, Italy

*Invited Talk

SESSION III.
ELEMENTAL SEMICONDUCTORS

Chairmen: J. S. Williams, RMIT, Melbourne, Australia
T. Sedgwick, IBM Thomas J. Watson Research Center

Tuesday Morning, November 17 — Georgian Room

8:30—******Silicon Crystal Growth Pheonomena at the Rapidly Moving Liquid-Solid Interface,* **J. M. Poate,** Bell Laboratories, Murray Hill, NJ

9:00—*Zone Refining of Nonsubstitutional Impurities During Pulsed Laser Annealing,* **C. W. White, H. Naramoto, J. M. Williams, J. Narayan, B. R. Appleton** and **S. R. Wilson,** Oak Ridge National Laboratory, Oak Ridge, TN and Motorola, Inc., Phoenix, AZ

9:15—*Infra-Red Light Annealing of Ion Implanted Silicon,* **H. B. Harrison, D. G. Beanland, K. T. Short, J. S. Williams** and **A. Zylewicz,** RMIT, Melbourne, Australia

9:30—*Superstaurated Solid Solution After Solid Phase Epitaxial Regrowth by Incoherent Light Scanning,* **L. Pedulli** and **L. Correra,** Istituto LAMEL, CNR, Bologna, Italy

9:45—*Laser Processing of UHV-Deposited Silicon Films on Si(100) and (110),* **T. de Jong, L. Smit, V. V. Korablev, D. D. Hoonhout** and **F. W. Saris,** FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

10:00—*Discharge Annealing of Ion Implanted Silicon,* **C. Fleddermann, N. Ianno, J. T. Verdeyen** and **B. G. Streetman,** University of Illinois at Urbana-Champaign, Champaign, IL

10:15— BREAK

10:30—******Melting Phenomenon and Interface Instability Associated with Pulsed Laser Irradiation,* **J. Narayan,** Oak Ridge National Laboratory, Oak Ridge, TN

11:00—*Light Absorption Effects on the Nd Laser Annealing of Ion Implanted Silicon,* **P. Baeri, A. E. Barbarino, S. U. Campisano, M. G. Grimaldi, G. Foti** and **E. Rimini,** Istituto di Struttura della Materia, Catania, Italy

11:15—*Competition Between Solid-Phase Epitaxy and Random Crystallization During cw Laser Annealing of Amorphous Si Films,* **J. A. Roth, S. A. Kokorowski, G. L. Olson** and **L. D. Hess,** Hughes Research Laboratories, Malibu, CA

11:30—*Thermal Stability of Ion Implanted, Laser Annealed Films,* **S. R. Wilson, W. M. Paulson, G. Tam, R. B. Gregory, C. W. White** and **B. R. Appleton,** Motorola, Inc., Phoenix, AZ and Oak Ridge National Laboratory, Oak Ridge, TN

11:45—*Laser Induced Diffusion of Radioactive As into Si,* **Loren Pfeiffer, T. Kovacs, G. K. Celler, L. E. Trimble** and **D. C. Jacobson,** Bell Laboratories, Murray Hill, NJ

12:00—*On the Influence of Laser Beam Homogenity on the Regrowth of Ion-Implanted Si,* **M. Wielunski, J. Auleytner, A. Turos** and **D. Wielunska,** Polish Academy of Science, Warsaw, Poland

12:15—*Pulse Electron Beam Annealing of Phosphorus Implanted Silicon,* **V. E. Borisenko** and **V. A. Labunov,** Minsk Radioengineering Institute, Minsk, USSR

12:30— LUNCH

*Invited Talk

SESSION IV.
DEFECTS AND ANNEALING

Chairman: J. L. Merz, University of California, Santa Barbara

Tuesday Afternoon, November 17 — Georgian Room

1:45—**Extended Defects in Laser Crystallized Materials,* **A. G. Cullis,** Royal Signals and Radar Establishment, Malvern, England

2:15—*Structural Modifications of Crystalline and Amorphous Silicon Induced by Picosecond Laser Pulses,* **G. A. Rozgonyi, H. Baumgart, F. Phillip, R. Uebbing** and **H. Oppolzer,** Max Planck Institut fur Festkorperforschung, Stuttgart, FRG

2:30—*Picosecond Laser Pulse Induced Damage in Crystalline Silicon,* **K. L. Merkle, R. Uebbing, H. Baumgart** and **F. Phillip,** Max Planck Institut fur Festkorperforschung, Stuttgart, FRG

2:45—*Defect Formation in CO_2 Laser Annealed Silicon,* **H. Baumgart, F. Phillipp** and **H. J. Leamy,** Bell Laboratories, Murray Hill, NJ and Max Planck Institut fur Festkorperforschung, Stuttgart, FRG

3:00—*Characterization of Laser Induced Backside Damage for Gettering Purposes,* **G. E. J. Eggermont, D. A. Allison, S. A. Gee, R. J. Falster** *and* **J. F. Gibbons,** Philips Research Laboratories, Sunnyvale, CA, Quantronix Corporation, Smithtown, NY and Stanford Electronic Laboratories, Stanford, CA

3:15—*Laser Processing: A Method to Control Grain Boundary Effects,* **R. T. Young, G. A. van der Leeden** and **G. E. Jellison, Jr.,** Oak Ridge National Laboratory, Oak Ridge, TN

3:30— BREAK

3:45—**Electronic Defects in Beam Crystallized Silicon,* **N. M. Johnson,** Xerox Palo Alto Research Centers, Palo Alto, CA

4:00—*Correlated Electrical and Microstructural Studies of Recrystallized Silicon Thin Films on Glass Substrates,* **D. K. Biegelsen, N. M. Johnson** and **M. D. Moyer,** Xerox Palo Alto Research Centers, Palo Alto, CA

4:15—*Quenched-In Defects in CW Laser-Annealed Si,* **N. H. Sheng** and **J. L. Merz,** University of California, Santa Barbara, CA

4:30—*Divacancy Annealing in Crystalline Silicon Using e-Beam and Pulsed Ruby Laser Excitation,* **H. J. Stein, J. A. Knapp** and **P. S. Peercy,** Sandia National Laboratories, Albuquerque, NM

4:45—*Residual Defects in Virgin and Implanted Si After Laser Processing,* **A. Mesli, E. Buttung, A. Goltzene, J. C. Muller, J. P. Ponpon, B. Meyer, C. Schwab** and **P. Siffert,** Universite Louis Pasteur and CNRS, Strasbourg, France

5:00—*Charge Collection SEM Study of the Crystalline to Amorphous Silicon Boundary Following Laser and Electron Beam Induced Solid Phase Epitaxy,* **J. P. Gonchond,** CNET/CNS, Grenoble, France

*Invited Talk

SESSION V.
ION IMPLANTATION AND PULSED BEAM ANNEALING
(Joint Session with Symposium E)

Chairmen:
F. W. Saris, FOM Institute for Atomic and Molecular Physics, Amsterdam
W. K. Chu, IBM General Technology Division, Hopewell Junction

Wednesday Morning, November 18 — Georgian Room

8:30—**Pulsed Ion Beam Annealing,* **John E. E. Baglin,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

9:00—*Defect Analysis of Si Irradiated by Pulsed Ion Beam,* **S. R. Mader** and **W. K. Chu,** IBM General Technology Division, Hopewell Junction, NY

9:15—*Microstructures Induced in Metal Thin Films on Silicon by Pulsed Ion Beam Annealing,* **L. J. Chen, L. S. Hung, J. W. Mayer** and **J. E. E. Baglin,** Cornell University, Ithaca, NY and IBM Thomas J. Watson Research Center, Yorktown Heights, NY

9:30—**Metallurgy and Microstructures of Pulse-Melted Alloys,* **David M. Follstaedt,** Sandia National Laboratories, Albuquerque, NM

10:00— BREAK

10:15—**Superconducting Effects in Rapidly Quenched Materials Formed by Ion and Laser Bombardment,* **B. Stritzker,** Institut fur Festkorperforschung, KFA, Julich, FRG

10:45—*Laser and Ion Beam Mixing Cr and Ni + Cr Films on Cu,* **C. W. Draper, D. C. Jacobson, J. M. Gibson, J. M. Vandenberg** and **J. M. Poate,** Western Electric Company, Princeton, NJ and Bell Laboratories, Murray Hill, NJ

11:00—*Thermal Stability of Metastable Phases Produced by Laser Treatment of Aluminum Implanted with Cr and Mo,* **G. Battaglin, A. Carnera, G. Della Mea, P. Mazzoldi, Animesh K. Jain, V. N. Kulkarni** and **D. K. Sood,** Universita di Padova, Padova, Italy and Bhabha Atomic Research Centre, Bombay, India

11:15—*Lattice Defects in Laser Irradiated Aluminum,* **P. S. Peercy, D. M. Follstaedt, S. T. Picraux** and **W. R. Wampler,** Sandia National Laboratories, Albuquerque, NM

11:30—*Pulsed Laser Annealing of Ni, and MgO Containing Ni Precipitates,* **J. Narayan,** Oak Ridge National Laboratory, Oak Ridge, TN

11:45—*Pulsed Laser Treatment of Virgin, Self and Europium Implanted Nickel: Evidence of Defect Impurity Interaction and Surface Segregation,* **G. Battaglin, A.**

Carnera, G. Della Mea, P. Mazzoldi, Animesh K. Jain, V. N. Kulkarni and **D. K. Sood,** Universita di Padova, Padova, Italy and Bhabha Atomic Research Centre, Bombay, India

12:00—*Pulsed Electron Beam Melting of Fe,* **J. A. Knapp** and **D. M. Follstaedt,** Sandia National Laboratories, Albuquerque, NM

12:15— LUNCH

*Invited Talk

SESSION VI.
DEPOSITED LAYERS

Chairman: T. W. Sigmon, Stanford Electronics Laboratory, Stanford

Wednesday Afternoon, November 18 — Georgian Room

1:45—**Laser Fabrication of Si on Dielectric Substrates,* **H. J. Leamy,** Bell Laboratories, Murray Hill, NJ

2:15—*Transient Heating with Graphite Heaters for Semiconductor Processing,* **John C. C. Fan, Bor-Yeu Tsaur** and **Michael W. Geis,** MIT Lincoln Laboratory, Lexington, MA

2:30—*Opitcal Characterization of Chemically Vapor Deposited and Laser-Annealed Polysilicon,* **B. G. Bagley, D. E. Aspnes, G. K. Celler** and **A. C. Adams,** Bell Laboratories, Murray Hill, NJ

2:45—*Green's Function Solution of the Heat Equation for Beam Interactions with Multilayer Structures,* **Mark L. Burgener, Ozzie Csanadi** and **Ronald E. Reedy,** Naval Ocean Systems Center, San Diego, CA

3:00—*Model for cw Laser Annealing of Multilayer Structures,* **I. D. Calder** and **R. S. Sue,** Bell Northern Research, Ontario, Canada

3:15—*Line-Source E-Beam Crystallization of Si on Silicon Nitride Layers,* **J. A. Knapp, S. T. Picraux, K. Lee, J. F. Gibbons, T. O. Sedgwick** and **S. W. Depp,** Sandia National Laboratories, Albuquerque, NM, Stanford University, Stanford, CA and IBM Research Center, San Jose, CA

3:30— BREAK

3:45—*The Use of Beam Shaping to Achieve Large Grain CW Laser Recrystallized Polysilicon on Amorphous Substrates,* **T. J. Stultz** and **J. F. Gibbons,** Lockheed Palo Alto Research Laboratories and Stanford University, Stanford, CA

4:00—*Seeded Growth of Si over SiO_2 Substrates by CW Laser Irradiation,* **L. E. Trimble, K. K. Ng, G. K. Celler, H. Baumgart** and **H. J. Leamy,** Bell Laboratories, Murray Hill, NJ

4:15—*Fast Scan Laser Annealing,* **John T. Schott,** Sperry Research Center, Sudbury, MA

4:30—*Laser Processing of Porous Silicon,* **H. Baumgart, R. C. Frye, L. E. Trimble, H. J. Leamy** and **G. K. Celler,** Bell Laboratories, Murray Hill, NJ

4:45—*Characteristics of Interpoly Oxides, Optimized by Conventional Processing and Laser Annealing,* **H. D.**

Rodeen, D. L. Brors and **G. E. J. Eggermont,** Signetics Corporation, Sunnyvale, CA and Philips Research Laboratories, Sunnyvale, CA

5:00—*Characterization of Thermal Oxides of Laser Annealed Polysilicon,* **Rajiv R. Shah, Robert Mays, Jr.** and **D. Lloyd Crosthwait,** Texas Instruments, Inc., Dallas, TX

5:15—*Reactive Laser-Sputtering for Amorphous Silicon Films,* **M. Hanabusa** and **M. Suzuki,** Toyohashi University of Technology, Toyohashi, Japan

*Invited Talk

SESSION VII.
COMPOUND SEMICONDUCTORS

Chairmen:
F. H. Eisen, Rockwell International Electronics Research Center
B. G. Streetman, University of Illinois, Urbana-Champaign

Wednesday Evening, November 18 — Georgian Room

8:00—**Material-Process Interactions in the Annealing of GaAs,* **C. Lawrence Anderson,** Hughes Research Laboratories, Malibu, CA

8:30—*Non Alloyed Ohmic Contacts for GaAs Coplanar Mixer Diodes,* **John M. Woodcock,** Philips Research Laboratories, Surrey, England

8:45—*Surface and Subsurface Morphology of Laser Beam Annealed GaAs Contacts,* **O. Aina, J. Norton, W. Katz** and **G. Smith,** General Electric Company, Schenectady, NY and Rensselaer Polytechnic Institute, Troy, NY

9:00—*Studies of Laser Annealed GaAs (100), (110) and (111) Surfaces,* **D. M. Zehner, C. W. White, G. W. Ownby** and **B. R. Appleton,** Oak Ridge National Laboratory, Oak Ridge, TN

9:15—*Photoluminescence of Pulsed Ruby Laser Annealed Crystalline and Ion Implanted GaAs,* **Douglas H. Lowndes** and **Bernard J. Feldman,** Oak Ridge National Laboratory, Oak Ridge, TN and University of Missouri, St. Louis, MO

9:30—*Multiscanned Electron Beam Annealing of Si-Implanted GaAs,* **M. Bujatti, A. Cetronio, R. Nipoti** and **E. Olzi,** Selenia, S.p.A., Rome, Italy, and CNR-Istituto LAMEL, Bologna, Italy

9:45— BREAK

10:00—*Epitaxial Ge/GaAs Heterostructures by Scanned CW Laser Annealing of a-Ge Layers on GaAs,* **J. E. Greene, K. C. Cadien, D. Lubben, G. A. Hawkins, G. R. Erikson** and **J. R. Clarke,** Eastman Kodak Co., Rochester, NY and University of Illinois, Urbana, IL

10:15—*Laser Annealing of Selenium Implanted Indium Phosphide,* **S. S. Gill, P. J. Topham, B. J. Sealy, K. G. Stephens** and **M. C. Hales,** University of Surrey, Surrey, England and Plessey Research (Caswell) Ltd., Towester, England

10:30—*Compositional Analysis and Electrical Property Measurements of CW Laser Annealed InSb,* **Yung S. Liu, Ching-Yeu Wei, Wirojana Tantraporn, Shin-Wu Chiang** and **George E. Possin,** General Electric Company, Schenectady, NY

10:45—*A Laser Triggered Self-Sustaining Metals-Compound Semiconductor Transition for $A1Sb^{+}$,* **R. Andrew, L. Baufay, A. Pigeolet** and **L. D. Laude,** Universite de l'Etat, Mons, Belgium

11:00—*Pulsed Electron Beam Polishing of Heteroepitaxial Thin Films,* **S. P. Tobin, A. C. Greenwald, R. G. Wolfson** and **T. Wong,** Spire Corporation, Bedford, MA and NERC, Inc., Sudbury, MA

*Invited Talk

SESSION VIII.
DEPOSITED LAYERS, METALS AND SILICIDES

Chairman: J. C. C. Fan, MIT Lincoln Laboratory

Thursday Morning, November 19 — Georgian Room

8:30—**Beam Recrystallized Silicon-on-Insulator Devices,* **H. W. Lam,** Texas Instruments, Inc., Dallas, TX

9:00—*Grain Enlargement in Polysilicon on Insulating Substrates Induced by Q-Switched Nd-YAG Laser Irradiation,* **R. J. Falster, G. E. J. Eggermont** and **J. F. Gibbons,** Quantronix Corporation, Smithtown, NY, Philips Research Laboratories, Sunnyvale, CA and Stanford Electronics Laboratories, Stanford, CA

9:15—*Optical, Structural and Electrical Characteristics of Explosively Crystallized Si Thin Films on Glass Substrates,* **G. Auvert, A. Perio** and **F. Morin,** CNET, Grenoble, France

9:30—*Laser and Electron Beam Induced Explosive Crystallization of a-Si on Silicon Substrates,* **M. Lerme, T. Ternisien, D. P. Vu** and **V. T. Nguyen,** CNET, Grenoble, France

9:45—*Uniform and Directed Crystallization of Deposited a-Si on Glass Substrates at Linear Velocities of 1 to 20 Meters Per Second,* **D. Bensahel** and **G. A. Rozgonyi,** CNET, Grenoble, France

10:00— BREAK

10:15—*CW Laser Melting of Ni-Si and Co-Si Films Evaporated on Fused Quartz,* **M. A. Bosch, A. H. Dayem, T. R. Harrison** and **R. A. Lemons,** Bell Laboratories, Holmdel, NJ

10:30—*Interplay of Thermally Assisted and Normal Impurity Diffusion During Laser vs. Electron Beam Heat Flow Transients in Metals,* **L. F. Dona dalle Rose** and **M. Miotello,** Unita GNSM-CNR, Padova, Italy and Istituto per la Ricerca Scientifica e Tecnologica, Povo, Italy

10:45—*Epitaxial Silicide Formation by Scanning Electron Beam Annealing,* **H. Ishiwara** and **H. Yamamoto,** Tokyo Institute of Technology, Yokohama, Japan

11:00—*Study of Titanium and Nickel Silicide Formation by Q-Switched Laser and Multi-Scanning E-Beam,* **G. G. Bentini, R. Nipoti, M. Servidori, C. Cohen** and **A. V. Drigo,** CNR Istituto LAMEL, Bologna, Italy

11:15—*Studies of Laser-Alloyed Zr-Containing Surface Layers,* **C. W. Draper, F. J. A. den Broeder, D. C. Jacobson, E. N. Kaufmann** and **J. M. Vandenberg,** Western Electric, Princeton, NJ and Bell Laboratories, Murray Hill, NJ

11:30—*Formation of p-n Junctions by Laser Processing Sb-Pt Thin Films on Si,* **R. J. Schutz, G. K. Celler** and **C. C. Chang,** Bell Laboratories, Murray Hill, NJ

11:45—*Laser-Induced Liquid Zone Migration of Metal-Silicon Alloys in Si,* **P. Kluge-Weiss** and **P. Roggwiller,** Brown Boveri Research Center, Baden, Switzerland

12:00—*CO_2 Laser Crystallization of Silicon on Bulk Fused Silica,* **William G. Hawkins** and **Jerry Black,** Xerox Webster Research Center, Webster, NY

12:15— LUNCH

SESSION IX.
DEVICE APPLICATIONS

Chairmen:
L. D. Hess, Hughes Research Laboratories
C. Hill, Plessey Research Ltd.

Thursday Afternoon, November 19 — Georgian Room

1:45—**Silicon Devices Fabricated by Using Laser Irradiation Process,* **M. Tamura, N. Natsuaki, M. Miyao, M. Ohkura** and **T. Tokuyama,** Hitachi, Ltd., Tokyo, Japan

2:15—*Shaping of Dopant Concentration Profiles in Silicon by Multiple Pulse Laser Processing,* **C. Hill, A. L. Butler** and **J. Daly,** Plessey Research (Caswell) Ltd., Towcester, England

2:30—*Laser-Assisted MOS/SOS Device Fabrication,* **L. D. Hess, S. A. Kokorowski, G. L. Olson, Y. M. Chi, A. Gupta** and **J. B. Valdez,** Hughes Research Laboratories, Malibu, CA and Hughes Newport Beach Research Center, Newport Beach, CA

2:45—*Schottky-Diodes in Laser Recrystallized Polysilicon,* **H. Schaber, H. Schelpmeier, W. M. Werner** and **D. Cutter,** Siemens AG, Munchen, FRG

3:00—*Pulsed Laser Annealing of rf Sputtered Amorphous Si:H Films, Doped with Arsenic,* **E. Fogarassy, R. Stuck, M. Toulemonde, P. Siffert, J. F. Morhange** and **M. Balkanski,** CRN, Strasbourg, France and Universite Paris, Paris, France

3:15—*Multiple E-Beam Processing Techniques,* **R. A. McMahon** and **H. Ahmed,** University of Cambridge, Cambridge, England

3:30— BREAK

3:45—**Beam Processing of Silicon with Large Diameter CW Sources,* **James F. Gibbons,** Stanford Electronics Laboratories, Stanford University, Stanford, CA

4:15—*Optimised Multi-Scan E-Beam Annealing of Boron Implants in MOS Device Processing,* **A. E. Glaccum, C. J. Pollard** and **J. D. Speight,** British Telecom Laboratories, Suffolk, England

4:30—*Pulsed Electron Beam Processing of Silicon,* **A. C. Greenwald, R. G. Wolfson** and **R. G. Little,** Spire Corporation, Bedford, MA

4:45—*Silicon-On-Insulator MOSFETs on Zone-Melting Recrystallized Poly-Si Films on SiO_2,* **B. Y. Tsaur, M. W. Geis, John C. C. Fan, D. J. Silversmith** and **R. W. Mountain,** MIT, Lexington, MA

5:00—*CW Annealing Techniques for Junction Formation in Ge,* **J. P. Lorenzo, D. Eirug Davies** and **K. J. Soda,** RADC/ESO, Hanscom AFB, MA

*Invited Talk

SYMPOSIUM B
GRAIN BOUNDARIES IN SEMICONDUCTORS

Chairmen:
C. H. Seager, Sandia Laboratories
G. E. Pike, Sandia Laboratories
H. J. Leamy, Bell Laboratories

November 16-19, 1981

SESSION B-1
STRUCTURAL PROPERTIES

Monday Morning, November 16 — Ballroom West

Chairman: W. D. Kingery, MIT, Cambridge, MA

7:55- 8:00—*Introductory Remarks:* **G. Pike,** Sandia National Laboratories, Albuquerque, NM

8:00- 8:50—*Characterization of Grain Boundaries in Electronic Ceramics by Electron Microscopy (Invited),* **D. R. Clarke,** Rockwell International Science Center, Thousand Oaks, CA

8:50- 9:05—*Experimental Study of the Relative Energy of Symmetrical <110> Tilt Boundaries in a Semi-Conducting F.C.C. Oxide (NiO),* **A. Revcolevschi, M. Dechamps** and **G. Dhalenne,** Laboratoire de Chimie Appliquee, Universite Paris XI, Orsay, France

9:05- 9:20—*High Resolution Electron Microscopy of Grain Boundaries in Silicon,* **B. Cunningham** and **D. G. Ast,** Cornell University, Ithaca, NY

9:20- 9:35—*Electron Microscopy Study of the Structure of Σ=3, 9, 11 Symmetrical Tilt Grain Boundaries in Germanium,* **A. M. Papon, M. Petit, G. Silvestre, J. J. Bacmann,** Centre D'Etudes Nucleaires De Grenoble, Grenoble, France

9:35- 9:50—*The Structure of Dislocations in Low-Angle Grain Boundaries in the Diamond Cubic Lattice,* **C. B. Carter,** Cornell University, Ithaca, NY

9:50-10:05—*Structure of Twin Boundaries in Silicon,* **C. Fontaine** and **D. A. Smith,** IBM T. J. Watson Research Center, Yorktown Heights, NY

10:05-10:20— BREAK

10:20-10:35—*Silicon Twin Boundaries: Structure and Internal Defects,* **Andre Rocher, Christiane Dianteill,** Laboratoire d'Optique Electronique du CNRS, Toulouse, France; and **Mongi Labidi,** Universite de Tunis, Tunisie

10:35-10:50—*TEM Methods for the Characterization of Grain Boundaries in Ceramics,* **N. W. Jepps, T. F. Page**

and **W. M. Stobbs,** Cambridge University, Cambridge, United Kingdom

10:50-11:05—*The Electrical Activity of Twin Boundaries in Silicon,* **B. Cunningham, H. P. Strunk** and **D. G. Ast,** Cornell University, Ithaca, NY

11:05-11:20—*Space Charge Distributions Near Interfaces During Kinetic Process,* **M. F. Yan,** Bell Laboratories, Murray Hill, NJ; **R. M. Cannon** and **H. K. Bowen,** MIT, Cambridge, MA

11:20-11:35—*Effect of Doping and Oxidation on Grain Growth in Polysilicon,* **D. A. Smith** and **T. Y. Tan,** IBM T. J. Watson Research Center, Yorktown Heights, NY

11:35-11:50—*Secondary Ion Images of Impurities at Grain Boundaries in Polycrystalline Silicon,* **Gary A. Pollock,** ARCO Solar Inc., Chatsworth, CA; **V. R. Deline** and **B. K. Furman,** Charles Evans and Associates, San Mateo, CA

11:50-12:05—*Preparation of Oriented GaAs Bicrystal Layers by Vaporphase Epitaxy Using Lateral Overgrowth,* **Jack P. Salerno, R. W. McClelland, P. Vohl, John C. C. Fan, W. Macropoulos,** and **C. O. Bozler,** MIT, Lincoln Laboratory, Lexington, MA; and **A. F. Witt,** MIT, Cambridge, MA

SESSION B-2
ELECTRICAL PROPERTIES

Monday Afternoon, November 16 — Ballroom West

Chairman: S. J. Fonash, Pennsylvania State University, University Park, PA

1:30-1:35—*Introductory Remarks and Announcements*

1:35-2:25—*Electronic Properties of Semiconductor Grain Boundaries (Invited),* **C. H. Seager,** Sandia National Laboratories, Albuquerque, NM

2:25-2:40—*Transport Across Silicon Grain Boundaries,* **J. Werner, W. Jantsch** and **H. J. Queisser,** Max-Planck-Institut fur Festkorperforschung, Stuttgart, West Germany

2:40- 2:55—*Light Effects on Grain Boundary Properties in Silicon,* **L. J. Cheng** and **C. M. Shyu,** California Institute of Technology, Pasadena, CA

2:55- 3:10—*Electrical and Structural Properties of Grain Boundaries in Polycrystalline Si,* **R. T. Young, J. Narayan,** and **Y. K. Chang,** Oak Ridge National Laboratory, Oak Ridge, TN

3:10- 3:25—*Direct Measurement of the Density and the Capture Cross Section of Grain Boundary States in Germanium,* **A. Broniatowski,** Laboratoire P.M.T.M., France, and **J. C. Bourgoin,** Laboratoire de Physique des Solides de l'E.N.S., Universite Paris VII, Paris, France

3:25- 3:40— · BREAK

3:40-3:55—*Characterization of Grain Boundaries in Poly-Crystalline GaAs,* **Michael G. Spencer,** Howard University, Washington, D.C., and **D. Ken Wagner,** Cornell University, Ithaca, NY

3:55-4:10—*Electronic States Associated with Grain Boundaries in Silicon,* **C. M. Shyu** and **L. J. Cheng,** California Institute of Technology, Pasadena, CA

4:10-4:25—*D.L.T.S. Studies on Polycrystalline Silicon,* **P. C. Srivastava** and **J. C. Bourgoin,** Universite Paris VII, Paris, France

4:25-4:40—*Electronic Structure of Grain Boundaries and Interfaces in Polycrystalline Zinc Oxide,* **M. H. Sukkar, H. L. Tuller** *and* **K. H. Johnson,** Massachusetts Institute of Technology, Cambridge, MA

4:40-4:55—*A Study of the Electrical Activity of Arsenic on the Si(100) Surface,* **S. C. Perino** and **C. R. Helms,** Stanford University, Stanford, CA

SESSION B-3
SOLAR CELLS – I

Tuesday Morning, November 17 – Ballroom West

Chairman: A. Heller, Bell Laboratories, Murray Hill, NJ

8:00- 8:05—*Introductory Remarks and Announcements*

8:05- 8:55—*Grain Boundary Structures and Properties in Polycrystalline Silicon (Invited),* **T. Surek, Y. S. Tsuo,** and **J. B. Milstein,** Solar Energy Research Institute, Golden, CO

8:55- 9:45—*EBIC/TEM Studies of Grain Boundaries in Silicon (Invited),* **D. G. Ast, B. Cunningham** and **H. P. Strunk,** Cornell University, Ithaca, NY

9:45-10:35—*Hydrogen Passivation in Polycrystalline Silicon (Invited),* **B. Faughnan,** RCA Laboratories, Princeton, NJ

10:35-10:50— BREAK

10:50-11:05—*The Observation of Enhanced Photoresponse at Dislocation Subgrain Boundaries in Polysilicon Solar Cells,* **S. M. Johnson*, R. W. Armstrong**, R. G. Rosemeier**, G. M. Storti*, H. C. Linn**,** *Solarex Corporation, Rockville, MD; **University of Maryland, College Park, MD

11:05-11:20—*Influence of Carbon and Hydrogen Segregation on the Electrical Properties of Grain Boundaries in Polycrystalline Silicon Sheets,* **Ottilia Rallon, Marc Aucouturier,** Laboratoire de Metallurgie Physique, Universite Paris-Sud, France; **C. Texier-Hervo, M. Mautref, C. Belouet,** Laboratorie de Marcoussis, CGE, Marcoussis, France

11:20-11:35—*Effects of Heat Treatment on Grain Boundary Properties in Cast Polycrystalline Silicon,* **Phillip E. Russell,** Solar Energy Research Institute, Golden, CO; **D. E. Burk** and **P. H. Holloway,** University of Florida, Gainesville, FL

11:35-11:50—*The Effect of Grain Boundary Sheet Conductance in Diode and Solar Cell Characteristics,* **S. Roy Morrison,** SRI International, Menlo Park, CA

11:50-12:05—*Chemical and Ion Beam Etch Studies of Poly-Crystalline Silicon,* **P. A. Lester, R. Singh, D. Rice, R. N. Pangborn, S. Ashok,** and **S. J. Fonash,** The Pennsylvania State University, University Park, PA

SESSION B-4
SOLAR CELLS – II

Wednesday Morning, November 18 – Parlor A

Chairman: R. Wood, Oak Ridge National Laboratory, Oak Ridge, TN

8:30- 8:35—*Introductory Remarks and Announcements*

8:35- 9:25—*Effects of Grain Boundaries in GaAs Solar Cells (Invited),* **A. E. Blakeslee,** Solar Energy Research Institute, Golden, CO

9:25-10:15—*Chemical Control of Electron Hole Recombination at Grain Boundaries on n-GaAs and p-InP (Invited),* **Adam Heller,** Bell Laboratories, Murray Hill, NJ

10:15-10:30—*High-Spatial-Resolution Diffusion Length Measurements in Polycrystalline GaAs,* **Robert Fletcher, D. Ken Wagner** and **Joseph M. Ballantyne,** Cornell University, Ithaca, NY

10:30-10:45— BREAK

10:45-11:00—*Charge Collection Characterization of Polycrystalline n-GaAs Layers for Solar Cells,* **O. Paz,** IBM East Fishkill, Hopewell Junction, NY; **K. N. Bhat** and **J. M. Borrego,** Rensselaer Polytechnic Institute, Troy, NY

11:00-11:15—*Grain Boundary Passivation and Analysis for Solar Cell Applications,* **V. J. Rao, W. A. Anderson** and **F. Kai,** State University of New York at Buffalo, Amherst, NY

11:15-11:30—*Advantages of MIS Processing on Passivated Poly-Si,* **G. Rajeswaran, M. Thayer, V. J. Rao** and **W. A. Anderson,** State University of New York at Buffalo, Amherst, NY

SESSION B-5
MICROELECTRONICS – I

Wednesday Afternoon, November 18 – Parlor A

1:00-1:05—*Introductory Remarks and Announcements*

1:05-1:55—*Potential Applications of Poly-Silicon as an Electronic Device Material (Invited),* **D. Bartelink,** Xerox Palo Alto Research Laboratory, Palo Alto, CA

1:55-2:45—*Physical and Electrical Properties of Polycrystalline Silicon Thin Films (Invited),* **Krishna C. Saraswat,** Stanford University, Stanford, CA

2:45-3:00— BREAK

3:00-3:50—*Surface Mobilities in Laser Processed Polycrystalline Silicon Thin Films (Invited),* **R. C. Frye** and **K. K. Ng,** Bell Laboratories, Murray Hill, NJ

3:50-4:40—*Grain Boundaries in Crystallized Silicon Thin Films (Invited),* **N. M. Johnson, D. K. Biegelsen,** and **M. D. Moyer,** Xerox Palo Alto Research Centers, Palo Alto, CA

4:40-4:55—*Grain Boundary Dominated Conductivity in Polycrystalline Semiconductor Thin Film Transistors,* **J. Levinson, F. R. Shepherd,** and **W. D. Westwood,** Bell-Northern Research, Ottawa, Canada

SESSION B-6
MICROELECTRONICS – II

Wednesday Evening, November 18 – Parlor A

Chairman: H. J. Leamy, Bell Laboratories, Murray Hill, NJ

7:25- 7:30—*Introductory Remarks and Announcements*

7:30- 8:20—*Polycrystalline Silicon Resistors: Theory, Technology Applications, and Limitations (invited),* **Levy Gerzberg, Nicky C. C. Lu** and **James D. Meindl,** Integrated Circuits Laboratory, Stanford University, Stanford, CA

8:20- 9:10—*Mosfet Operation in Small-Grain Polysilicon (Invited),* **Steven W. Depp, B. G. Huth, A. Juliana,** and **R. W. Koepcke,** IBM Research Laboratory, San Jose, CA

9:10- 9:25—*Characterization of Electrical Conduction in Laser-Recrystallized Poly-Crystalline Silicon Resistors,* **H. J. Singh*, N. C-C. Lu*, D. J. Bartelink**, *L. Gerzberg*,** and **J. D. Meindl*,** *Integrated Circuits Laboratory, Stanford University, Stanford, CA; **Xerox Corporation, Palo Alto Research Centers, Palo Alto, CA

9:25- 9:40—*Diffusion of Arsenic in Laser Processed Poly-Crystalline Silicon Thin Films,* **H. Baumgart, H. J. Leamy, L. E. Trimble, C. J. Doherty** and **G. K. Celler,** Bell Laboratories, Murray Hill, NJ

9:40- 9:55—*Furnace Annealing of Ion Implanted Poly-crystalline Silicon,* **J. L. Tandon, H. B. Harrison, C. L. Neoh, K. T. Short** and **J. S. Williams,** Royal Melbourne Institute of Technology, Melbourne, Australia

9:55-10:10—*Laser Recrystallization of Poly Si on SiO_2 for High Performance Resistors,* **Rajiv R. Shah, D. Randy Hollingsworth,** and **D. Lloyd Crosthwait,** Texas Instruments Inc., Dallas, TX

SESSION B-7
ELECTRONIC CERAMIC DEVICES – I

Thursday Morning, November 19 – Parlor A

Chairman: Tapan K. Gupta, Westinghouse R&D, Pittsburgh, PA

8:30- 8:35—*Introductory Remarks and Announcements*

8:35- 9:25—*Zinc Oxide Varistors - An Overview (Invited),* **Lionel M. Levinson,** General Electric Company, Schenectady, NY

9:25-10:15—*Theory of ZnO Varistors (Invited),* **G. D. Mahan,** Indiana University, Bloomington, IN

10:15-10:30— BREAK

10:30-11:20—*Grain Boundary Phenomena in ZnO Varistors (Invited),* **R. Einzinger,** Siemens AG Research Laboratories, Munich, West Germany

11:20-11:35—*Varistor Properties of TiO_2-Based Ceramics,* **Man F. Yan** and **W. W. Rhodes,** Bell Laboratories, Murray Hill, NJ

11:35-11:50—*Effects of Surface Layer Defects and Adsorbed Oxygen on TiO_2 - Rutile Schottky Barriers,* **Mark Levinson,** Bell Laboratories, Murray Hill, NJ

SESSION B-8
ELECTRONIC CERAMIC DEVICES – II

Thursday Afternoon, November 19 – Parlor A

Chairman: H. R. Philipp, General Electric R&D, Schenectady, NY

1:45-1:50—*Introductory Remarks and Announcements*

1:50-2:40—*Electronic Properties of ZnO Varistors (Invited),* **G. E. Pike,** Sandia National Laboratories, Albuquerque, NM

2:40-3:30—*Electrical Properties of ZnO-Bi_2O_3 Oxide Heterojunction (Invited),* **Kazuo Eda,** Matsushita Electric Industrial Co., Ltd. Wireless Research Laboratory, Osaka, Japan

3:30-3:45— BREAK

3:45-4:00—*Prebreakdown Current-Voltage Analysis of Potential Barriers in ZnO Varistor Compositions,* **Michel Graciet** and **Francoise Buchy,** Laboratoire Central de Recherches, Thompson-CSF, Orsay, France

4:00-4:15—*Metastable Barrier Voltage in ZnO Varistors,* **T. K. Gupta, B. O. Hall** and **W. G. Carlson,** Westinghouse Research and Development Center, Pittsburgh, PA

4:15-4:30—*Degradation of Zinc Oxide Varistors,* **Ken Takahashi, T. Miyoshi, K. Maeda, T. Yamazaki,** and **S. Ohwada,** Hitachi Ibaraki-ken, Japan

4:30-4:45—*Thermal Runaway in Metal Oxide Varistors,* **Martin A. Seitz** and **Richard Hirthe,** Marquette University, Milwaukee, WI and **M. E. Potter,** McGraw-Edison Co., Franksville, WI

4:45-5:00—*Electrical Conductivity Characteristics of Internal Boundary Layer Capacitors,* **S. B. Desu, C.T.A. Suchicital** and **D. A. Payne,** University of Illinois at Urbana-Champaign, Urbana, IL

SYMPOSIUM C
THIN FILMS AND INTERFACES

Chairmen: P. S. Ho and K. N. Tu
IBM T. J. Watson Research Center, Yorktown Heights, NY

November 17-19, 1981

SESSION C-1
METAL-SEMICONDUCTOR INTERFACES

Tuesday Morning, November 17 – Parlor C

Chairmen:
J. Blakely, Cornell University, Ithaca, NY
P. S. Ho, IBM T. J. Watson Research Center, Yorktown Heights, NY

9:00—**Microscopic Theory of Metal-Semiconductor Interfaces,* **M. Schluter,** Bell Laboratories, Murray Hill, NJ

9:40—**Electronic Structure of Silicide/Si Interfaces,* **G. W. Rubloff** and **P. S. Ho,** IBM T. J. Watson Research Center, Yorktown Heights, NY

10:20— BREAK

10:40—**Atomic Views of the Behaviors of Single Silicon Atoms on Metal Surfaces,* **T. T. Tsong,** The Pennsylvania State University, University Park, PA

11:20—*Atomic Interdiffusion, Chemical Reaction, and Barrier Formation at Metal-Compound Semiconductor Interfaces,* **C. F. Brucker** and **L. J. Brillson,** Xerox Webster Research Center, Webster, NY

11:40—*Low-temperature Intermixing Reactions Between Silicon and Metals,* **A. Hiraki,** Osaka University, Osaka, Japan

*Invited Talk

SESSION C-2
SILICIDE-Si INTERFACES

Tuesday Afternoon, November 17 — Parlor C

Chairmen:
S. Mader, IBM General Tech. Div., E. Fishkill, NY
C. M. Wayman, University of Illinois, Urbana, IL

2:00—**Epitaxial Growth of Silicides,* **J. M. Poate, J. C. Bean, J. M. Gibson, D. C. Jacobson** and **R. T. Tung,** Bell Laboratories, Murray Hill, NJ

2:40—*Transmission Electron Microscopy of Silicide-Silicon Interfaces,* **L. J. Chen, J. W. Mayer,** Cornell University, Ithaca, NY; **K. N. Tu,** IBM T. J. Watson Research Center, Yorktown Heights, NY; **T. T. Sheng,** Bell Laboratories, Murray Hill, NJ

3:00—*The Effects of Nucleation and Growth on Epitaxy in the $CoSi_2$/Si System,* **J. C. Bean, J. M. Gibson, J. M. Poate** and **R. T. Tung,** Bell Laboratories, Murray Hill, NJ

3:20— BREAK

3:40—*Analysis of High Resolution Electron Microscope Images of the Pd_2Si-Si Interface,* **W. Krakow, D. A. Smith,** IBM T. J. Watson Research Center, Yorktown Heights, NY and **D. Cherns,** Oxford University, Oxford, England

4:00—*$CrSi_2$, $ZrSi_2$ and $TiSi_2$ Formation Sudied by a Radioactive ^{31}Si Marker Technique,* **A. P. Botha** and **R. Pretorius,** Southern Universities Nuclear Institute, Faure, South Africa

4:20—*Formation and Structures of Epitaxial Silicides on Silicon,* **L. J. Chen, J. W. Mayer,** Cornell University, Ithaca, NY, and **K. N. Tu,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:40—*An Epitaxial Si/Insulator/Si Structure by Vacuum Deposition of CaF_2 and Si,* **T. Asano,** Tokyo Institute of Technology, Yokohama, Japan

*Invited Talk

SESSION C-3
INTERFACE ANALYSIS AND CHARACTERIZATION

Wednesday Morning, November 18 – Parlor C

Chairmen:
J. E. E. Baglin, IBM T. J. Watson Research Center, Yorktown Heights, NY
S. S. Lau, University of California at San Diego, La Jolla, CA

9:00—******Ion-Beam Crystallography of Interfaces,* **F. W. Saris,** FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

9:40—*Defects at the Ge/Si Interface,* **D. K. Sadana, J. Washburn,** University of California, Berkeley, CA., **M. Maenpaa, T. F. Kuech,** California Institute of Technology, Pasadena, CA, and **S. S. Lau,** University of California at San Diego, La Jolla, CA

10:00—*Effects of Electrically Active Impurities on Epitaxial Regrowth Rate of Amorphized Si and Ge,* **I. Suni, G. Goltz,** and **M-A. Nicolet,** California Institute of Technology, Pasadena, CA, and **S. S. Lau,** University of California at San Diego, La Jolla, CA

10:20— BREAK

10:40—*Non-planar Solid Phase Epitaxial Growth Processes in Ion Implanted GaAs,* **J. S. Williams, F. M. Adams,** and **K. G. Rossiter,** Royal Melbourne Institute of Technology, Melbourne, Australia

11:00—*Dislocations as Growth Step Sources in Solution Growth and Their Influence on Interface Structures,* **E. Bauser** and **H. Strunk,** Max-Planck-Institut Fur Metallforschung, Stuttgart, West Germany

11:20—*Characterization of Heterinterfaces in (Al, Ga) As Double Heterostructures,* **V. Swaminathan, W. R. Wagner, N. E. Schumaker** and **R. C. Miller,** Bell Laboratories, Murray Hill, NJ

11:40—*In Situ X-ray Diffraction Study of the Interfacial Processes Between Gold and Gallium Arsenide,* **Xian-Fu Zeng, D. D. L. Chung,** Carnegie-Mellon University, Pittsburgh, PA

*Invited Talk

SESSION C-4
INTERFACE-RELATED THIN FILM STUDIES

Wednesday Afternoon, November 18 – Parlor C

Chairmen:
U. Gosele, Max-Planck Institute, Stuttgart, Germany
M-A. Nicolet, California Institute of Technology, Pasadena, CA

2:00—******Analysis of Surface Structural Defects by Low-energy Electron Diffraction,* **M. G. Lagally, D. G. Welkie, T. M. Lu,** and **H. M. Clearfield,** University of Wisconsin, Madison, WI

2:40—*The Direct Observation of Atomic Surface Structure and Inclined Planar Defects in (111) Au Films,* **W. Krakow,** IBM T. J. Watson Research Center, Yorktown Heights, NY

3:00—*Growth Kinetics of Nickel/Silicides Studied by Radiotracer and Backscattering Techniques,* **J. E. E. Baglin, D. Gupta** and **H. Atwater,** IBM T. J. Watson Research Center, Yorktown Heights, NY

3:20— BREAK

3:40—*Comparison of the Three Classes (Rare Earth, Refractory and Near Noble) of Silicide Contacts,* **R. D. Thompson** and **K. N. Tu,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:00—*Differences Between the Growth Kinetics of Thin Film and Bulk Diffusion Couples,* **U. Gosele** and **K. N. Tu,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:20—*Sequence of Formation of Intermetallics and Grain Boundary Diffusion in Al-Cu and Al-Au Thin-Film Couples,* **J. M. Vandenberg, F. J. A. den Broeder, W. L. Brown** and **R. A. Hamm,** Bell Laboratories, Murray Hill, NJ

4:40—*Formation and Growth of Voids and/or Gas Bubbles in Thin Films,* **J. R. Lloyd,** IBM, General Technology Div., E. Fishkill, NY, and **S. Nakahara,** Bell Laboratories, Murray Hill, NJ

*Invited Talk

SESSION C-5

THIN FILM APPLICATIONS IN MICROELECTRONICS I

Thursday Morning, November 19 — Parlor C

Chairmen:
W. Brown, Bell Laboratories, Murray Hill, NJ
J. Zemel, University of Pennsylvania, Philadelphia, PA

9:00—**Structure and Performance of Polycrystalline Thin-Film Solar Cells,* **E. S. Yang,** Columbia University, NY

9:40—*Interface Studies on Metal-Amorphous Silicon Interfaces,* **W. W. Anderson, J. L. Crowley, H. F. MacMillian** and **A. D. Jonath,** Lockheed Research Laboratory, Palo Alto, CA

10:00—*Electron-Beam Study of Silicide Schottky Diodes,* **H.-C. W. Huang, C. F. Aliotta** and **P. S. Ho,** IBM T. J. Watson Research Center, Yorktown Heights, NY

10:20— BREAK

10:40—*Interface State of Si MOSFET Studies by Dynamic Conductance and Noise Measurements and Effects of Bias Temperature Stresses,* **K. L. Ngai,** Naval Research Laboratory, Washington, D. C.

11:00—*Effects of Interface Structure on the Electrical Characteristics of PtSi-Si Schottky Barrier Contacts,* **B-Y Tsaur, D. J. Silversmith** and **R. W. Mountain,** MIT, Lexington, MA

11:20—*Role of Grain Boundaries as Conduction Limiting Defects in Cosputtered WSi_2 Films,* **D. R. Campbell, S. Mader** and **W. K. Chu,** IBM General Technology Div., E. Fishkill, NY

11:40—*New Developments in Ion Implanted Furnace Annealed Silicon on Sapphire Films,* **E. D. Richmond** and **A. R. Knudson,** Naval Research Laboratory, Washington, D.C.

*Invited Talk

SESSION C-6

THIN FILM APPLICATIONS IN MICROELECTRONICS II

Thursday Afternoon, November 19 — Parlor C

Chairmen:
G. Ottaviani, Institute of Physics, Modena, Italy
K. N. Tu, IBM T. J. Watson Research Center, Yorktown Heights, NY

2:00—**Silicide Applications in Microelectronics,* **B. L. Crowder,** IBM T. J. Watson Research Center, Yorktown Heights, NY

2:40—**Metallization for Very Large Scale Integrated Circuits,* **P. B. Ghate,** Texas Instruments, Inc., Dallas, TX

3:00—*On the Role of Passivation Defects on Electromigration Induced Failure in Thin Films,* **J. R. Lloyd,** IBM General Technology Div., E. Fishkill, NY

3:20— BREAK

4:00—*Applications of TiN Thin Films in Si Device Technology,* **M. Wittmer** and **H. Melchior,** Swiss Federal Institute of Technology, Zurich, Switzerland

4:20—*The Effective Height of a Platinum-Silicide Barrier on A p-type Silicon Substrate,* **C.-Y. Wei, W. Tantraporn, W. Katz, G. Smith,** General Electric Corporate Research and Development Center, Schenectady, NY, and **H. Bakhrut,** SUNY, Albany, NY

4:40—*Oxide Barriers to Formation of Refractory Silicides,* **D. J. Silversmith, D. D. Rathman** and **R. W. Mountain,** MIT, Lexington, MA

*Invited Talk

SYMPOSIUM D

INTERNATIONAL SYMPOSIUM ON THE SCIENTIFIC BASIS FOR NUCLEAR WASTE MANAGEMENT

Chairman:
Stephen V. Topp, Du Pont - Savannah River Laboratory, Aiken, SC

November 16-19, 1981

ABOUT THE SYMPOSIUM

The purpose of this symposium is to provide an interdisciplinary forum for discussion of the scientific aspects of nuclear waste management. Invited and contributed papers will be presented on research dealing with all levels and types of radioactive wastes and their management. The presentations will emphasize scientific foundations underlying such subject areas as:

- —Treatment and disposal of non-high-level radioactive waste
- —Waste-near-field interaction
- —Waste form processing complexities at large scale
- —Waste form properties
- —Methodology and standards for waste management
- —Canister/container lifetime and compatibility
- —Backfill barriers
- —In situ migration
- —Characterization and modeling of fractured rock
- —Chemistry of waste elements in the geologic environment
- —Performance assessment of nuclear waste management
- —Related topics in geology (e.g., predictive geology, metamictization, natural analogues)

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.

PROGRAM COMMITTEE

S. V. Topp, Chairman, Du Pont - Savannah River Laboratory
L. A. Boatner, Oak Ridge National Laboratory
C. J. M. Northrup, Jr., Sandia National Laboratories
J. D. Tewhey, Jordan Gorrill Associates
D. G. Brookins, University of New Mexico
C. M. Brown, Rockwell - Rocky Flats
W. A. Ross, Battelle Pacific Northwest Laboratory
J. G. Steger, Los Alamos Scientific Laboratory
J. Kircher, Office of Nuclear Waste Isolation
K. Wolfsberg, Los Alamos Scientific Laboratory

STEERING COMMITTEE

John A. Stone, Chairman, Savannah River Laboratory, USA
Claude Sombret, Commissariat a l'Energie Atomique, FRANCE

Torbjorn Westermark, Royal Institute of Technology, SWEDEN
Peter Zuhlke, Gesellschaft zur Wiederaufarbeitung von Kernbrennstoffen, GERMANY
Eva L. J. Rosinger, Whiteshell Nuclear Research Establishment, CANADA
Takehiko Ishihara, Radioactive Waste Management Center, JAPAN
R. H. Flowers, AERE Harwell, UK
Daniel J. Lam, Argonne National Laboratory, USA
Julius R. Berreth, Idaho Chemical Processing Plant, USA
William B. White, Pennsylvania State University, USA
Samuel J. Basham, Battelle, Office of Nuclear Waste Isolation, USA
Gerald H. Daly, Department of Energy, USA
K. F. Kim, U. S. Nuclear Regulatory Commission, USA

SESSION A
CHEMICAL AND PHYSICAL PROPERTIES OF WASTE FORMS — SESSION I

Monday Morning, 8:15-12:15

Presiding: John A. Stone, Du Pont - Savannah River Laboratory and Peter Zuhlke, Federal Republic of Germany

8:15- 8:30 *Greeting and Opening Remarks* - **S. V. Topp**

8:30- 9:00 A1 —Invited Keynote Address: *An Experimental Comparison of Alternative Solid Forms for Savannah River High Level Wastes,* **J. A. Stone,** Du Pont - Savannah River Laboratory

9:00- 9:20 A2 —*Factors Affecting the Leach Rates of Perovskite and Sphene,* **G. M. Bancroft, J. Metson, H. W. Nesbitt, W. S. Fyfe,** and **P. J. Hayward,** Western Ontario University

9:20- 9:40 A3 —*Effects of Processing Parameters on SYNROC Performance,* **V. K. Sethi, J. K. Bates** and **R. M. Arons,** Argonne National Laboratory

9:40-10:00 A4 —*Behavior of Titanate - Based Waste Forms in Aqueous Solutions,* **R. G. Dosch,** Sandia National Laboratories

10:00-10:15 BREAK

10:15-10:35 A5 —*Iron - Enriched Basalt for Containment of Nuclear Wastes,* **J. M. Welch, P. V. Kelsey, Jr., S. P. Henslee, R. L. Tallman, R. P. Schuman, R. M. Horton, C. W. Sill, D. E. Owen** and **J. E. Flinn,** EG&G Idaho, Inc.

10:35-10:55 A6 —*Studies of Pollucite,* **E. R. Vance, B. E. Scheetz, M. W. Barnes** and **B. J. Bodnar,** Pennsylvania State University

10:55-11:15 A7 —*Evaluation of Ceramic Materials to Immobilize ICPP Calcines,* **B. A. Staples, H. S. Cole, J. C. Mittl,** Exxon Nuclear Idaho Company

11:15-11:35 A8 —*Immobilization of Savannah River High-Level Wastes in SYNROC: Results from Product Performance Tests,* **J. Campbell, C. Hoenig, C. Bazan, R. Ryerson** and **R. Van Konynenburg,** Lawrence Livermore National Laboratory

11:35-11:55 A9 —*The Application of Mossbauer Spectroscopy to the Characterization of Nuclear Waste Forms,* **L. A. Boatner** and **M. M. Abraham,** Oak Ridge National Laboratory; **P. G. Huray, M. T. Spaar, S. E. Nave** and **J. M. Legan,** University of Tennessee

11:55-12:15 A10 —*Photoemission Study of Leached 76-68 Waste Glass Surfaces,* **D. P. Karim, D. J. Lam, H. Diamond, A. M. Friedman,** Argonne National Laboratory; **D. G. Coles, F. Bazan,** Lawrence Livermore National Laboratory; **G. L. McVay,** Battelle Pacific Northwest Laboratory

SESSION B
GEOLOGIC AND GEOCHEMICAL CONSIDERATIONS

Monday Afternoon, 1:30-5:00

Presiding: Kurt Wolfsberg, Los Alamos National Laboratory; Douglas G. Brookins, University of New Mexico; and Eva L. J. Rosinger, AECL, Whiteshell, Canada

1:40- 2:00 B1 —*The Use of ^{222}Rn as a Flow Path Monitor for Studies of Radionuclide Transport in Fissures,* **J. Hines, D. Cohen, S. Fried** and **A. M. Friedman,** Argonne National Laboratory

2:00- 2:20 B2 —*Formation and Properties of Americium Colloids in Aqueous Systems,* **U. Olofsson, B. Allard, K. Andersson** and **B. Torstenfelt,** Chalmers University of Technology, Goteborg, Sweden

2:20- 2:40 B3 —*Site Characterization for Field Radionuclide Migration Studies in Climax Granite,* **D. Isherwood, E. Raber** and **R. Stone,** Lawrence Livermore National Laboratory

2:40- 3:00 B4 —*Nuclide Migration Field Experiments in Tuff, G-Tunnel, Nevada Test Site,* **B. R. Erdal, R. S. Rundberg, K. Wolfsberg,** Los Alamos National Laboratory; **D. R. Fortney, K. L. Erickson,** Sandia National Laboratories; **A. M. Friedman, S. Fried, J. J. Hines,** Argonne National Laboratory

3:00- 3:15 BREAK

3:15- 3:35 B5 —*Predicting Pu Concentrations in Solutions Contacting Geologic Materials,* **R. G. Strickert** and **D. Rai,** Battelle Pacific Northwest Laboratory

3:35- 3:55 B6 —*Transient Hydraulic Tests in Granite: Fractured Porous Medium Analysis and Results,* **J. H. Black** and **J. A. Barker,** Harwell Laboratory, UK

3:55- 4:15 B7 —*A Natural Analogue for Storage of Radwaste in Crystalline Rocks,* **D. G. Brookins, M. S. Abashian,** University of New Mexico; **L. H. Cohen,** University of California - Riverside; **H. A. Wollenberg, Jr.,** Lawrence Berkeley Laboratory

4:15- 4:35 B8 —*Radionuclide Migration: Laboratory Experitments with Isolated Fractures,* **R. J. Rundberg, S. Maestas,** Los Alamos National Laboratory; **J. L. Thompson,** Idaho State University

4:35- 4:55 B9 —*Effect of Organic Complexing Agents and Temperature on Adsorption of Radionuclides: Implications for Disposal of Radioactive Waste,* **A. Maest, S. Trehu, E. Dillon** and **D. Crerar,** Princeton University; **J. Means,** Battelle Columbus Laboratories

SESSION C
CANISTER, BACKFILL, AND NEAR-FIELD INTERACTIONS

Tuesday Morning, 8:15-12:00

Presiding: John Kircher, Office of Nuclear Waste Isolation, and Takehiko Ishihara, Radioactive Waste Management Center, Japan

8:20- 8:40 C1 —*Diffusion Measurements in Compacted Bentonite,* **B. Torstenfelt, K. Andersson, B. Allard** and **U. Olofsson,** Chalmers University of Technology, Goteborg, Sweden

8:40- 9:00 C2 —*Dissolution of Simulated Spent Fuel in Hydrothermal Solutions,* **W. P. Freeborn, S. Komarneni, B. E. Scheetz** and **W. B. White,** Pennsylvania State University

9:00- 9:20 C3 —*Migration Rates of Brine Inclusions in Single Crystals of NaCl,* **I-Ming Chou,** U. S. Geological Survey

9:20- 9:40 C4 —*Corrosion of Structural Materials in Clay Environments,* **J. Dresselaers, F. Casteels** and **H. Tas,** SCK/CEN, Mol, Belgium

9:40-10:00 C5 —*The Dissolution of Irradiated Fuel Under Hydrothermal Conditions,* **L. H. Johnson,** AECL, Whiteshell, Canada

10:00-10:15 BREAK

10:15-10:35 C6 —*Retardation, Permeability, and Swelling of Candidate Backfill Materials,* **J. H. Westsik, Jr., L. A. Bray, F. N. Hodges** and **E. J. Wheelwright,** Battelle Pacific Northwest Laboratory

10:35-10:55 C7 —*PNL - Sandia HLW Package Interactions Test: Phase One,* **M. A. Molecke,** Sandia National Laboratories; **D. J. Bradley** and **J. W. Shade,** Battelle Pacific Northwest Laboratory

10:55-11:15 C8 —*Experimental Studies of Processes Governing the Release and Subsequent Sorption of Nuclides in Granite Repositories,* **N. A. Chapman, P. J. Dudson, I. J. McKinley, D. Savage** and **J. M. West,** Institute of Geologic Sciences, Harwell, UK

11:15-11:35 C9 —*Degradation of Rocks Through Cracking Caused by Differential Thermal Expansion,* **R. W. Davidge, J. R. McLaren** and **I. Titchell,** AERE Harwell, UK

11:35-11:55 C10 —*Development of Engineered Structural Barriers for Nuclear Waste Packages,* **R. E. Westerman, S. G. Pitman** and **R. P. Elmore,** Battelle Pacific Northwest Laboratory

SESSION D
INVITED SPEAKERS ON OVERVIEW TOPICS

Tuesday Afternoon, 1:20-3:15

Presiding: John D. Tewhey, Jordan Gorrill Associates, and Claude Sombret, Atomic Energy Commission, France

1:20- 1:40 D1 —*ONWI Overall Program and Scientific Requirements,* **J. Kircher,** Office of Nuclear Waste Isolation

1:45- 2:05 D2 —*Materials Research for the Canadian Waste Management Program,* **D. J. Cameron,** AECL, Whiteshell, Canada

2:10- 2:30 D3 —*History of European Waste Management and Preview of Next Five Years,* **S. Orlowski,** Commission of European Communities

2:35- 2:50 D4 —*Material Aspects of NRC High-Level Waste Disposal Regulations,* **M. J. Bell** and **F. R. Cook,** U.S. Nuclear Regulatory Commission

2:55- 3:10 D5 —*Materials Implications of 10 CFR Part 61 (Low-Level Waste),* **P. H. Lohaus** and **R. D. Smith,** U. S. Nuclear Regulatory Commission

SESSION E
POSTER SESSION
GEOLOGIC, CANISTER, BACKFILL CONSIDERATIONS

Tuesday Afternoon, 3:15-5:00

Presiding: James G. Steger, Los Alamos National Laboratory, and Wayne A. Ross, Battelle Pacific Northwest Laboratory

E1 —*A Study of Zirconolite from Sri Lanka and South Africa,* **R. F. Haaker, R. C. Ewing,** University of New Mexico; **T. J. Headley,** Sandia National Laboratories

E3 —*Experimental and Theoretical Analyses of Small-Scale Radionuclide Migration Field Experiments,* **K. L. Erickson** and **D. R. Fortney,** Sandia National Laboratories

E4 —*Reference Laboratory Testing for Backfill,* **R. M. Chung** and **F. Y. Yokel,** National Bureau of Standards

E5 —*Studies of Localized Corrosion at High Temperatures of Pit and Crevice Microenvironments,* **V. K. Hardman** and **J. Kruger,** National Bureau of Standards

E6 —*Strontium - Basalt Reactions Under Nuclear Waste Repository Conditions,* **S. Komarneni,** Pennsylvania State University

E7 —*Backfill - Waste Interactions Under Radwaste Repository Conditions,* **N. Sasaki,** Tokai Works, Japan; **S. Komarneni, B. E. Scheetz** and **R. Roy,** Pennsylvania State University

E8 —*Alpha Decay Self-Damage in Cubic and Monoclinic Zirconolite,* **F. W. Clinard, Jr., C. C. Land, E. D. Peterson, D. L. Rohr** and **R. B. Roof,** Los Alamos National Laboratory

E9 —*Chemical, Physical, and Engineering Characterization of Candidate Backfill Clays and Clay Admixtures for a Nuclear Waste Repository,* **S. K. Singh,** Materials Research Laboratory, Ltd., Canada

E10 —*Radiation Induced Sodium Metal Colloid Formation in Natural Rock Salt from Several Geological Localities,* **J. J. Loman, P. W. Levy** and **K. J. Swyler,** Brookhaven National Laboratory

E11 —*Study of Polyhalite from the WIPP Site, New Mexico,* **D. G. Brookins,** University of New Mexico

E12 —*Uranium - Lead Radiometric Age Determinations of Naturally Occurring U(VI) Minerals: Application to Radwaste Storage,* **D. G. Brookins,** University of New Mexico

E13 —*Diffusion of Neptunyl(V)- and Pertechnetate Ions in Marine Sediments,* **F. Schreiner, S. Fried** and **A. Friedman,** Argonne National Laboratory

E14 —*Radiogeological Assessment of Candidate Sites for Nuclear Waste Repositories, Exemplified by Studies of the Stripa Pluton, Sweden,* **H. A. Wollenberg, S. Flexser** and **L. Andersson,** Lawrence Berkeley Laboratory

E15 —*Novel Experiments for Understanding the Shallow Land Burial of Low-Level Radioactive Wastes,* **G. L. DePoorter,** Los Alamos National Laboratory

E16 —*Identification of Possible High Integrity Containers for Nuclear Waste Disposal,* **J. Williams,** Hittman Nuclear and Development Corporation

E17 —*Predictions of Radionuclide Migration Rates for a Subseabed Repository,* **L. H. Brush,** Sandia National Laboratories

SESSION F
NON HIGH-LEVEL WASTE ASSESSMENTS

Wednesday Morning, 8:15-11:35

Presiding: James G. Steger, Los Alamos National Laboratory, and Ron H. Flowers, AERE Harwell, UK

8:20- 8:40 F1 —*Stochastic Analysis of Groundwater Flow and Contaminant Transport in a Fractured Rock System,* **F. D. Schwartz, A. S. Crowe,** University of Alberta; **L. Smith,** University of British Columbia, Canada

8:40- 9:00 F2 —*Solidification of Radioactive Wastes with Thermosetting Resin,* **M. Hayashi,** Tokyo Electric; **K. Kobayashi,** Tohoku Electric; **O. Okamoto,** Chubu Electric; **T. Kagawa,** Chugoku Electric; **K. Wakamatsu,** Japan Atomic; **H. Irie,** Tashiba Corporation; **H. Matsuura** and **Y. Nakayama,** NAIG Laboratory, Japan

9:00- 9:20 F3 —*Nuclear Waste Disposal: The Interface Between Performance Assessment and Research,* **R. B. Lyon,** AECL, Whiteshell, Canada

9:20- 9:40 F4 —*Processing of Titanates and Zeolites, and Use of a Cartridge System for "Reactor" Wastes,* **S. Forberg, T. Westermark, K. Svardstrom,** RIT, Stockholm; **L. Falth,** LIT, Lund, Sweden

9:40-10:00 F5 —*Performance of Asphalt and Clay Liners as a Uranium Mill Tailings Leachate Barrier,* **J. L. Buelt, V. Q. Hale** and **S. M. Barnes,** Battelle Pacific Northwest Laboratory

10:00-10:15 BREAK

10:15-10:35 F6 —*Behavior of Radionuclides in Fused Waste-Disposal-Site Soil Produced by In-Situ Vitrification,* **C. L. Timmerman** and **J. L. Buelt,** Battelle Pacific Northwest Laboratory

10:35-10:55 F7 —*A Comparative Assessment of TRU Immobilization Systems,* **W. A. Ross, C. O. Harvey, R. O. Lokken, R. P. May, F. P. Roberts, C. L. Timmerman, R. L. Treat** and **J. H. Westsik, Jr.,** Battelle Pacific Northwest Laboratory

10:55-11:15 F8 —*Low-Level Waste Disposal Risk Analysis,* **S. G. Oston, C. M. Koplik, D. A. Ensminger, J. Y. Nalbandian** and **M. F. Kaplan,** The Analytic Sciences Corporation

11:15- 1:35 F9 —*Leach Studies of Radionuclides from Solidified Wastes with Thermosetting Resin,* **K. Suzuki** and **H. Kuribayashi,** JGC Corp; **W. Morimitsu** and **I. Ono,** Industrial Research Institute of Kanagawa, Japan

SESSION G
PROCESSING COMPLEXITIES AT FULL SCALE

Wednesday Afternoon, 1:30-3:00

Presiding: Charles M. Brown, Rockwell-Rocky Flats, and Torbjorn Westermark, Royal Institute of Technology, Sweden

1:30- 1:45 G1 —*Processing Tailored Ceramic Nuclear Waste Forms,* **J. Flintoff, D. R. Clarke, A. B. Harker, P. E. D. Morgan** and **C. M. Jantzen,** Rockwell Science Center

1:45- 2:00 G2 —*On-Line Measurements of the Volatilization of Ruthenium in a Vitrification Process,* **R. Odoj,** Institute for Chemical Technology, Julich, FRG

2:00- 2:15 G3 —*Cementitious Radioactive Waste Hosts Formed Under Elevated Temperatures and Pressures (FUETAP Concretes),* **L. R. Dole, J. G. Moore, G. C. Rogers, G. A. West, H. E. Devaney, M. T. Morgan** and **J. H. Kessler,** Oak Ridge National Laboratory

2:15- 2:20 G4 —*Behavior of Radionuclides at Smelting of Non-combustible Solid Wastes,* **M. Osaki, S. Yokoi,** Daido Steel Company, Ltd.; **M. Miyagawa,** Chubu Electric Power Company, Japan

2:30- 2:45 G5 —*Vitrification of High-Level Radioactive Waste in a Small-Scale Joule-Heated Ceramic Melter,* **G. B. Woolsey, R. E. Eibling** and **Lien-Mow Lee,** Du Pont - Savannah River Laboratory

2:45- 3:00 G6 —*Metastable Liquid Immiscibility in Nuclear-Waste Glasses,* **J. E. Engell** and **G. Roed,** Technical Univ. of Denmark

SESSION H
POSTER SESSION
NON-HIGH-LEVEL, RADIATION EFFECTS, PROCESSING, AND CHEMICAL AND PHYSICAL PROPERTIES

Wednesday Afternoon, 3:00-5:00

Presiding: Charles M. Brown, Rockwell - Rocky Flats, and Kurt Wolfsberg, Los Alamos National Laboratory

H1 —*Mercury Reduction and Removal During High-Level Radioactive Waste Processing and Vitrification,* **R. E. Eibling** and **J. R. Fowler,** Du Pont - Savannah River Laboratory

H2 —*Interim Waste Forms for High-Level Radioactive Wastes: Processing and Properties,* **G. Bandyopadhyay** and **S. M. Gehl,** Argonne National Laboratory

H3 —*Immersion and Leach Tests on Solidified Decontamination Wastes from Dresden Unit 1,* **R. E. Barletta, J. W. Adams** and **R. E. Davis,** Brookhaven National Laboratory.

H4 —*Tailored Ion Exchange Resins for Combined Cesium and Strontium Removal from Soluble Defense High-Level Waste,* **M. A. Ebra** and **R. M. Wallace,** Du Pont - Savannah River Laboratory

H5 —*Biological Intrusion of Low Level Waste Trench Covers,* **T. E. Hakonson,** Los Alamos National Laboratory

H6 —*Stability of I and Sr Radiophases in Cement Matrices,* **M. W. Barnes, B. E. Scheetz, L. D. Wakeley, S. D. Atkinson** and **D. M. Roy,** Pennsylvania State University

H7 —*The System $SrMoO_4$-$BaMoO_4$-$CaMoO_4$: Compatibility Relations, The Implications for Supercalcine Ceramics,* **B. E. Scheetz, W. P. Freeborn, J. Pepin** and **W. B. White,** Pennsylvania State University

H8 —*Iron-Enriched Basalt and Its Application to Three-Mile Island and West Valley Radioactive Waste Disposal,* **P. V. Kelsey, Jr., J. M. Welch, D. E. Owen** and **J. E. Flinn,** EG&G Idaho, Inc.

H9 —*Leaching Studies of Na-Bearing Crystalline Phases in Nuclear Waste Forms,* **E. R. Vance** and **T. Adl,** Pennsylvania State University

H10 —*Immobilization and Leakage of Krypton Encapsulated in Zeolite and Glass,* **J. E. Tanner, J. A. Del Debbio, A. B. Christensen** and **D. A. Knecht,** Exxon Nuclear Idaho Company, Inc.

H11 —*Solubility Effects in Waste Glass/Demineralized Water Systems,* **H. T. Fullam,** Battelle Pacific Northwest Laboratory

H12 —*Immobilization of ^{14}C Formed During Reactor Operations,* **S. Fried, F. Schreiner, D. Cohen, J. Hines** and **A. M. Friedman,** Argonne National Laboratory

H13 —*Lanthanide Orthophosphates as a Matrix for Solidified Radioactive Defense and Reactor Wastes,* **M. Petek, M. M. Abraham** and **L. A. Boatner,** Oak Ridge National Laboratory

H14 —*Hot-pressed Barium Sulphate Ceramics for Immobilization of Medium Level Magnox Waste,* **A. Briggs, D. V. C. Jones** and **G. B. Cole,** AERE Harwell, UK

H15 —*Immobilization of High-Level Nuclear Reactor Wastes in SYNROC: A. Current Appraisal,* **A. E. Ringwood, V. M. Oversby** and **S. E. Kesson,** Research School of Earth Sciences, Australia

H16 —*The Influence of Gamma Irradiation on the Leaching Behavior of Modified SYNROC-B Ceramic Waste Form,* **A. G. Solomah,** North Carolina State University

H17 —*Migration of Radionuclide Chains in Subseabed Disposal,* **A. K. Ray,** University of Kentucky; **H. E. Nuttall,** Univeristy of New Mexico

H18 —*Standard Tests for Thermal Stability of Nuclear Waste Forms,* **W. J. Gray, R. P. May** and **W. J. Weber,** Battelle Pacific Northwest Laboratory

H19 —*Radiation Effects in Radwaste Glasses: A Reappraisal of Alpha-Recoil Aging as Simulated by Ion Implantation,* **J. D. Dran, Y. Langevin, M. Maurette** and **J. C. Petit,** Orsay, France

H20 —*Rheological Characterization of Cementitious Grouts Used to Dispose of Intermediate-Level Radio-*

active Waste by Hydrofracturing at Oak Ridge National Laboratory, **E. W. McDaniel** and **J. G. Moore,** Oak Ridge National Laboratory

SESSION I
RADIATION EFFECTS ON NUCLEAR WASTE FORMS

Thursday Morning, 8:15-12:00

Presiding: Clyde J. M. Northrup, Jr., Sandia National Laboratories and Lynn A. Boatner, Oak Ridge National Laboratory

8:20- 8:40 I1 —*Enhanced Dissoluation of Glass in the Presence of Salts and Radiation Damage,* **C. Burman** and **W. A. Lanford,** State University of New York at Albany

8:40- 9:00 I2 —*Influence of Glass Composition and Environmental Parameters on the Durability of Alpha-Recoil-Aged Radwaste Glasses,* **J. C. Dran, M. Maurette, J. C. Petit** and **B. Vassent,** Orsay, France

9:00- 9:20 I3 —*Valence State Determination and the Effect of Radiation on Leaching of Borosilicate Glass,* **D. P. Karim, D. J. Lam, K. L. Nash, A. M. Friedman, J. C. Sullivan** and **S. Fried,** Argonne National Laboratory

9:20- 9:40 I4 —*Ion Implantation Studies of Nuclear Waste Forms,* **C. J. Northrup, G. W. Arnold** and **T. J. Headley,** Sandia National Laboratories

9:40-10:00 I5 —*Effects of Alpha, Gamma, and Alpha-Recoil Radiation on Borosilicate Glass Containing Defense High-Level Nuclear Waste,* **N. E. Bibler,** Du Pont - Savannah River Laboratory

10:00-10:15 BREAK

10:15-10:35 I6 —*Properties of Alpha Doped Glasses Referring to the Long Term Disposal of Solidified High-Level Radioactive Wastes,* **N. Jacquet-Francillon** and **E. Vernaz,** CEA, France

10:35-10:55 I7 —*Study of the Metamict Transformation in Alpha-Quartz Using High Resolution Lattice Imaging and Convergent Beam Electron Diffraction,* **M. R. Pascucci,** Case Western Reserve University; **J. L. Hutchison,** Oxford University, UK; **S. McKernan, J. A. Eades,** Bristol University, UK, and **L. W. Hobbs,** Massachusetts Institute of Technology

10:55-11:15 I8 —*Radiation Effects in Nuclear Waste Glasses,* **D. G. Howitt, J. F. DeNatale** and **D. K. McElfresh,** University of California - Davis

11:15-11:35 I9 —*Influence of Irradiation With Gamma-Quanta and Beams of Accelerated Electrons on the Sorption Parameters of Clay Minerals of the Montmorillonite Group,* **V. I. Spitsyn, V. D. Balukova, M. K. Savushkina,** Academy of Sciences, USSR

11:35-11:55 I10 —*Microstructural Stability of Waste Glasses Under Irradiation,* **M. Antonini, A. Manara** and **S. N. Buckley,** AERE, Harwell, England

SESSION J

CHEMICAL AND PHYSICAL PROPERTIES OF WASTE FORMS – SESSION II

Thursday Afternoon, 1:30-3:50

Presiding: Wayne A. Ross, Battelle Pacific Northwest Laboratory, and Gerald H. Daly, U.S. Department of Energy

1:30- 1:50 J1 —*Rutherford Backscattering Investigation of the Leaching Characteristics of Borosilicate Glass,* **L. A. Boatner, H. Naramoto, C. W. White** and **B. C. Sales,** Oak Ridge National Laboratory

1:50- 2:10 J2 —*Development of Sphene-Based Glass Ceramics Tailored for Canadian Waste Disposal Conditions,* **P. J. Hayward** and **E. V. Cecchetto,** AECL, Whiteshell, Canada

2:10- 2:30 J3 —*The Development and Testing of SYNROC C as a High-Level Nuclear Waste Form,* **K. D. Reeve, E. J. Ramm, D. M. Levins, J. L. Woolfrey** and **W. J. Buykx,** AAEC Research Establishment, Australia

2:30- 2:50 J4 —*The Leaching Behavior of the Swedish KBS Glasses ABS-39 and ABS-41,* **H. P. Hermansson** and **H. Christensen,** Studsvik, Energiteknik, Sweden

2:50- 3:10 J5 —*Comparative Impact Properties of Five Solid Alternative Savannah River Laboratory Defense High-Level Waste Forms,* **L. J. Jardine, G. T. Reedy** and **W. J. Mecham,** Argonne National Laboratory

3:10- 3:30 J6 —*A Methodology for Characterizing Brittle Fracture of Solid Waste Forms from Accidental Impacts,* **W. J. Mecham, L. J. Jardine** and **M. J. Steindler,** Argonne National Laboratory

3:30- 3:50 J7 —*Alkoxide Derived Amorphous Solids as an Alternate Nuclear Waste Form,* **J. M. Pope** and **D. E. Harrison,** Westinghouse Research and Development Center

SYMPOSIUM E

METASTABLE MATERIALS FORMATION BY ION IMPLANTATION

Jointly Sponsored by
The American Physical Society

Chairmen:
S. T. Picraux, Sandia National Laboratories
W. J. Choyke, Westinghouse Electric Corporation Research and Development Center

November 16–18, 1981

Session E-1: Ion Beam Mixing
Session E-2: Metastable Materials
Session E-3: Amorphous Materials
Session E-4: Applications and Techniques
Session E-5: Implantation and Materials Properties*
Session E-6: Ion Implantation and Pulsed Beam Annealing†

*Joint Poster Session with Symposium F: Rapidly Solidified Metastable Materials

†Joint Session with Symposium A: Laser Electron Beam Interactions with Solids

SESSION E-1
ION BEAM MIXING

Session Chairman: J. M. Poate, Bell Laboratories

Monday Morning, November 16 — Parlor A

E1.1 8:15—******Principles of Ion Mixing,* **M-A. Nicolet,** California Institute of Technology, Pasadena, CA

1.2 8:45—******Ion-Beam Surface Modification and Radiation-Induced Segregation,* **L. E. Rehn,** Argonne National Laboratory, Argonne, IL

1.3 9:15—*Dynamical Behavior of the Subsurface Region in Alloys Under Ion Bombardment at High Temperatures,* **Nghi Q. Lam** and **H. Wiedersich,** Argonne National Laboratory, Argonne, IL

1.4 9:35—*Calculation of the Influence of Irradiation on the Phase Stability of Fe-Ni-C Alloys,* **S. E. Best** and **K. C. Russell,** Massachusetts Institute of Technology, Cambridge, MA

1.5 9:55—*Material Transport in the Formation of Metastable Materials by Ion Implantation,* **S. Matteson,** Texas Instruments, Dallas, TX

10:15— BREAK

1.6 10:30—*Ion-Beam Mixing of Cu-Au and Cu-W Systems,* **Zhong-lie Wang, Han Westendorp** and **F. W. Saris,** FOM Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands

1.7 10:50—*Ion Beam Mixing of Sb-Fe, Sb-Aℓ, Sb-Si, Sb-GaAs and In-GaAs Systems,* **J. S. Williams, K. T. Short, F. M. Adams** and **D. K. Sood,** Royal Melbourne Institute of Technology, Melbourne, Australia

1.8 11:10—*Ion-Beam-Induced Mixing and Demixing in the Au-Si System,* **B. X. Liu, L. Wielunski** and **Marc-A. Nicolet,** California Institute of Technology, Pasadena, CA; **S. S. Lau,** University of California, San Diego, La Jolla, CA

1.9 11:30—*Temperature Dependence of Ion Beam Mixing in Aℓ.,* **S. T. Picraux, D. M. Follstaedt** and **J. Delafond,** Sandia National Laboratories, Albuquerque, NM

1.10 11:50—*Ion Beam Mixing of Sb Layers in A1,* **B. M. Paine** and **Marc-A. Nicolet,** California Institute of Technology, Pasadena, CA

1.11 12:10—*Depth Profiling of Xe Ion-Mixed Films of Al on Si.,* **F. Namavar+, F. A. Otter++,** and **J. I. Budnick+:** +University of Connecticut, Storrs, CT; ++United Technologies Research Center, East Hartford, CT

12:30— LUNCH

*Invited Paper

SESSION E-2
METASTABLE MATERIALS

Session Chairman: S. S. Lau, University of California, San Diego

Monday Afternoon, November 16 – Parlor A

E2.1 1:30—*****_Thermodynamics of Metastable Structure Synthesis,_ **David Turnbull,** Harvard University, Cambridge, MA

2.2 2:00—_Metastable Solid Solutions of Impurities in Silicon,_ **J. S. Williams** and **K. T. Short,** Royal Melbourne Institute of Technology, Melbourne, Australia

2.3 2:20—_Studies of Defects and Limits of Solid Solubility in SPE Grown In Sb Implanted Silicon,_ **J. Fletcher, J. Narayan** and **O. W. Holland,** Oak Ridge National Laboratory, Oak Ridge, TN

2.4 2:40—_Chromium Implantation in GaAs - Metastable Atomic Configurations and Precipitation Limit,_ **P. P. Pronko,** Universal Systems, Inc., Dayton, OH; **O. W. Holland, B. R. Appleton** and **J. Narayan,** Oak Ridge National Laboratory, Oak Ridge, TN

2.5 3:00—_Precipitation Phenomena in Implanted Ionic Oxide MgO,_ **A. Perez, M. Treilleux, L. Fritsch** and **G. Marest,** Universite Claude Bernard Lyon I, 69622 Villeurbanne, France

2.6 3:20—_Structure and Properties of Cr Implanted Al_2O_3,_ **C. J. McHargue, H. Naramoto, B. R. Appleton, C. W. White** and **J. M. Williams,** Oak Ridge National Laboratory, Oak Ridge, TN

3:40— BREAK

2.7 4:00—*****_Comparison of Metastable Phase Formation by Ion, Electron or Laser Beams,_ **J. W. Mayer,** Cornell University, Ithaca, NY

2.8 4:30—_X-Ray Structural Studies of Ion Beam Mixed Films of Niobium and Gold on Silicon (111) Substrates,_ **F. Namavar, D. Pease, J. I. Budnick,** University of Connecticut, Storrs, CT; **F. A. Otter,** United Technologies Research Center, East Hartford, CT

2.9 4:50—_Effect of Ion Irradiation on the Silicide Formation of Ni and Pt,_ **L. S. Wielunski, C-D. Lien, B. X. Liu** and **Marc-A. Nicolet,** California Institute of Technology, Pasadena, CA

2.10 5:10—_Reaction of N_2^+ Beams with Aluminum Surfaces,_ **J. Ashley Taylor,** Perkin-Elmer Corp., Eden Prairie, MN; **J. Wayne Rabalais,** University of Houston, Houston, TX

*Invited Paper

SESSION E-3
AMORPHOUS MATERIALS

Session Chairman: G. Dresselhaus, Massachusetts Institute of Technology

Tuesday Morning, November 17 – Parlor A

E3.1 8:30—*****_Atomic and Electronic Structure of Amorphous Alloys,_ **W. L. Johnson,** California Institute of Technology, Pasadena, CA

3.2 9:00—*Structure and Properties Changes During Ion Bombardment of Crystalline 75Fe-25B,* **A. E. Berkowitz, W. G. Johnston, A. Mogro-Campero, J. L. Walter,** General Electric Research and Development Center, Schenectady, NY; **H. Bakhru,** State University of New York, Albany, NY

3.3 9:20—*Crystalline to Amorphous Transformation of Fe_3B By 1 MeV Electron Irradiation,* **A Mogro-Campero, E. L. Hall, J. L. Walter,** General Electric Research and Development Center, Schenectady, NY; **A. J. Ratkowski,** New York State Department of Health, Albany, NY

3.4 9:40—*Mossbauer Spectroscopy Study of the Amorphisation of Tellurium by Ion Implantation,* **G. Langouche, I. Dezsi, M. Van Rossum, M. de Potter, J. De bruyn, D. Schroyen** and **R. Coussement,** Leuven University, B-3030, Leuven, Belgium

10:00— BREAK

3.5 10:20—*Transmission Electron Microscopy and Resistivity Measurements on $Pd_{1-x}Si_x$ Alloys Prepared by Ion Implantation,* **A. Traverse, M. O. Ruault, L. Mendoza-Zelis, M. Schack, H. Bernas, J. Chaumont,** C.S.N.S.M., BP 1, 91406 Orsay, France; **L. Dumoulin,** Universite Paris XI, 91405 Orsay, France

3.6 10:40—*Electrical Properties of the Ion Implanted $Pd_{1-x}B_x$ System,* **L. Mendoza-Zelis, A. Traverse, J. Chaumont, H. Bernas,** C.S.N.S.M., BP 1, 91406 Orsay, France; **L. Dumoulin,** Universite Paris XI, 91405 Orsay, France

3.7 11:00—*Study of Metastable Fe-W Films,* **G. Goltz, R. Fernandez** and **M-A. Nicolet,** California Institute of Technology, Pasadena, CA

3.8 11:20—*Radiation Induced Amorphous Transformation in Intermetallic Compounds,* **J. L. Brimhall, H. E. Kissinger** and **L. A. Charlot,** Battelle Pacific Northwest Laboratories, Richland, WA

3.9 11:40—*Non Equilibrium Structures in Ion-Implanted B_2 Type Ordered Alloys Fe-Al and Ni-Ti,* **P. Moine, J. P. Riviere, N. Junqua** and **J. Delafond,** Universite de Poitiers, 86000 Poitiers, France

12:00— LUNCH

*Invited Paper

SESSION E-4
APPLICATIONS AND TECHNIQUES

Session Chairman: J. K. Hirvonen, Naval Research Laboratory

Tuesday Afternoon, November 17 — Parlor A

E4.1 1:00—**DOD Applications of Implantation-Modified Materials,* **G. K. Hubler,** Naval Research Laboratory, Washington, DC

4.2 2:30—**Implantation and Industrial Metal Processing,* **R. E. Fromson** and **R. Kossowsky,** Westinghouse Electric Corp. Research and Development Center, Pittsburgh, PA

4.3 1:55—*Mechanical Properties of Ion-Implanted Thin Films and Interfaces,* **G. L. Miller, M. Soni, M. McDonald, E. N. Kaufmann,** Bell Laboratories, Murray Hill, NJ; **R. L. Fenstermacher,** Drew University, Madison, NJ

4.4 2:15—*Ultra-Microhardness Tests on Ion Implanted Surfaces,* **John B. Pethica,** BBC Brown Boveri Research Center, CH-5405 Baden, Switzerland

4.5 2:35—*Trapping and Surface Permeation of Deuterium in He-Implanted Fe,* **S. M. Myers** and **D. M. Follstaedt,** Sandia National Laboratories, Albuquerque, NM; **F. Besenbacher** and **J. Bottiger,** Institute of Physics, University of Aarhus, Aarhus, Denmark

2:55— BREAK

4.6 3:15—**Optical Imaging and Information Storage in Ion Implanted Ferroelectric Ceramics,* **P. S. Peercy** and **C. E. Land,** Sandia National Laboratories, Albuquerque, NM

4.7 3:45—*Ion Beam Deposition of Amorphous Carbon Films with Diamondlike Properties,* **John C. Angus,** Case Western Reserve University, Cleveland, OH; **Michael J. Mirtich** and **Edwin G. Wintucky,** NASA Lewis Research Center, Cleveland, OH

4.8 4:05—*Raman Spectra of Ion Implanted Graphite,* **B. S. Elman, H. Mazurek, M. S. Dresselhaus** and **G. Dresselhaus,** Massachusetts Institute of Technology, Cambridge, MA

4.9 4:25—*The Microstructure of Silicon-On-Insulator Structures Formed by High Dose Oxygen Ion Implantation,* **R. F. Pinizzotto, B. L. Vaandrager** and **H. W. Lam,** Texas Instruments, Inc., Dallas, TX

4.10 4:45—*The Search for a Nitrogen Lattice Site in Implanted Stainless Steel,* **I. V. Mitchell** and **H. H. Plattner,** Chalk River Nuclear Laboratories, Chalk River, Canada; **G. T. Ewan** and **M. M. Ferguson,** Queen's University, Kingston, Canada; **J. L. Whitton,** H. C. Oersted Institute, Copenhagen, Denmark

*Invited Paper

SESSION E-5

IMPLANTATION AND MATERIALS PROPERTIES

(Joint Session with Symposium F: Rapidly Solidified Metastable Materials)

Tuesday Evening Poster Session

7:00-10:00 PM — Bay State Room

E5.1 *High Fluence Boron Implantations in Beryllium,* **R. A. Kant, J. S. Wollam++** and **A. R. Knudson+:** +Naval Research Laboratory, Washington, DC; ++C. S. Draper Laboratory, Cambridge, MA

5.2 *Fatigue Improvement of Ti Alloys by Ion Implantation and Transmission Electron Microscopic Studies,* **Shiro Fujishiro,** Wright-Patterson AFB, OH; **G. K. Hubler** and **K. S. Grabowski,** Naval Research Laboratory, Washington, DC

5.3 *Friction and Wear of Iron and Stainless Steels Implanted with Ti and C.*, **F. G. Yost, L. E. Pope, D. M. Follstaedt, J. A. Knapp** and **S.T. Picraux,** Sandia National Laboratories, Albuquerque, NM

5.4 *The Effect of Nitrogen Implantation of Martensite in 304 Stainless Steel,* **R. G. Vardiman** and **I. L. Singer,** Naval Research Laboratory, Washington, DC

5.5 *Structural and Mechanical Properties of Ion Implanted Al and Cu,* **P. Moine** and **J. Delafond,** Universite de Poitiers, 86000 Poitiers, France

5.6 *Effects of Heavy Dose Implantations of C^+ and B^+ into A-15 Nb_3Al Superconductors,* **Mireille Treuil Clapp,** University of Massachusetts, Amherst, MA

5.7 *Superconducting Transition Temperatures of C-Implanted Al5 Structure V-Si,* **J. R. Gavaler** and **A. I. Braginski,** Westinghouse Research and Development Center, Pittsburgh, PA; **B. R. Appleton, C. W. White** and **J. M. Williams,** Oak Ridge National Laboratory, Oak Ridge, TN

5.8 *Ion Beam Mixing of Ceramic Alloys-Preparation and Mechanical Properties,* **M. B. Lewis** and **C. J. McHargue,** Oak Ridge National Laboratory, Oak Ridge, TN

5.9 *Surface Mechanical Properties of Ceramics Modified by Implantation,* **P. F. Page,** University of Cambridge, Cambridge, UK

5.10 *Mechanical Property Improvements on Ion Implanted Diamond,* **N. E. W. Hartley,** AERE Harwell, Didcot, UK

5.11 *Structure and Properties of Silicon Carbide Implanted with Chromium,* **C. J. McHargue, M. B. Lewis, J. M. Williams,** Oak Ridge National Laboratory, Oak Ridge, TN

5.12 *The Surface Behavior of a Binary Alloy During Production by Ion Implantation,* **G. W. Reynolds** and **F. R. Vozzo,** State University of New York, Albany, NY; **R. G. Allas** and **A. R. Knudson,** Naval Research Laboratory, Washington, DC; **J. M. Lambert** and **P. A. Treado,** Georgetown University, Washington, DC

5.13 *Experiments in Recoil Implantation,* **M. Baron** and **R. Kossowsky,** Westinghouse Research and Development Center, Pittsburgh, PA

5.14 *The Effects of Ion-Implantation Damage on the Mossbauer Spectrum of Iron,* **F. L. Milder** and **C. Bajgar,** Spire Corporation, Bedford, MA

5.15 *Saturation, Exchange and Retention of Implanted H/D Ions in Fused Silica,* **B. L. Doyle** and **G. W. Arnold,** Sandia National Laboratories, Albuquerque, NM

5.16 *Metastable Percolation Phase Formation in LiF Implanted with Alkali Ions,* **J. Davenas** and **C. Dupuy,** Dept. de Physique des Materiaux, Villeurbanne, France

5.17 *Ion Mixing During Film Deposition: Growth of Metastable Semiconducting and Metallic Alloys,* **K. C. Cadien, M. A. Ray, S. M. Shin, J. M. Rigsbee** and **J. E. Greene,** University of Illinois, Urbana, IL

5.18 *SEM and AES Analysis of Ion Implanted Graphite,* **M. Shayegan, B. S. Elman, H. Mazurek, M. S. Dresselhaus** and **G. Dresselhaus,** Massachusetts Institute of Technology, Cambridge, MA

5.19 *Rapid Annealing of Implant Damage Using Thermal Radiation,* **Ronald T. Fulks,** Varian Central Research, Palo Alto, CA; **Carl J. Russo, Daniel F. Downey** and **Peter R. Hanley,** Varian/Extrion, Gloucester, MA

5.20 *Observations of Structural Modifications in Si and P Implanted GaAs,* **B. J. Isherwood** and **D. K. Wickenden,** General Electric Co. Ltd., Hirst Research Center, Wembley, UK

5.21 *Channeling Study of P-Implanted Ni Amorphization,* **L. Thome^{+}, C. Cohen^{++}, J. Chaumont^{+}, K. Krolas^{+}, H. Bernas^{+}** and **A. V. Drigo^{++}**: $^{+}$Centre de Spectromatrie de Masse, Orsay, France; $^{++}$Ecole Normale Superieure, Universite Paris, Paris, France

5.22 *Ion Beam Mixing of Ni Film with Si Substrate by Xe^{+} Irradiation,* **L. S. Wielunski, B. M. Paine, B. X. Kiu, C-D Lien** and **M-A. Nicolet,** California Institute of Technology, Pasadena, CA

5.23 *Formation of Au-Si Metastable Phases by Ion-Beam-Induced Mixing,* **B. X. Liu, L. Wielunski, M. Maenpaa** and **Marc-A. Nicolet,** California Institute of Technology, Pasadena, CA; **S. S. Lau,** University of California, San Diego, La Jolla, CA

5.24 *Implantation into Covalent Polymeric Materials,* **David C. Weber, Patrick Brant** and **Carmine A. Carosella,** Naval Research Laboratory, Washington, DC

SESSION E-6
ION IMPLANTATION AND PULSED BEAM ANNEALING

(Joint Session with Laser and Electron Beam Interactions with Solids Symposium)

Session Chairman: F. W. Saris, FOM, Amsterdam
Coordinator: W. K. Chu, IBM, Hopewell Junction

Wednesday Morning, November 18 – Georgian Room

E6.1 8:30—******Pulsed Ion Beam Annealing,* **John E. E. Baglin,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

6.2 9:00—*Defect Analysis on Si by Pulsed Ion Beam,* **S. R. Mader** and **W. K. Chu,** IBM General Technology Division, Hopewell Junction, NY

6.3 9:15—*Microstructures Induced in Metal Thin Films on Silicon by Pulsed Ion Beam Annealing,* **J. J. Chen, L. S. Hung, J. W. Mayer,** Cornell University, Ithaca, NY; **J. E. Baglin,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

6.4 9:30—******Metallurgy and Microstructures of Pulse-Melted Alloys,* **David M. Follstaedt,** Sandia National Laboratories, Albuquerque, NM

10:00— BREAK

6.5 10:15—******Superconducting Effects in Rapidly Quenched Materials Formed by Ion and Laser Bombardment,* **B. Stritzker,** Kernforschungsanlage, Julich, Fed. Rep. Germany

6.6 10:45—*Laser and Ion Beam Mixing Cr and Ni + Cr Films on Cu,* **C. W. Draper,** Western Electric, Princeton, NJ; **D. C. Jacobson, J. M. Gibson, J. M. Vandenberg** and **J. M. Poate,** Bell Laboratories, Murray Hill, NJ

6.7 11:00—*Thermal Stability of Metastable Phases Produced by Laser Treatment of Aluminum Implanted with Cr and Mo,* **G. Battaglin, A. Carnera, G. Della Mea, P. Mazzoldi,** Padova University, Padova, Italy; **Animesh K. Jain, V. N. Kulkarni** and **D. K. Sood,** Bhabha Atomic Research Center, Bombay, India

6.8 11:15—*Lattice Defects in Laser Irradiated Aluminum,* **P. S. Peercy, D. M. Follstaedt, S. T. Picraux** and **W. R. Wampler,** Sandia National Laboratories, Albuquerque, NM

6.9 11:30—*Pulsed Laser Annealing of Ni, and MgO Containing Ni Precipitates,* **J. Narayan,** Oak Ridge National Laboratory, Oak Ridge, TN

6.10 11:45—*Pulsed Laser Treatment of Virgin, Self and Europium Implanted Nickel: Evidence of Defect Impurity Interaction and Surface Segregation,* **G. Battaglin, A. Carnera, G. Della Mea, P. Mazzoldi,** Padova University, Padova, Italy; **Animesh K. Jain, V. N. Kulkarni** and **D. K. Sood,** Bhabha Atomic Research Center, Bombay, India

6.11 12:00—*Pulsed Electron Beam Melting of Fe,* **J. A. Knapp** and **D. M. Follstaedt,** Sandia National Laboratories, Albuquerque, NM

12:15— LUNCH

*Invited Paper

SYMPOSIUM F

RAPIDLY SOLIDIFIED AMORPHOUS AND CRYSTALLINE ALLOYS

Chairmen:
B. H. Kear, Exxon Research & Engineering Company
B. C. Giessen, Northeastern University

November 17-19, 1981

SESSION I

FUNDAMENTALS

Chairmen: E. C. VanReuth, DARPA, Arlington, VA
R. J. Reynik, NSF, Washington, DC

Tuesday Afternoon, November 17 — Ballroom West

1:30—******Non-Equilibrium Thermodynamics,* **M. H. Hillert,** Royal Institute of Technology, Stockholm, Sweden

2:00—******Theory of Melt Undercooling,* **D. Turnbull,** Harvard University, Cambridge, MA

2:30—******Growth Kinetic Limitations During Rapid Solidification,* **W. J. Boettinger,** National Bureau of Standards, Washington, DC

3:00— BREAK

3:15—**Coarsening of Rapidly Solidified Structures,* **M. E. Glicksman** and **P. W. Voorhees,** Rensselaer Polytechnic Institute, Troy, NY

3:45—**Morphological Stability of Electron Beam Melted Aluminum Alloys,* **R. J. Schaefer, S. R. Coriell, R. Mehrabian, C. Fenimore** and **F. S. Biancaniello,** National Bureau of Standards, Washington, DC

4:15—*Formation and Stability of Extended Solid Solutions Made by Rapid Quenching From the Melt,* **H. Jones,** University of Sheffield, England

4:30—*Development of Morphological Instability and Cells During Rapid Solidification of Laser-Annealed Silicon Alloys,* **J. Narayan** and **J. Fletcher,** Oak Ridge National Laboratory, Oak Ridge, TN

4:45—*Deformation Induced Dilatations in Metallic Glasses at Low Temperatures,* **J. Megusar, A. S. Argon** and **N. J. Grant,** MIT, Cambridge, MA

*Invited Talk

SESSION II
POSTER SESSION

Chairmen: J. B. VanderSande, MIT, Cambridge, MA
C. M. Adam, P&WA, West Palm Beach, FL

Tuesday Evening, November 17 —Bay State Room
7:30 PM — 10:00 PM

F.II.1 *Sorption of Hydrogen and Deuterium in Glassy $Pd_{80}Si_{20}$ By a Bending-Cantilever Technique,* **B. S. Berry** and **W. C. Pritchet,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

F.II.2 *Critical Properties and Flux Pinning in Liquid Quenched Nb-Ga Superconducting Alloys,* **G. Clemente,** Gordon McKay Laboratory, Harvard University, Cambridge, MA; **J. Bevk,** Bell Laboratories, Murray Hill, NJ

F.II.3 *Analysis of a Rapidly Solidified High-Phosphorus Austenitic Steel Containing an Amorphous Interdendritic Phase,* **T. F. Kelly, G. B. Olson** and **J. B. VanderSande,** MIT, Cambridge, MA

F.II.4 *FCC and BCC Solidification Products in a Rapidly Solidified Austenitic Steel,* **T. F. Kelly, J. B. VanderSande** and **M. Cohen,** MIT, Cambridge, MA

F.II.5 *Consolidation Studies of Ni60 Nb40 Metallic Glass Strips Into Metal Matrix Composites,* **S. J. Cytron,** AARDC, Dover, NJ

F.II.6 *Friction and Sliding Wear Behavior of Nickel Base Amorphous Alloys,* **N. Saka,** MIT, Cambridge, MA; **Y. V. Murty,** AVCO, Lowell, MA

F.II.7 *An Automated Laboratory Apparatus for the Production of Rapidly Solidified Submicron Powders,* **Z. Shanfield, J. Perel** and **J. F. Mahoney,** Phrasor Scientific, Inc., Duarte, CA; **C. Levi,** University of Illinois, Urbana, IL

F.II.8 *Rapidly Solidified Long Range Ordered Alloys,* **E. H. Lee, C. C. Koch** and **C. T. Liu,** Oak Ridge National Laboratory, Oak Ridge, TN

F.II.9 *Solidification Mechanism of Highly Undercooled Metal Alloys,* **Y. Shiohara, M. G. Chu, D. MacIsaac** and **M. C. Flemings,** MIT, Cambridge, MA

F.II.10 *The Effect of Fretting Corrosion on Amorphous Alloys,* **R. Becker** and **G. Sepold,** Bremer Institut fur angewandte Strahltechnik, West Germany

F.II.11 *Electronic Structure of CuZr and PdSi Metallic Glasses,* **F. A. Leon** and **K. H. Johnson,** MIT, Cambridge, MA

F.II.12 *Microstructures of Rapidly Solidified Fe- Al-Zr Alloys,* **A. N. Patel, L. F. Vassamillet** and **A. H. Clauer,** Battelle Columbus Laboratories, Columbus, OH

F.II.13 *Microstructural Study of Devitrified Amorphous Alloys,* **L. F. Vassamillet, R. E. Maringer, R. S. Carbonara** and **J. L. McCall,** Battelle Columbus Laboratory, Columbus, OH

F.II.14 *Pseudo-Elastic Behaviour in Rapidly Quenched Dilute Tin Alloys,* **M. Gallerneault** and **R. W. Smith,** Queens's University, Kingston, Canada

F.II.15 *Characteristics of the $\alpha \rightleftharpoons \beta$ Transformation in Rapidly-Quenched Tin-Germanium Alloys,* **M. Gallerneault** and **R. W. Smith,** Queen's University, Kingston, Canada

F.II.16 *Influence of Solidification Parameters on the Microstructure of Rapidly Quenched (Fe,Co, Ni)-B Alloys,* **U. Koster,** University Dortmund, Dortmund, F.R. Germany; **U. Herold, D. Krause** and **G. Tersteegen,** Institut fur Werkstoffe, Ruhr-Universitat, Bochum, F.R. Germany

F.II.17 *Influence of Solidification Parameters on Thermal Stability and Mechanical Properties of Fe-Ni-B Metallic Glasses,* **U. Herold** and **H.-G. Hillenbrand,** Institut fur Werkstoffe, Ruhr-Universitat, Bochum, F.R. Germany and **U. Koster,** University Dortmund, Dortmund, F. R. Germany

F.II.18 *Mechanical Properties of $(Fe_{100-x}M_x)_{83}B_{17}$ Metallic Glasses,* **G. Hunger** and **B. L. Mordike,** Institut fur Werkstoffkunde and Werkstofftechnik der Technischen Universitat Clausthal, West Germany

F.II.19 *Influence of Cr, Co and Ni on the Crystallization Behaviour of $(Fe_{1-x}M_x)_y$ Metalloid$_y$ Metallic Glasses,* **H. W. Bergmann** and **U. Brokmeier,** Institut fur Werkstoffkunde and Werkstofftechnik der Technischen Universitat Clausthal, West Germany

F.II.20 *Calculation of the Crystallization Behaviour of Metallic Glasses,* **H. W. Bergmann** and **H. U. Fritsch,** Institut fur Werkstoffkunde and Werkstofftechnik der Technischen Universitat Clausthal, West Germany

F.II.21 *Diffusion Rates of Metals in $NiZr_2$ Metallic Glass,* **D. Akhtar, B. Cantor** and **R. W. Cahn,** University of Sussex, Brighton, Sussex, England

F.II.22 *Rapid Solidification - Mechanisms, Morphology and Microstructure,* **J. A. Domingue, W. J. Boesch** and **K. O. Yu,** Special Metals Corporation, New Hartford, NY; **J. F. Radavich,** Micromet Laboratory, West Lafayette, IN

F.II.23 *Microstructure and Mechanical Properties of Laser-Processed Ni-Al-Mo-Ta Alloys,* **D. B. Snow,** United Technologies Research Center, East Hartford, CT

F.II.24 *Diffusivity of Different Sized Atoms in Metal-Metal and Metal-Metalloid Glasses,* **M. Kijek** and **B. Cantor,** University of Sussex, Falmer, Sussex, England

F.II.25 *The Metallography and Mechanical Properties of IM and PM Fe-Si-Al Alloys,* **E. S. Powell** and **G. W. Powell,** The Ohio State University, Columbus, OH

F.II.26 *Surface Melting of Cast Iron With High Power Laser Beam,* **Y. Nilsson,** The Royal Institute of Technology, Stockholm, Sweden

F.II.27 *Surface Alloying of Tool Steels With Carbides By Laser or Electron Beam Melting,* **B. L. Mordike** and **H. W. Bergmann,** Institut fur Werkstoffkunde und Werkstofftechnik der Technischen Universitat Clausthal, West Germany

F.II.28 *New High Strength Copper Base Alloys Made Using Rapid Solidification Process,* **V. Panchanathan** and **R. Ray,** Marko Materials, Inc., N. Billerica, MA; **B. C. Giessen,** Institute of Chemical Analysis, Northeastern University, Boston, MA

F.II.29 *Effect of Alloying Additions on the Hydrogen Absorption Isotherms of Pd-Si,* **R. Finocchiaro, C. L. Tsai** and **B. C. Giessen,** Department of Chemistry, Northeastern University, Boston, MA

F.II.30 *Some Observations on Segregation-free Solidification in the Systems Ag-Pb, Pb-S, Cu-Mn and Cu-Zn,* **H. Fredriksson,** Royal Institute of Technology, Stockholm, Sweden

F.II.31 *Property Enhancement in Rapidly Quenched Alloy Surfaces,* **M. Tuli,** Pilgrim Materials Corp., East Granby, CT; **P. R. Strutt,** University of Connecticut

F.II.32 *Catalytic Properties of Amorphous and Crystalline Pd-Si Alloys,* **S. Mahmoud, D. Forsythe** and **B. C. Giessan,** Department of Chemistry, Northeastern University, Boston, MA

F.II.33 *Elastic Modulus, Dilatometric and Calorimetric Measurements of the Structural Relaxation of Metallic Glasses,* **M. G. Scott,** University of Sussex, Brighton, England

F.II.34 *Effect of Fast Neutron Irradiation on Mechanical Properties of Amorphous* $Ni_{40}Fe_6Co_{20}Cr_{12}Mo_6B_{16}$, **R. Mishra** and **Vikil Singh,** Banaras Hindu University, Varanasi, India

F.II.35 *Preparation of Amorphous Fe-B-Si Powder,* **R. Murphy,** Department of Mechanical Engineering, Northeastern University, Boston, MA

SESSION III
PROCESSING

Chairmen: A. M. Adair, AFML, Dayton, OH
J. B. Moore, P&WA, West Palm Beach, FL

Wednesday Morning, November 18 — Ballroom West

8:30—******Rapid Solidification of Metastable Materials,* **H. H. Liebermann** and **J. L. Walter,** General Electric, Schenectady, NY

9:00—******The Modeling of Rapidly Solidified Powders,* **R. J. Patterson,** Pratt and Whitney Aircraft, West Palm Beach, FL

9:30—******Critical Factors in Laser and e.b.-Glazing of Materials,* **P. R. Strutt,** University of Connecticut, Storrs, CT; **B. H. Kear,** Exxon Research and Engineering Company, Linden, NJ; **M. Tuli,** Pilgrim Materials Corp., East Granby, CT

10:00—******Undercooling Behavior of Liquid Metals,* **J. H. Perepezko** and **J. S. Paik,** University of Wisconsin, Madison, WI

10:30— COFFEE BREAK

10:45—*Casting of Laminated Ribbon Using a Modified Melt Spinning Technique,* **R. V. Raman,** Battelle Columbus Labs., Columbus, OH; **A. F. Witt,** MIT, Cambridge, MA

11:00—*Comparison of the Quench Rates Attained in Gas Atomized Powders and Melt-Spun Ribbons of Co and Ni Base Superalloys,* **F. Duflos** and **J. F. Stohr,** ONERA, Chatillon, France

11:15—*New Nickel Base Amorphous Spray Powders,* **V. Panchanathan** and **R. Ray,** Marko Materials, Billerica, MA; **C. L. Tsai** and **S. Whang,** Northeastern University, Boston, MA

11:30—*The Laser Surface Treatment of Aerospace Steels,* **G. Christodoulou** and **W. M. Steen,** Imperial College, London, UK

11:45—*Rapidly Solidified Microstructures in Surface Layers of Laser-Alloyed Mo on FeC Substrates,* **T. R. Tucker, A. H. Clauer, S. L. Ream** and **C. T. Walters,** Battelle Columbus Labs., Columbus, OH

*Invited Talk

SESSION IV
STRUCTURE/PROPERTY RELATIONSHIPS IN METALLIC GLASSES

Chairmen: G. Mayer, ARO, Durham, NC
B. C. Giessen, Northeastern University, Boston, MA

Wednesday Afternoon, November 18 — Ballroom West

1:30—******Localized Shear Deformation of Amorphous Metals,* **J. C. M. Li,** University of Rochester, Rochester, NY

2:00—******Relation Between Chemical Short-Range Order in Liquid and Amorphous Alloys,* **C. N. J. Wagner,** University of California, Los Angeles, CA; **H. Ruppersberg,** Universitat des Saarlandes, Saarbrucken, West Germany

2:30—*****_Composition Dependence of Glass Formation and Mechanical and Thermal Properties of Glassy Metals,_ **C. L. Tsai, S. Whang** and **B. C. Giessen,** Northeastern University, Boston, MA

3:00— BREAK

3:15—_Recent Measurements of Diffusion in Metallic Glasses,_ **R. W. Cahn,** Universite de Paris-Sud, Orsay, France and **B. Cantor,** University of Oxford, Oxford, UK

3:30—_The Effects of Ribbon Thickness and Annealing Temperature on the AC Magnetic Properties of_ $Fe_{81.5}B_{14.5}Si_3C_1$ _Alloy,_ **S. C. Huang, P. G. Frischmann, F. E. Luborsky, J. D. Livingston** and **A. Mogro-Campero,** General Electric, Schenectady, NY

3:45—_Electronic Structure of Amorphous Fe-Co-B Alloys,_ **M. Eberhardt, K. H. Johnson** and **R. C. O'Handley,** MIT, Cambridge, MA

4:00—_Properties of Amorphous Iron Chromium "Invar" Alloys,_ **G. Hunger, H. W. Bergmann** and **B. L. Mordike,** Universitat Clausthal, West Germany

4:15—_The Variation of Magnetic Properties of Fe-Based Amorphous Alloys Along the Ribbon Length,_ **T. Sato, T. Ozawa** and **R. Matsumoto,** Nippon Steel, Kowasaki-City, Japan

4:30—_Environmental Cracking of Amorphous Alloys,_ **S. Ashok, T. Slavin** and **N. S. Stoloff,** Rensselaer Polytechnic Institute, Troy, NY

4:45—_Production and Properties of Amorphous Layers on Metal Substrates by Laser and Electron Beam Melting,_ **H. W. Bergmann** and **B. L. Mordike,** Universitat Clausthal, West Germany

*Invited Talk

SESSION V

STRUCTURE/PROPERTY RELATIONSHIPS IN AMORPHOUS AND CRYSTALLINE ALLOYS

Chairmen: B. A. MacDonald, ONR, Arlington, VA
J. R. Manning, NBS, Washington, DC

Thursday Morning, November 19 — Ballroom West

8:30—_Wear of Transition Metal Rich Glassy Alloys,_ **S. Whang** and **B. C. Giessen,** Northeastern University, Boston, MA

8:45—_The Influence of Hydrogen on An Iron-Based Amorphous Alloy,_ **H. Shahani** and **H. Soderhjelm,** Royal Institute of Technology, Stockholm, Sweden

9:00—*****_Techniques for Investigating Structure and Composition With High Spatial Resolution,_ **J. B. Vander-Sande,** MIT, Cambridge, MA

9:30—*****_Rapidly Solidified Steels,_ **B. Cantor,** University of Oxford, Oxford, UK

10:00—*****_Perpendicularly Crystallized Ribbons by Means of Rapid Solidifications from Melts,_ **N. Tsuya,** Tohoku University, Sendai, Japan

10:30— COFFEE BREAK

10:45—**Devitrification/Hot Consolidation of Metallic Glasses: Novel Multiphase Crystalline Materials in Bulk Shapes With Technological Potentials,* **R. Ray,** Marko Materials, Billerica, MA

11:15—*Crystallization Behavior and Properties of Rapidly Solidified Ni-Mo-B Alloys,* **C. C. Wan,** Allied Corporation, Morristown, NJ

11:30—*Requirements for the Formation of Metastable Crystalline Phases and Glasses in Ternary Fe-C-Base Alloys,* **E. Hornbogen** and **I. Schmidt,** Ruhr-Universitat Bochum, Bochum, West Germany

11:45—*Micromechanisms of Crystallization in (Fe, Co, Ni)-Zr Metallic Glasses,* **H. G. Franke, U. Koster** and **H. W. Schroeder,** University Dortmund, Dortmund, F. R. Germany and **J. Muller,** Ruhr-Universitat, Bochm, F. D. Germany

*Invited Talk

SESSION VI
STRUCTURE/PROPERTY RELATIONSHIPS IN CRYSTALLINE ALLOYS

Chairmen: N. J. Grant, MIT, Cambridge, MA
S. M. Wolf, DOE, Washington, DC

Thursday Afternoon, November 19 — Ballroom West

1:30—**Structure/Property Relationships and Applications of Rapidly Solidified Aluminum Alloys,* **C. M. Adam,** Pratt and Whitney Aircraft, West Palm Beach, FL

2:00—**Raney-Type Nickel Catalysts From RSR Atomization of Al-Ni Powder,* **F. D. Lemkey,** United Technologies, East Hartford, CT

2:30—*Grain-Coarsening Resistance and the Stability of Second-Phase Dispersions in Rapidly Solidified Steels,* **H. C. Ling, G. B. Olsen, J. B. VanderSande** and **M. Cohen,** MIT, Cambridge, MA

2:45—*Microstructure and Properties of Fine Grained Supersaturated Fe-C Alloys,* **B. L. Mordike** and **H. W. Bergmann,** Universitat, Clausthal, West Germany

3:00— BREAK

3:15—*Microsegregation Behavior of An Al-Cu Alloy at High Solidification Rates,* **L. J. Masur, D. Imeson, T. Z. Kattamis** and **M. C. Flemings,** MIT, Cambridge, MA

3:30—*Preferred Orientation in Splat-Quenched Materials,* **N. W. Blake, F. A. Hames** and **R. W. Smith,** Queen's University, Kingston, Canada

3:45—*Fine Microstructures and Spatial Chemistries of RSR, Soluble Gas Processed and Argon Atomized Superalloy Powder,* **F. Cosandey, R. D. Kissinger, B. Naylor** and **J. K. Tien,** Columbia University, NY, NY

4:00—*Quantitative Treatment of the Microstructure of Rapidly Solidified Al-Fe-Co-Ni Alloys,* **T. H. Sanders, Jr.,** Georgia Institute of Technology, Atlanta, GA; **J. W. Mullins** and **H. G. Paris,** Alcoa Technical Center, Alcoa Center, PA

4:15—*Characterization and Properties of Laser Quenched Aluminum Bronzes,* **C. W. Draper,** Western Electric, **J. M. Vandenberg,** Bell Telephone Laboratories; **C. M. Preece,** Korrosionscentralen ATV; **C. R. Clayton,** State University of New York at Stony Brook

4:30—*Superconducting Properties of Melt-Quenched Nb-B (Si) Microcrystalline Alloys,* **C. H. Lin, F. Habbal,** Gordon McKay Laboratory, Harvard University, Cambridge, MA; **J. Bevk,** Bell Laboratories, Murray Hill, NJ

4:45—*Phase Transformation Studies of Laser Processed Fe-0.2% C-Cr Surface Alloys,* **P. A. Molian, P. J. Wang** and **W. E. Wood,** Oregon Graduate Center, Beaverton, Oregon; **K. H. Kahn,** University of Portland, Portland, Oregon

*Invited Talk

SYMPOSIUM G

MATERIALS PROCESSING RESEARCH IN THE REDUCED GRAVITY ENVIRONMENT OF SPACE

Jointly Sponsored by the Universities Space Research Association (USRA)

Chairman: Guy E. Rindone, The Pennsylvania State University and USRA

November 16-19, 1981

SESSION I

OVERVIEW OF MPS RESEARCH BY NASA AND ESA (EUROPEAN SPACE AGENCY)

Chairman: Guy E. Rindone

Monday, November 16 — Stanbro Hall

8:30 AM Opening Remarks

8:40 #IA.1 Keynote Address: *Materials Science in Space,* **John R. Carruthers,** Hewlett Packard Laboratories, Palo Alto, CA

9:20 #IA.2 Invited Address: *Review of the European Microgravity Activities,* **Yves Malmejac** and **Ulrich Huth,** Agence Spatiale Europeenne, France

9:55 COFFEE BREAK

SESSION II

CONTAINERLESS MEASUREMENT AND PROCESSING TECHNOLOGIES

Chairman: William Oran, NASA Headquarters, Washington, DC

Monday, November 16 — Stanbro Hall

10:15 AM #IIA.1 Invited Paper—*Overview of Containerless Processing Technologies,* **M. Barmatz,** Jet Propulsion Laboratory

10:45 #IIA.2 *Levitation Studies of Liquid Metals at High Temperatures,* **John L. Margrave,** Rice University

11:05 #IIA.3 *High Temperature Property Measurements on Levitated Spheres,* **Paul C. Nordine,** Yale University

11:25 #IIA.4 *A Dynamic Technique for Measurements of Thermophysical Properties at High Temperatures,* **Ared Cezairliyan,** National Bureau of Standards

11:45 #IIA.5 *Levitation, Coating and Transport of Particulate Materials,* **C. D. Hendricks,** Lawrence Livermore National Laboratory

12:05 LUNCH

1:30 #IIB.1 *Polymer Coating of Glass Microballons Levitated in a Focused Acoustic Field,* **Ainslie T. Young,** Los Alamos National Lab and **Mark C. Lee, I-an Feng, Daniel D. Elleman** and **Taylor G. Wang,** Jet Propulsion Laboratory

1:50 #IIB.2 *Controlled Action on Suspended Particles by Crossed Electric and Magnetic Fields,* **A. Bewersdorff, G. P. Gorler,** DFVLR, Inst. fur Raumsimulation, Germany

2:10 #IIB.3 *Theory and Applications of Electromagnetic Levitation,* **R. T. Frost** and **Chien wu Chang,** General Electric Company

2:30 #IIB.4 *Crystal Nucleation in Pd-Si Alloys,* **A. J. Drehman** and **D. Turnbull,** Harvard University

2:50 #IIB.5 *Solidification Studies of Nb-Ge Alloys at Large Degrees of Supercooling,* **L. L. Lacy,** Exxon Corp., **M. Robinson** and **T. Rathz,** Marshall Space Flight Center, NASA, **N. Evans** and **R. Bayuzick,** Vanderbilt University

3:10 BREAK

3:30 #IIB.6 *Application of Microgravity and Containerless Environments to the Investigation of Fusion Target Fabrication Technology,* **Mark C. Lee, J. Kendall, D. Elleman, Won-Kyu Rhim, R. Helizon, C. Youngberg, I-an Feng** and **Taylor Wang,** Jet Propulsion Laboratory

3:50 #IIB.7 *Investigation of Metallic and Metallic Glass Hollow Spheres for Fusion Target Application,* **Mark C. Lee, J. Kendall, T. Wang,** Jet Propulsion Lab.; **W. Johnson,** California Institute of Technology

4:10 #IIB.8 *Convection and Impurity Macrosegregation in Directional Solidification in Space Processing Experiments,* **S. A. Nikitin, V. I. Polezhayev** and **A. I. Fedyushkin,** Institute for Problems in Mechanics, USSR Academy of Sciences, Vernadskogo 101, 117526 Moscow, USSR

SESSION III
FLUIDS, TRANSPORT AND CHEMICAL PROCESSES

Chairman: Dudley A. Saville, Princeton University, Princeton, NJ

Tuesday, November 17 – Stanbro Hall

8:30 AM #IIIA.1 Invited Paper, Title to be Announced, **L. E. Scriven,** University of Minnesota, Minneapolis, MN

9:00 #IIIA.2 *An Experimental Study of Heat Induced Surface Tension Driven Flow,* **Y. Kamotani, S. Lowry** and **S. Ostrach,** Case Western Reserve University

9:20 #IIIA.3 *Steady Thermocapillary Flows and Their Stability,* **A. K. Sen, M. K. Smith** and **S. H. Davis,** Northwestern University; **G. M. Homsy,** Stanford University

9:40 #IIIA.4 *Benard-Marangoni Instability in a Rotating Liquid Layer Subjected to a Transverse Magnetic Field,* **G. S. R. Sarma,** DFVLR, Institut fur Theoretische Stromungsmechanic, Germany

10:00 COFFEE BREAK

10:20 #IIIA.5 *Measurement of Surface Rheological Effects on a Rotating Flow,* **Roger F. Gans** and **Timothy J. Singler,** University of Rochester

10:40 #IIIA.6 *Bubble Motion in a Rotating Liquid Body,* **P. Annamalai, R. Subramanian** and **R. Cole,** Clarkson College of Technology

11:00 #IIIA.7 *A Mathematical Representation of the Electromagnetic Force Field, The Fluid Flow Field and the Temperature Profiles in Levitated Metal Droplets,* **N. El-Kaddah** and **J. Szekely,** MIT

11:20 #IIIA.8 *Expansive Convection in Vapor Transport Across Horizontal Rectangular Enclosures,* **B. S. Jhaveri** and **F. Rosenberger,** University of Utah

11:40 #IIIA.9 *Natural Convection with Gravity-Shift in Circular Cylinders in Low Gravity,* **Robert F. Dressler,** NASA Headquarters; **S. Robertson** and **L. Spradley,** Lockheed Missiles & Space Company, Inc., Huntsville

12:00 LUNCH

1:30 #IIIB.1 *Structure of Temperature and Velocity Fields in an Electro-Osmotically Driven Flow,* **D. A. Saville,** Princeton University

1:50 #IIIB.2 *The Effect of Axial Gradients on the Fluid Flow in an Electrophoresis-Type Separation Chamber,* **Percy H. Rhodes** and **Robert S. Snyder,** Marshall Space Flight Center

2:10 #IIIB.3 *Studies on Aqueous Two Phase Polymer Systems Useful for Partitioning of Biological Materials,* **D. E. Brooks,** University of British Columbia

2:30 #IIIB.4 *A Theory of Electrophoresis of Emulsion Drops in Aqueous Two-Phase Polymer Systems,* **S. Levine,** University of British Columbia

2:50 #IIIB.5 *Thermocapillary Motion of Bubbles Inside Drops,* **N. Shankar, R. Cole** and **R. S. Subramanian,** Clarkson College of Technology

3:10 BREAK

SESSION IV
GLASS, CERAMICS AND REFRACTORIES

Chairman: Elias Snitzer, United Technologies, Hartford, CT

Tuesday, November 17 — Stanbro Hall

3:30 PM #IVA.1 Invited Paper: *Glass Processing in a Microgravity Environment,* **D. R. Uhlmann,** MIT, Cambridge, MA

4:00 #IVA.2 *Experimental Observation of the Thermocapillary Driven Motion of Bubbles in a Molten Glass under Zero Gravity Conditions,* **H. D. Smith, D. M. Mattox,** Westinghouse R&D Center; **W. R. Wilcox, R. S. Subramanian** and **M. Meyyappan,** Clarkson College of Technology

4:20 #IVA.3 *Surface Tension Driven Flow in Glassmelts and Model Fluids,* **T. McNeil, R. Cole** and **R. S. Subramanian,** Clarkson College of Tech.

4:40 #IVA.4 *The Effect of Chemical Reactions on Gas Bubble Behavior in Glassmelts,* **Michael C. Weinberg,** GTE Laboratories

Wednesday, November 18 — Stanbro Hall

8:30 AM #IVB.1 *Bubble Behavior in Molten Glass in a Temperature Gradient,* **M. Meyyappan, R. S. Subramanian** and **W. R. Wilcox,** Clarkson College of Technology; **H. Smith,** Westinghouse R&D Center

8:50 #IVB.2 *Nucleation Theory: Is Replacement Free Energy Needed?* **Robert H. Doremus,** Rensselaer Polytechnic Institute

9:10 #IVB.3 *Gels and Gel Derived Glasses in the Na_2O-B_2O_3-SiO_2 System,* **Shyama P. Mukherjee,** Battelle

9:30 #IVB.4 *Microstructure and Immiscibility Behavior of Gel-Derived Soda-Silica Glasses,* **G. F. Neilson,** Jet Propulsion Laboratory

9:50 #IVB.5 *Glass Manufacturing in Space,* **Robert L. Nolen, R. L. Downs, M. A. Egner,** KMS Fusion, Inc.

10:10 COFFEE BREAK

SESSION V
ELECTRONIC MATERIALS

Chairman: Robert A. Laudise, Bell Laboratories, Murray Hill, NJ

Wednesday, November 18 — Stanbro Hall

10:30 AM #VA.1 Invited Paper: *Growth and Segregation Problems on Earth and in Space,* **Harry Gatos,** MIT

11:00 #VA.2 Inited Paper: *The Role of Fluid Flow Phenomena in the Czochralski Growth of Oxides,* **D. C. Miller,** Airtron Division Litton Systems

11:30 #VA.3 *Modelling of TGS Growth in Space,* **L. C. Liu** and **W. R. Wilcox,** Clarkson College of Technology, **R. Kroes,** NASA Marshall Space Flight Center and **R. Lal,** Alabama A&M University

11:50 #VA.4 *Growth of Triglycine Sulfate (TGS) Crystals by Solution Technique,* **R. B. Lal,** Alabama A&M University; **R. L. Kroes,** NASA/MSFC; **W. R. Wilcox,** Clarkson College of Technology

12:10 LUNCH

1:30—4:00 See Poster Session

7:00 PM #VB.1 *Directional Solidification and Characterization of $Hg_{1-x}Cd_xTe$ Alloys,* **S. L. Lehoczky** and **F. R. Szofran,** McDonnell Douglas Research Laboratories

7:20 #VB.2 *Electrical Characterization of $Hg_{1-x}Cd_xTe$ Alloys,* **S. L. Lehoczky, F. R. Szofran, C. J. Summers** and **B. G. Martin,** McDonnell Douglas Research Laboratories

7:40 #VB.3 *Chemical Vapor Transport, Crystal Growth, Thermodynamic and Fluid Dynamic Analysis of the $Hg_{1-x}Cd_xTe$ System,* **Heribert Wiedemeier** and **D. Chandra,** Rensselaer Polytechnic Institute

8:00 #VB.4 *Point Defects in Doped and Undoped $Hg_{1-x}Cd_xTe$ Alloys,* **H. R. Vydyanath,** Honeywell Inc., Lexington, MA

8:20 #VB.5 *Growth of Single Crystals of Mercuric Iodide (HgI_2) in Spacelab III,* **L. van den Berg** and **W. F. Schnepple,** EG&G Energy Measurements Group

8:40 #VB.6 *Increased Uniformity of Silicon Needed for Critical Devices - How can we Improve the Float-zone Process?* **Edward L. Kern,** Consultant, Del Mar, CA

SESSION VI
METALS, ALLOYS, AND COMPOSITES

Chairmen: Robert Mehrabian and John R. Manning National Bureau of Standards, Washington, DC

Thursday, November 19 — Stanbro Hall

8:30 AM #VIA.1 *Influence of Diffusion and Convective Transport on Dendritic Growth in Dilute Alloys,*

M. E. Glicksman, Narsingh B. Singh and **M. Chopra,** Rensselaer Polytechnic Institute

9:00 #VIA.2 *Convective and Interfacial Instabilities During Solidification of Succinonitrile Containing Ethanol,* **R. J. Schaefer** and **S. R. Coriell,** National Bureau of Standards, Washington, DC

9:30 #VIA.3 *Solidification of Undercooled Monotectic Alloys,* **J. H. Perepezko, C. Galaup** and **K. Cooper,** University of Wisconsin-Madison

10:00 COFFEE BREAK

10:20 #VIA.4 *Studies of Liquid Metal Surfaces Using Auger Spectroscopy,* **Stephen C. Hardy** and **Joseph Fine,** National Bureau of Standards

10:50 #VIA.5 *Suppression of Marangoni Convection with Oxide Films,* **J. D. Verhoeven, M. A. Noack** and **A. J. Bevolo,** Iowa State University

11:20 #VIA.6 *Influence of Gravity Driven Convection on the Directional Solidification of Bi/MnBi Eutectic Composites,* **David J. Larson** and **Ron G. Pirich,** Grumman Aerospace Corporation, Bethpage, NY

11:45 #VIA.7 *Response of MnBi-Bi Eutectic to Freezing Rate Changes,* **M. Nair, K. Doddi, T-W. Fu, W. R. Wilcox** and **P. S. Ravishankar,** Clarkson College of Technology; **D. Larson,** Grumman Aerospace Corporation

12:10 LUNCH

1:30 #VIB.1 *Solidification of Hypermonotectic Al-In Alloys Under Microgravity Conditions,* **Claude Potard,** L.E.S., CEN-G, France

1:50 #VIB.2 *Directional Solidification of Alloys in Systems Containing a Liquid Miscibility Gap,* **R. N. Grugel, T. A. Lograsso, A. Hellawell,** Michigan Technological University

2:10 #VIB.3 *A Study of the Coalescense Process Inside the Miscibility-Gap in Zn-Bi Alloys,* **A. Bergman** and **H. Fredriksson,** The Royal Institute of Technology, Stockholm, Sweden

2:30 #VIB.4 *The Influence of Gravity on the Solidification of Monotectic and Near Monotectic CU-PB Alloys,* **A. Bergman, T. Carlberg, H. Fredriksson** and **J. Stjerndahl,** The Royal Institute of Technology, Stockholm, Sweden

2:50 #VIB.5 *Gravitationally Induced Convection During Directional Solidification of Off-Eutectic Mn-Bi Alloys,* **Ron G. Pirich,** Grumman Aerospace Corp.

3:10 BREAK

3:30 #VIB.6 *The Effect of Solute on the Homogeneous Crystal Nucleation Frequency in Metallic Melts,* **C. V. Thompson** and **F. Spaepen,** Harvard University

3:50 #VIB.7 *Ground Based Studies for the Space Processing of PbSnTe,* **R. K. Crouch, A. L. Fripp, W. J. Debnam, I. O. Clark,** NASA Langley Research Center; **F. M. Carlson,** Clarkson College of Technology

4:10 #VIB.8 *The Effect of the Natural Convection on the Transition from Equeaxed to Columnar Crystals,* **H. Fredriksson,** The Royal Institute of Technology, Stockholm, Sweden

4:30 #VIB.9 *Finite Element Analysis of the Effect of a Non-Planar, Solid-Liquid Interface on the Lateral Solute Segregation During Unidirectional Solidification,* **F. M. Carlson, L-Y Chin,** KRAR Inc.; **A. L. Fripp, R. K. Crouch,** NASA Langley Research Center

4:50 #VIB.10 *Brazing under Microgravity in a Resistance Heated Furnace,* **K. Frieler, R. Stickler,** University of Vienna; **E. Siegfried,** Bundesanstalt fur Materialprufung, Berlin

POSTER SESSION

Wednesday, November 18 – Bay State Room
1:30–4:00 PM

P-1 *Acoustic Positioning and the Response of Large Liquid Drops in Low Gravity,* **A. P. Croonquist, D. D. Elleman, N. Jacobi, T. G. Wang,** Jet Propulsion Lab

P-2 *Electrostatic Levitation Device at JPL,* **W. K. Rhim, M. Saffren** and **D. D. Elleman,** Jet Propulsion Lab

P-3 *Air Jet Levitation Furnace System for Observing Glass Microspheres During Heating and Melting,* **E. C. Ethridge,** Marshall Space Flight Center and **S. A. Dunn,** Bjorksten Research Laboratory, Madison, WI

P-4 *Properties of a Constricted-Tube Air-Flow Levitator,* **J. E. Rush** and **W. K. Stephens,** University of Alabama; **E. C. Ethridge,** Marshall Space Flight Center

P-5 *Low-Gravity Solidification Structures in the Sn-15wt%Pb and Sn-3wt%Bi Alloys,* **M. H. Johnston** and **R. A. Parr,** Marshall Space Flight Center

P-6 *Compound Semiconductor Crystal Growth by Physical-Vapor Transport,* **John A. Zoutendyk** and **Wesley M. Akutagawa,** Jet Propulsion Laboratory

P-7 *Defect Structure Analysis of Polycrystalline Materials by Computer Controlled Double Crystal Diffractometer and Position Sensitive Detector,* **S. Weissmann, W. Mayo, R. Yazici** and **T. Takemoto,** Rutgers University

P-8 *Thermophysical Properties of Germanium for Thermal Analysis of Growth From the Melt,* **R. K. Crouch, A. L. Fripp, W. J. Debnam,** NASA Langley Research Center; **R. E. Taylor** and **H. Groot,** CINDAS - Purdue University

P-9 *Anomalous Behavior in the First to Freeze Region in Directionally Solidified* $Pb_{1-x}Sn_xTe$, **A. L. Fripp, R. K. Crouch, W. J. Debnam** and **I. O. Clark,** NASA Langley Research Center; **T. I. Ejim,** University of Virginia

P-10 *Present and Future Capabilities of Acoustic Levitation and Positioning Devices,* **C. A. Rey, R. R. Whymark, T. Danley, D. Merkley** and **J. Yearnd,** Intersonics Inc.

P-11 *Mathematical Modeling and Computer Simulation of Isoelectric Focusing,* **O. A. Palusinski, R. A. Mosher, M. Bier,** University of Arizona; **D. A. Saville,** Princeton University

P-12 *Isoelectric Focusing in Space,* **M. Bier, N. B. Egen, G. E. Twitty** and **R. A. Mosher,** University of Arizona

SYMPOSIUM H

APPLICATION OF SYNCHROTRON RADIATION TO MATERIALS SCIENCE

Chairmen:
J. B. Hastings, NSLS, Brookhaven National Laboratory, Upton, NY
J. Stohr, Exxon Research and Engineering Co. Linden, NJ

November 16 – 18, 1981

Monday, November 16 – Parlor B

X-RAY FLUORESCENCE AND SCATTERING
Chairman: J. B. Hastings

8:30–*An X-ray Fluorescence Microprobe for Materials Research,* **C. J. Sparks, Jr.,** Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, TN

9:20–*The Application of Powder Diffraction to Structural Studies,* **D. E. Cox,** Physics Department, Brookhaven National Laboratory, Upton, NY

10:10– COFFEE BREAK

PHOTON STIMULATED ION DESORPTION
Chairman: J. Stohr

10:30–*Photon Stimulated Desorption - Mechanistic and Applications,* **M. L. Knotek,** Sandia National Laboratories, Albuquerque, NM

11:20–*Photon Stimulated Ion Desorption as a Probe for Surface EXAFS: Potential and Limitations,* **R. Jaeger,** Stanford Synchrotron Radiation Laboratory, Stanford University, Stanford, CA

12:10– LUNCH

1:30–*Photon Stimulated Desorption of Chemisorbed Atoms and Molecules from Metal Surfaces,* **T. E. Madey, R. L. Stockbauer, D. M. Hanson** and **S. A. Flodstrom,** National Bureau of Standards, Washington, DC

2:20–*Photon Stimulated Ion Desorption from the Surface of Molecular Solids,* **R. A. Rosenberg, A. K. Green, V. Rehn,** Michelson Lab, NWC, China Lake, CA; **G. Loubriel,** Sandia Labs, Albuquerque, NM; **C. C. Parks,** LBL and University of California, Berkeley, CA

2:40–*Photon Stimulated Desorption of H^+ Ions from GaAs(110)/H_2O,* **G. Thornton,** University of Manchester, UK; **R. A. Rosenberg, V. Rehn, A. Green,** Michelson Lab., NWC, China Lake, CA; **C. C. Parks,** University of California, Berkeley, CA

3:00—*The Interaction of CH_3OH with a Ti (001) Surface Investigated Using Photostimulated Desorption UV Photoemission Spectroscopy,* **D. M. Hanson, R. L. Stockbauer, T. E. Hadey,** National Bureau of Standards, Washington, DC

3:20— BREAK

TOPOGRAPHY
Chairman: C. J. Sparks

3:40—*Applications of Real Time Synchrotron Topography with Image Magnification,* **Masao Kuriyama** and **William J. Boettinger,** National Bureau of Standards, Washington, DC

4:30—*X-ray Plane Wave Analysis of MBE Grown Ag Layers Over GaAs Substrates,* **Michele Sauvage,** LURE, bat. 209c, UPS, 91405 Orsay-cedex France and **J. Massies,** LCR-Corbeville, Thomson-CSF, BP10, 91405, Orsay, France

4:55—*New Techniques in X-ray Topography and Radiography with Synchrotron Radiation,* **D. Keith Bowen** and **Samuel T. Davies,** Daresbury Laboratory, Warrington, UK and University of Warwick, Coventry, UK

Tuesday, November 17 — Parlor B

X-RAY DIFFRACTION
Chairman: D. E. Cox

8:30—*Energy Dispersive Diffraction from Powder Specimens at High Pressures,* **Millard Baublitz, Jr.,** Polaroid Corporation, Cambridge, MA

9:20—*X-ray Diffraction Studies of the Structure of Grain Boundaries,* **J. Budai** and **S. L. Sass,** Department of Materials Science and Engineering, Cornell University, Ithaca, NY

10:10— COFFEE BREAK

PHOTOEMISSION
Chairman: D. Norman

10:30—*Photoemission from the Bulk and from Clean Surfaces,* **F. J. Himpsel,** IBM Thomas J. Watson Research Center, Yorktown Heights, NY

11:20—*Resonant Satellites in the Valence Bands of Nickel Compounds,* **S.-J. Oh, I. Lindau,** SEL, Stanford University, Stanford, CA; **J. W. Allen,** Xerox Palo Alto Research Center, Palo Alto, CA

11:45—*Studies of Photoelectron Diffraction, Angle-Resolved Photoemission, and Threshold Effects in Auger Spectroscopy in a Novel Energy Region: 800-4500 eV,* **Zahid Hussain,** Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, CA

12:35— LUNCH

2:00—*Angle Resolved Photoemission from Adsorbates,* **W. Eberhardt,** Brookhaven National Laboratory, Upton, NY

2:50—*Photoemission Studies of Nickel and Palladium Silicides with Synchrotron Radiation,* **Y. J. Chabal, A. Franciosi, J. H. Weaver, J. E. Rowe** and **J. M. Poate,** Bell Laboratories, Murray Hill, NJ and Synchrotron Radiation Center, University of Wisconsin, Madison, WI

3:15—*Spin Polarized Photoemission and GEV Satellite of Ni*, **R. Clauberg, W. Gudat, E. Kisker, E. Kuhlmann,** and **G. M. Rothberg,** Institut fur Festkorperforschung, KFA, Julich, Germany

3:40— BREAK

ANOMALOUS SCATTERING
Chairman: P. Eisenberger

4:00—*Structural Studies of Disordered Materials Using X-ray Anomalous Scattering,* **Paul Fuoss,** Bell Laboratories, Murray Hill, NJ

4:50—*Combined Use of RDF, EXAFS, and Anomalous X-ray Diffraction in the Structural Study of Amorphous MoS_3 and WS_3,* **K. S. Liang** and **S. P. Cramer,** Exxon Research and Engineering Co., Linden, NJ

Wednesday, November 18 — Parlor B

INFRARED SPECTROSCOPY AND SURFACE X-RAY SCATTERING
Chairman: P. H. Citrin

8:30—*Infra-Red Spectroscopy at the National Synchrotron Light Source,* **Gwyn P. Williams,** National Synchrotron Light Source, Brookhaven National Laboratory, Upton, NY

9:20—*X-ray Scattering Studies of Surfaces,* **P. Eisenberger,** Exxon Research and Engineering Co., Linden, NJ; **W. Marra** and **P. Fuoss,** Bell Laboratories, Murray Hill, NJ

10:10— COFFEE BREAK

SEXAFS AND EXAFS
Chairman: R. Jaeger

10:30—*SEXAFS Studies of Cℓ I and Te Adsorbed on Semiconductor and Metal Surfaces,* **P. H. Citrin, J. E. Rowe, P. Eisenberger,** Bell Laboratories, Murray Hill, NJ

11:20—*X-ray Absorption Near-Edge Structure (XANES) and the Structure of Surfaces,* **P. J. Durham, J. B. Pendry** and **D. Norman,** Daresbury Laboratory, Science and Engineering Research Council, Daresbury, Warrington, UK

12:10—*X-ray Absorption-Edge Studies of a Pt Catalyst Supported on Carbon,* **D. M. Pease,** Department of Physics and Institute of Materials Sciences, University of Connecticut, Storrs, CT; **F. A. Otter,** United Technologies Research Center, East Hartford, CT; **J. I. Budnick** and **G. Hayes,** Physics and IMS, University of Connecticut, Storrs, CT

12:35—*X-ray Absorption Spectroscopy and EXAFS of Pt/TiO_2 Catalysts,* **D. R. Short** and **J. R. Katzer,** Center for Catalytic Science and Technology, University of Delaware, Newark, DE; **A. Mansour** and **D. E. Sayers,** Department of Physics, North Carolina State University, Raleigh, NC

1:00— ADJOURN

SYMPOSIUM I

MICROSCOPY AND CHEMICAL ANALYSIS OF SEGREGATION AND CLUSTERING IN CRYSTALLINE SOLIDS

Chairmen:
D. A. Smith and W. Krakow, IBM Thomas J. Watson Research Center, Yorktown Heights, NY

November 16, 1981

SESSION I-1

Room 433

Chairman: W. Krakow, IBM T. J. Watson Research Center, Yorktown Heights, NJ

9:00—******Segregation and Clustering in Metals,* **V. Vitek,** University of Pennsylvania, Philadelphia, PA

9:40—******Segregation and Clustering in Non-Metals,* **R. M. Cannon,** MIT, Cambridge, MA

10:20— BREAK

10:40—******Imaging of Strain-fields,* **C. B. Carter,** Cornell University, Ithaca, NY

11:25—******Chemical Analysis at High Resolution,* **D. B. Williams,** Lehigh University, Bethlehem, PA

SESSION I-2

Room 433

Chairman: D. A. Smith, IBM

2:00—*Incubation Times and Size Distributions for He-Vacancy Clusters in Several Fe-Base Alloys: I. Experiment,* **J. N. McGruer** and **J. R. Townsend,** University of Pittsburgh, Pittsburgh, PA; **J. A. Spitznagel, S. Wood** and **N. J. Doyle,** Westinghouse Research and Development Center, Pittsburgh, PA; **W. J. Choyke,** University of Pittsburgh and Westinghouse Research and Development Center, Pittsburgh, PA

2:20—*Incubation Times and Size Distributions for He-Vacancy Clusters in Several Fe-Base Alloys: II. Theory,* **C. A. Parker,** MIT, Cambridge, MA

2:40—******Field-ion Microscopy of Segregation and Clustering,* **T. T. Tsong,** Pennsylvania State University, University Park, PA

3:20— BREAK

3:40—******Electron Microscopy of the Interaction of Point Defects with Dislocations in Silicon,* **D. Cherns,** Oxford University, Oxford, UK

4:20—*Electron Microscopy of Antimony Implanted Silicon,* **A. P. Pogany,** Royal Melbourne Institute of Technology, Melbourne, Australia

4:40—*Redistribution of Oxygen and Precipitation within Damage Regions of Ion-Implanted Silicon,* **T. J. Magee,**

C. Leugng and **H. Kawayoshi,** Advanced Research and Applications Corp., Sunnyvale, CA; **B. K. Furman** and **C. A. Evans, Jr.,** Charles Evans & Associates, San Mateo, CA

*Invited Talk

SYMPOSIUM J

POLYMERS AS ELECTRONIC MATERIALS

Chairman: J. Mort, Xerox Corporation

Monday, November 16 — Parlor C

8:30- 9:30 *Electronic States in Polymers,* **J. Ritsko,** Xerox Corporation

9:30-10:30 *Opitcal Studies of Doped Polymers,* **D. Haarer,** University of Bayreuth

10:30-11:00 COFFEE BREAK

11:00-12:00 *Electronic Properties of Photoconducting Polymers,* **J. Mort,** Xerox Corporation

12:00- 1:30 LUNCH

1:30- 2:30 *Polymers in Electrophotography,* **W. Mey,** Eastman Kodak Corporation

2:30- 3:30 *Piezo and Pyroelectricity in Polymers,* **M. Broadhurst,** National Bureau of Standards

3:30- 4:00 BREAK

4:00- 5:00 *Metallic and Semiconducting Complexes of Organic Polymers,* **R. H. Baughman et al,** Allied Corporation

Contributed Papers:

5:00- 5:15 *Electrical Properties of Ion Implanted Poly (p-phenylene sulfide),* **J. S. Abel, H. Mazurek, D. Day, E. W. Maby, S. D. Senturia, G. Dresselhaus** and **M. S. Dresselhaus,** Massachusetts Institute of Technology

5:15- 5:30 *Cadmium Sulfide-Polyacetylene Photovoltaic Junctions,* **M. Rolland, M. Cadene, M. Aldissi** and **F. Schue,** Universite des Sciences et Techniques du Languedoc, Montpellier, Cedex, France

SYMPOSIUM K

SOLID STATE TRANSDUCERS

Chairmen:
S. C. Chang, GM Research Laboratories
W. H. Ko, Case Western University

November 18–19, 1981

SESSION K-1
GENERAL CONSIDERATION OF SOLID STATE TRANSDUCERS

Chairman: Wen H. Ko, Case Western Reserve University Cleveland, OH

Wednesday Morning, November 18 – Room 436

8:30—Opening Remarks: **S. C. Chang** and **W. H. Ko**

8:45—**Signal Conversion in Solid-State Transducers,* **S. Middelhoek** and **D.J.M. Noorlag,** Delft University of Technology, Delft, The Netherlands

9:15—**Integrated Silicon Sensors: Interfacing Electronics to a Nonelectronic World,* **K. D. Wise,** The University of Michigan, Ann Arbor, MI

9:45—**VLSI and Intelligent Transducers,* **W. H. Ko** and **C. D. Fung,** Case Western Reserve University, Cleveland, OH

10:15— COFFEE BREAK

SESSION K-2
PHYSICAL TRANSDUCERS

Chairman: J. N. Zemel, University of Pennsylvania, Philadelphia, PA

Wednesday Morning, November 18 – Room 436

10:30—**Magnetic-Field Sensitivity of Two-Collector Transistor Structures,* **V. Zieren** and **S. Middelhoek,** Delft University of Technology, Delft, The Netherlands

11:00—**Integrated Probes for the in situ Measurement of Low-Frequency Dielectric Relaxations,* **D. R. Day, et al.,** Massachusetts Institute of Technology, Cambridge, MA

11:30—**Thin Film Temperature Sensors Based on Silicon,* **S. J. Fonash, M. D. Aggarwal, S. Ashok,** The Pennsylvania State University, University Park, PA; **W. Hurst,** National Bureau of Standards

12:00—**A Solid-State Dew-Point Sensor,* **P. P. L. Regtien,** Delft University of Technology, Delft, The Netherlands

*Invited Talk

SESSION K-3
GAS SENSORS

Chairman: S. C. Chang, G.M. Research Lab., Warren, MI

Wednesday Afternoon, November 18 – Room 436

2:00—**Semiconductor Gas Sensors,* **S. R. Morrison,** SRI International, Menlo Park, CA

2:30—**Homogeneous Semiconducting Gas Sensors,* **G. Heiland,** Physikalisches Institut der Rheinisch-Westfalischen Technischen Hochschule Aachen, Aachen, Germany

3:00— BREAK

3:30—***Conducting MIS Diode Gas Detectors: The Pd/SiO_X/Si Hydrogen Sensor, S. J. Fonash,** The Pennsylvania State University, University Park, PA

4:00—*Thin Solid State Electrochemical Gas Sensors,* **G. Velasco, J. P. Schnell, M. Croset,** Laboratoire Central de Recherches, Orsay, France

4:30—*Sulfur Dioxide Sensors Using Solid Sulfate Electrolytes,* **Wayne L. Worrell,** Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA

*Invited Talk

Wednesday Evening, November 18 — Room 436
8:00—10:00 P.M.

Panel Discussion
TRANSDUCER NEEDS AND APPROACHES IN VARIOUS SECTORS

Moderator: **W. H. Ko,** Case Western Reserve University, Cleveland, OH

Panel Members: **B. F. Spielvogel,** U. S. Army Research Office, Research Triangle Park, NC
D. L. Nelson, Office of Naval Research Arlington, VA
J. F. Cassidy, General Electric Company Schenectady, NY
J. N. Zemel, University of Pennsylvania, Philadelphia, PA
P. W. Cheung, Case Western Reserve University, Cleveland, OH

SESSION K-4
PRESSURE TRANSDUCERS

Chairman: S. Middelhoek, Delft University of Technology Delft, The Netherlands

Thursday Morning, November 19 — Room 436

8:30—***Miniature Capacitive Pressure Transducer, W. H. Ko, C. D. Fung,** Case Western Reserve University, Cleveland, OH

9:00—*A Special Silicon Diaphragm Pressure Sensor with High Output and High Accuracy,* **M. Shimazoe, et al.,** Naka Works, Hitachi Ltd., Katsuta, Japan

9:30—*Hall Effect Devices as Strain and Pressure Sensors,* **Y. Kanda,** Hamamatsu University School of Medicine, Hamamatsu, Japan

10:00— COFFEE BREAK

10:30—*Cantilever Type Displacement Sensor Using Diffused Silicon Strain Gauges,* **M. Ai, et al.,** Hitachi Research Laboratory, Ibaraki, Japan

11:00—*An Integrated Pressure Transducer for Biomedical Applications,* **X. P. Wu,** Fudan University, Shanghai, People's Republic of China

11:30—***Multiple Pressure Sensor Catheter for Biomedical Use, T. Matsuo, et al.,** Tohoku University, Sendai, Japan

SESSION K-5
ION SENSORS

Chairman: P. W. Cheung, Case Western Reserve University Cleveland, OH

Thursday Afternoon, November 19 – Room 436

1:30—******New Solid Electrolyte for Sensor Applications,* **G. C. Farrington,** University of Pennsylvania, Philadelphia, PA

2:00—******Aluminum Oxide pH Sensor,* **P. W. Cheung,** Case Western Reserve University, Cleveland, OH

2:30—******Prototype Sodium and Potassium Sensitive Micro-ISFET's,* **Y. Ohta, S. Shoji, M. Esashi** and **T. Matsuo,** Tohoku University, Sendai, Japan

3:00— BREAK

3:30—******Ion Sensitive Diodes,* **J. N. Zemel** and **I. R. Lauks,** University of Pennsylvania, Philadelphia, PA

4:00—******Interface State Properties of Electrolyte-Silicon Dioxide-Silicon Structures,* **P. R. Barabash** and **R. S. C. Cobbold,** University of Toronto, Toronto, Canada

*Invited Talk

SYMPOSIUM L
CONFERENCE ON IN SITU COMPOSITES – IV

Chairmen:
Dr. Malcolm McLean, National Physical Laboratory Teddington, Middlesex, England
Dr. F. D. Lemkey, United Technologies Research Center East Hartford, CT
Dr. H. E. Cline, General Electric Research & Development Schenectady, NY

November 16-19, 1981

SESSION I
HIGH TEMPERATURE STRUCTURAL EUTECTIC ALLOYS

Session Chairman: E. Thompson, United Technologies Research Center, E. Hartford, CT

Monday Morning, November 16 – Room 436

9:00 *1. *Mechanical Properties of Eutectic Superalloys For Gas Turbine Blades,* **M. McLean,** National Physical Laboratory, Teddington, Middlesex, England

9:25 2. *Transverse Mechanical Behavior of High-Strength Monocarbide Eutectics,* **M. F. X. Gigliotti, Jr., M. R. Jackson, S. W. Yang, M. F. Henry** and **D. A. Woodford,** General Electric Corporate Research and Development, Schenectady, NY

9:50 3. *The Quaternary System Fe-Cr-Mn-C and Aligned Ferrous Superalloys,* **H. Nowotny,** University of Connecticut; **E. R. Thompson** and **F. D. Lemkey,** United Technologies Research Center, E. Hartford, CT

10:15 COFFEE BREAK

10:30 4. *Off-Axis Tensile Properties of γ/γ'-αMo DS Eutectic,* **Z. Q. Hu, J. H. Zhang, Z. Y. Zhang, Y. S. Zhang, Y. J. Tang, Y. Yang,** Institute of Metal Research, The Chinese Academy of Science, Liaoning, China
yang, Liaoning, China

10:55 5. *The Fatigue Behavior of Three Advanced Nickel-Base Eutectic Composites,* **T. Ishii, K. Dannemann, D. J. Duquette** and **N. S. Stoloff,** Rensselaer Polytechnic Institute, Troy, NY

11:20 6. *Fatigue Crack Growth in Co and Ni Base Directionally Solidified Eutectic Composites,* **C. Hoffman** and **A. J. McEvily,** Metallurgy Dept., University of Connecticut, Storrs, CT; **P. Bhowal,** Rockwell International, Troy, MI

11:45 7. *Design, Development, Structure and Properties of Some New Eutectic Alloys For High Temperature Use,* **R. P. H. Fleming,** City of London Polytechnic, Dept. of Metallurgy and Materials Engineering, London, England

12:10 LUNCH

*Invited Talk

SESSION II
MECHANICAL PROPERTIES

Session Chairman: M. F. X. Gigliotti, General Electric Corporate Research & Development, Schenectady, NY

Monday Afternoon, November 16 – Room 436

2:00 *1. *The Effect of Solidification Rate on Fiber Distribution and Mechanical Properties of a Directionally Solidified Nickel Base-TaC Eutectic,* **J. L. Walter,** General Electric Corporate Research and Development, Schenectady, NY

2:25 2. *The Influence of Alloy Chemistry on Controlling Fiber Volume Fraction in Ni-Base MC Aligned Eutectics,* **M. R. Jackson** and **J. L. Walter,** General Electric Corporate Research and Development, Schenectady, NY

2:50 3. *Tensile Creep and Relaxation of the Lamellar Al-Al_2Cu Composite. . .Experiments in the Tensile Stage of a High Voltage Electron Microscope,* **M. Ignat,** Inst. Nat. Polytechnique de Grenoble, ENSEEG Domaine University Saint Martin d'Heres, France; **D. Caillard,** Laboratoire d'Opitque Electronique, CNRS, Toulouse, France

3:15 COFFEE BREAK

3:30 4. *Unified Model for Creep and Relaxation of the Al-Al_2Cu Composite,* **M. Ignat, R. Bonnet** and **F. Durand,** Inst. Nat. Polytechnique de Grenoble, ENSEEG Domaine Universitaire Saint Martin d'heres, France
lurgiques (LA 29), ENSEEG Domaine Universitaire BP44 38401 Saint Martin d'Heres, France

3:55 5. *Growth and Thermal Stability of γ/γ'-α Eutectic Composite,* **Y. G. Nakagawa,** Ishikawajima-Harima **Heavy Industries Co.,** Ltd., Tokyo, Japan; **M. Nemoto,** Tohoku University, Japan

4:20 6. *Monocarbide Characterization in Nickel-Base MC Aligned Eutectics,* **M. R. Jackson, M. F. X. Gigliotti, Jr., S. W. Yang** and **J. L. Walter,** General Electric Corporate Research & Development, Schenectady, NY

4:45 7. *Development of the $\gamma/\gamma' Cr_3C_2$ In Situ Composite,* **M. McLean, P. N. Quested** and **P. Henderson,** Division of Materials Applications, National Physical Laboratory, Teddington, Middlesex, England

5:10 8. *Solidification and Strength Characteristics of Ni-Cr-Ti and Co-Cr-Mo Eutectics,* **M. K. Thomas,** Naval Air Development Center, Warminster, PA

5:30 End

*Invited Talk

SESSION III
PHYSICAL PROPERTIES AND STRUCTURE

Session Chairman: W. Tiller, Stanford University, Stanford, CA

Tuesday Morning, November 17 – Room 436

9:00 *1. *In Situ Composite Field Emitter Arrays,* **A. Chapman,** Georgia Institute of Technology, GA

9:20 2. *Selective Etching and Laser Melting Studies of Monotectic Composite Structures,* **L. M. Angers,** Northwestern University, Evanston, IL; **R. N. Grugel** and **A. Hellawell,** Michigan Technological University, Houghton, MI; **C. W. Draper,** Western Electric Company, Princeton, NY

9:40 3. *Submicron Eutectic Thin Film Structure,* **H. E. Cline,** General Electric Corporate Research & Development, Schenectady, NY

10:00 COFFEE BREAK

10:15 4. *The SnSe-$SnSe_2$ Semiconductor Eutectic,* **A. S. Yue** and **J. G. Yu,** University of California, Dept. of Materials Science and Engineering, School of Engineering and Applied Science, Los Angeles, CA

10:35 5. *Dendrite-Eutectic Transition at Low and High Growth Rates,* **V. Laxmanan,** Allied Chemical, Corporate Technology, Morristown, NJ

10:55 6. *Directionally Crystallized Potassium Silicate Glass-Ceramic,* **Grant Lu** and **L. C. Klein,** Ceramics Dept., Rutgers University, Piscataway, NY

11:15 7. *In Situ Electron Microscopy of Solidifying Metallic, Eutectic Alloys,* **Clement Lemaignan** and **Joseph Pelissier,** Centre d'Etudes Nucleaires de Grenoble, Grenoble Cedex, France

11:35 8. *Microstructural Perturbations in Directionally Solidified Al-In, Al-Bi and Zn-Bi Monotectic Alloys,* **B. Toloui,** Dept. of Materials Science, University of Sussex, England; **A. J. Macleod,** Pirelli Research Laboratories, Southampton, England; **D. D. Double,** Dept. of Metallurgy and Science of Materials, University of Oxford, England

11:55 LUNCH

*Invited Talk

SESSION IV
COMPOSITE STRUCTURE

Session Chairman: B. F. Oliver, University of Tennessee, Knoxville, TN

Tuesday Afternoon, November 17 – Room 436

2:00 *1. *In Situ Composites Prepared by Mechanical Techniques,* **J. D. Verhoeven,** Ames Laboratory and Department of Materials Science and Engineering, Iowa State University, Ames, IA

2:25 2. *Mechanical and Superconducting Properties of Cu-Nb_3Sn In Situ Produced Composite Wires,* **A. Kolb-Telieps** and **B. L. Mordike,** Institut fur Werkstoffkunde und Werkstofftechnik der Technischen, Universitat Clausthal, West Germany

2:50 3. *The Long Term, Lower Temperature Structural Stability of the Eutectic Composites Cd-Zn and Pb-Cd,* **R. H. van de Merwe, G. D. Delamore** and **R. W. Smith,** Queen's University, Kingston, Canada

3:15 COFFEE BREAK

3:30 4. *The High Temperature Degradation of Cd-Zn and Pb-Cd Eutectic Alloys,* **R. H. van de Merwe** and **R. W. Smith,** Queen's University, Kingston, Canada

3:55 5. *Quantitative Evaluation of the Interfacial Free Energies at a Solid-Liquid Lamellar Eutectic Interface,* **W. F. Kaukler** and **W. Rutter,** Dept. of Metallurgy and Materials Science, University of Toronto, Toronto, Ontario, Canada

4:20 6. *The Response of MnSb-Sb Composites to Isothermal Aging,* **T. F. Marinis,** Bell Telephone Laboratories, Allentown, PA; **R. F. Sekerka,** Head, Dept. of Metallurgy and Materials Science, Carnegie-Mellon University, Pittsburgh, PA

4:45 7. *Off-Axis Mechanical Properties of Cellular Al-Al_3Ni Directionally Solidified Eutectic,* **D. W. Hetzner,** Timken Research Laboratories, Canton, OH; **B. F. Oliver** and **W. T. Becker,** University of Tennessee, Knoxville, TN

5:10 End

*Invited Talk

SYMPOSIUM M

MAGNETIC AND OPTICAL MATERIALS FOR INFORMATION STORAGE

Chairman: Theodore Davidson, Xerox Corporation, Webster, NY

November 18–19, 1981

MAGNETICS SESSION

Wednesday, November 18 — Parlor B

1300 Keynote Lecture: *Magnetic Recording Materials: New Developments Promise Large Increases in Information Storage Density,* **Denis Speliotis,** Advanced Development Corp., Lexington, MA

1400 *Hot Pressed Ceramic Materials for New Generations of Magnetic Recording Heads,* **L. A. Brissette** and **E. A. Grossi,** Potter Instrument Co., Gonic, NH

1420 *Compositional Analysis of Pattern-Plated Permalloy Films,* **O. Muller, G. Scilla** and **R. Fernquist,** Xerox Corporation, Webster, NY

OPTICAL MATERIALS SESSION

1440 *Testing of Optical Disk Materials for Use by the Computer Industry,* **M. Capote, R. Hazel, Y. Kohanzadeh** and **P. Shepherd,** Burroughs Corp., Westlake Village, CA

1500 COFFEE BREAK

1520 *Laser Writing in Novel Bilayer Structures,* **K. Y. Ahn, T. H. DiStefano** and **N. J. Mazzeo,** IBM Research Laboratory, Yorktown Heights, NY

1540 *Structure and Reflectivity Changes in Novel Bilayer Optical Media,* **S. R. Herd, K. N. Tu** and **K. Y. Ahn,** IBM Research Laboratory, Yorktown Heights, NY

1600 *Degradation of Optical Recording Media in the SEM,* **C. M. Shevlin** and **R. E. DeLong,** Optical Coating Laboratory, Inc., Santa Rosa, CA

Thursday, November 19 — Parlor B

0900 Keynote Lecture: *A Review of Optical Recording Media,* **Alan Bell,** Exxon Corporate Research Laboratories, Linden, NJ

1000 *Optical Data Disk Substrate,* **M. Temple, T. Mayer** and **J. Rancourt,** Optical Coating Laboratory, Inc., Santa Rosa, CA

1020 *Microscopically Textured Opitcal Storage Media,* **H. G. Craighead** and **R. E. Howard,** Bell Laboratories, Holmdel, NJ

1040 COFFEE BREAK

1100 *Laser Marking of Thin Organic Films,* **Allan B. Marchant** and **Joseph J. Wrobel,** Kodak Research Laboratories, Rochester, NY

1130 *Photochromic Switching in Organic Semiconductors,* **Susan C. Dahlberg,** Bell Laboratories, Murray Hill, NJ

1200 LUNCH

1330 *A Thermal Analysis of Hole Forming Process on Ablative Film Optical Disks,* **R. A LaBudde** and **C. Carlino,** Burroughs Corp., Westlake Village, CA

1350 *A Simple Model for the Deterioration of a Tellurium Optical Disk,* **Edward V. LaBudde,** Burroughs Corp., Westlake Village, CA

1410 PANEL DISCUSSION:
Current Issues in Materials for Information Storage

SYMPOSIUM N

EFFECTS OF FLYASH INCORPORATION IN CEMENT AND CONCRETE

Chairpersons:
S. Diamond, Purdue University
Della M. Roy, Penn State University

November 16-18, 1981

SESSION N-1

FLYASH CHARACTERIZATION

Chairman: D. M. Roy, Penn State University, University Park, PA

Monday Morning, November 16 – Room 437

9:00—Welcome from Symposium Chairpersons; Administrative Remarks

9:15—**Production and Collection of Flyash for Use in Concrete,* **D. Ravina,** Technion, Israel

9:55—**Flyash Characterization,* **S. Diamond,** Purdue University, West Lafayette, IN

10:35— BREAK

10:50—*Physical and Chemical Behavior of Selectively-Etched Flyashes,* **B. E. Scheetz, D. W. Strickler, M. W. Grutzeck** and **D. M. Roy,** Pennsylvania State University, University Park, PA

11:15—*Properties of Flyashes Used in the German Federal Republic,* **K. Wesche** and **W. vomBerg,** Technical University Aachen, Aachen, German Federal Republic

11:40—*On the Distinction in Physical and Chemical Characteristics Between Lignitic and Bituminous Fly Ashes,* **S. Diamond** and **F. Lopez-Flores,** Purdue University, West Lafayette, IN

12:05—*Natural Pozzolanas and Flyashes- Analogies and Differences,* **U. Costa** and **F. Massazza,** Italcementi, Bergamo, Italy

12:25— LUNCH

*Invited Talk

SESSION N-2
HYDRATION REACTIONS AND MICROSTRUCTURE I

Chairman: G. M. Idorn, G. M. Idorn Consult ApS, Denmark

Monday Afternoon, November 16 — Room 437

1:40—Chairman's Remarks

1:45—*Pastes of Tricalcium Silicate With Flyash- Analytical Electron Microscopy, Trimethylsilylation, and Other Studies,* **K. Mohan** and **H. F. W. Taylor,** University of Aberdeen, Aberdeen, Scotland

2:10—*Interaction of Flyash With Calcium Silicates During Hydration,* **I. Jawed** and **J. Skalny,** Martin Marietta Laboratories, Baltimore, MD

2:35—*Influence of PFA on the Hydration Reactions of Calcium Aluminates,* **C. Plowman** and **J. Cabrera,** Central Electricity Generating Board, Harrogate, England and University of Leeds, Leeds, England

3:00— BREAK

3:15—*Studies of the Hydration Reactions and Microstructure of Cement-Flyash Pastes,* **A. Ghose** and **P. L. Pratt,** Imperial College of Science and Technology, London, England

3:40—*Pore Structure Formation During Hydration of Flyash and Slag Cement Blends,* **R. F. Feldman,** National Research Council Canada, Ottawa, Canada

4:05—*Hydration Reactions of a Class C. Flyash - The First Three Days,* **E. R. Dunston,** Dunston Laboratories, Denver, CO

4:30—*Modifications of the Cement Paste-Aggregate Interfacial Region Due to Additions of Fly Ash or Silica Fume,* **A. Carles-Gibergues, J. Grandet** and **J. P. Ollivier,** I.M.S.A.-U.P.S., Toulouse, France

4:55—*Combined Lime and Specific Surface Area of the Hydration Products of Lime-Pozzolana and Lime-Flyash Mixes,* **G. Tognon** and **P. Ursella,** Italcementi, Bergamo, Italy

*Invited Talk

SESSION N-3
HYDRATION REACTIONS AND MICROSTRUCTURE II

Chairman: H. F. W. Taylor, University of Aberdeen, Aberdeen, Scotland

Tuesday Morning, November 17 — Room 437

9:00—Chairman's Remarks

9:05—*Comparative Studies of Reaction in Lignitic and in Bituminous Flyash Pastes,* **S. Diamond** and **F. Lopez-Flores,** Purdue University, West Lafayette, IN

9:30—*Reactions in High-Lime Cement Composites,* **M. W. Grutzeck, B. E. Scheetz** and **D. M. Roy,** Pennsylvania State University, University Park, PA

9:55—*The Porosity-Strength Relationships of a Cement Paste Containing Different Proportions of Fly Ash,* **J. A. Dalziel** and **C. D. Pomeroy,** Cement and Concrete Association, Slough, England

10:20— BREAK

10:35—*Flyash in Cement Pastes - Some Effects of Particle Size and Distribution,* **D. G. Montgomery,** University of Wollongong, Wollongong, Australia

11:00—*Effect of Reaction Between PFA and Calcium Hydroxide on Concrete Properties,* **F. G. Buttler,** Teeside Polytechnic, Middlesborough, Cleveland, England

11:25—*Cementitious Properties of a Lignite Flyash: Hydration Mechanism and Utilization as Cement in Road Bases,* **A. Carles-Gibergues,** I.N.S.A. - U.P.S., Toulouse, France

11:50— LUNCH

*Invited Talk

SESSION N-4
PROPERTIES OF CONCRETE CONTAINING FLYASH I

Chairman: C. D. Pomeroy, Cement and Concrete Association, England

Tuesday Afternoon, November 17 — Room 437

1:30—Chairman's Remarks

1:35—**Effects of Various Types of Flyash on Behavior and Properties of Concrete,* **Craig J. Cain,** American Flyash Corp., Chicago, IL

2:15—*Effect of Flyash on the Setting Time of Concrete - Chemical or Physical?* **Vance H. Dodson,** W. R. Grace and Co., Cambridge, MA

2:40—*Improved Utilization of Flyash in Concrete Through A Chloride-Free Accelerator,* **S. Popovics,** Drexel University, Philadelphia, PA

3:05— BREAK

3:20—*The Distinction Between Water Reduction and Reactivity as Factors Influencing Flyash Performance in Concrete,* **W. R. Barker,** Darling and Hodgson Construction Materials (Pty.) Ltd., Transvaal, South Africa

3:45—*Fly Ash Concrete Under Hot Weather Conditions,* **D. Ravina,** Technion, Haifa, Israel

4:10—*Properties of Mortars and Concretes Made with Flyash,* **K. Wesche** and **R. Schubert,** Technical University Aachen, Aachen, German Federal Republic

4:35—*Performance Characteristics of Concretes Containing Flyash,* **V. Ramakrishnan, W. V. Coyle, J. Brown, P. A. Tlustus** and **P. Venkataramanujam,** South Dakota School of Mines and Technology, Rapid City, SD

*Invited Talk

SESSION N-5
PROPERTIES OF CONCRETE CONTAINING FLYASH II

Chairman: Vance R. Dodson, W. R. Grace and Co., Cambridge, MA

Wednesday Morning, November 18 – Room 437

9:00—Chairman's Remarks

9:05—*Structural Properties of Flyash Concrete,* **R. N. Swamy,** University of Sheffield, Sheffield, England

9:30—*Properties of Flyash Concrete,* **Roselle D. Crow,** Bureau of Reclamation, Denver, CO

9:55—*Moisture-Related Movements in OPC/PFA Concrete,* **L. T. Ong, J. G. L. Munday** and **R. K. Dhir,** University of Dundee, Dundee, Scotland

10:20— BREAK

10:35—*The Strength Contribution of Flyash to Concrete - A New Approach to Its Estimation,* **Vance R. Gordon,** W. R. Grace and Co., Cambridge, MA

*Invited Talk

SESSION N-6
BLENDED CEMENTS, STANDARDIZATION, AND RESEARCH NEEDS

Chairman: Sidney Diamond, Purdue University, West Lafayette, IN

Wednesday Afternoon, November 18 – Room 437

1:30—Chairman's Remarks

1:35—**International Aspects of the Development of Uses of Flyash With Cement,* **G. M. Idorn,** G. M. Idorn Consult ApS, Naerum, Denmark

2:15—*American and Foreign Characterization of Flyash For Use in Concrete,* **O. E. Manz,** University of North Dakota, Grand Forks, ND

2:40—*Effects of Grinding on Properties of Flyash Cements,* **B. Osbaeck,** F. L. Smidth and Co., A/S, Copenhagen, Denmark

3:05— BREAK

3:20—*Use of Silica Fumes in Cement and Concrete,* **P.-C. Aitcin,** University of Sherbrooke, Sherbrooke, Canada

3:45—*Effects of Indian Flyashes on Development and Optimization of Blended Cements and Concretes,* **S. K. Syal** and **S. S. Kataria,** University of Illinois, Urbana, IL and Feeders India Consultants, New Delhi, India

4:10—*Development of Cementitious Materials from Waste Lead Slags,* **R. A. McCauley, B. Fasano** and **W. H. Bauer,** Rutgers University, New Brunswick, NJ

4:35—General Discussion and Symposium Summary

*Invited Talk

MATERIALS RESEARCH SOCIETY ORGANIZATION, 1981

OFFICERS

President

K. N. Tu, IBM Thomas J. Watson Research Center

Vice President

C. J. Northrup, Sandia Laboratories

Secretary

B. C. Giessen, Northeastern University

Treasurer

K. C. Taylor, General Motors Technical Center

Executive Directors

A. Tarpinian, Army Materials and Mechanics Center
E. M. Hawk, The Pennsylvania State University

Councillors

E. Baer, Case Western University
T. Barbee, Stanford University
G. E. Brock, IBM
H. S. Chen, Bell Laboratories
F. Gamble, Exxon
H. C. Gatos, MIT
K. A. Jackson, Bell Laboratories
H. J. Leamy, Bell Laboratories
F. Lemkey, United Technologies
J. W. Mayer, Cornell University
G. J. McCarthy, North Dakota State University
P. A. Montano, West Virginia University
M. Myers, Xerox
J. M. Poate (Past President), Bell Laboratories
H. Poppa, NASA-AMES
R. J. Voorhoeve, Celanese
J. H. Wernick, Bell Laboratories
W. S. Williams, University of Illinois

Corporate Sponsors

Allied Corporation
Bell Laboratories
Coherent
Exxon Research and Engineering Company
GTE Laboratories
JEC Lasers
Quantronix Corporation
Spectra Physics
Tachisto
United Technologies Research Center

ACTIVITIES LOCATOR

SYMPOSIA	SUNDAY NOVEMBER 15 Evening	MONDAY NOVEMBER 16 AM	MONDAY NOVEMBER 16 PM	MONDAY NOVEMBER 16 EVE	TUESDAY NOVEMBER 17 AM	TUESDAY NOVEMBER 17 PM	TUESDAY NOVEMBER 17 EVE	WEDNESDAY NOVEMBER 18 AM	WEDNESDAY NOVEMBER 18 PM	WEDNESDAY NOVEMBER 18 EVE	THURSDAY NOVEMBER 19 AM	THURSDAY NOVEMBER 19 PM	THURSDAY NOVEMBER 19 EVE
A. *Laser & Electron Beam Interactions with Solids*		Georgian		PLENARY SESSION: GLOBAL THEORIES OF MATERIALS PROPERTIES 5:30 p.m. East Ballroom - followed by Beer and Pretzels	Georgian		VON HIPPEL AWARD	Georgian			Georgian		
B. *Grain Boundaries in Semiconductors*		Ballroom West			Ballroom West			Parlor A			Parlor A		
C. *Thin Films and Interfaces*					Parlor C			Parlor C			Parlor C		
D. *Nuclear Waste Management*		Ballroom East			Ballroom East			Ballroom East			Ballroom East		
E. *Metastable Materials Formation by Ion Implantation*		Parlor A			Parlor A		Bay State Poster	Georgian					
F. *Rapidly Solidified Amorphous & Crystalline Alloys*						Ballroom West		Ballroom West			Ballroom West		
G. *Materials Processing in the Reduced Gravity Environment of Space*		Stanbro Hall			Stanbro Hall		VON HIPPEL AWARD RECEPTION 5:30 p.m. East Ballroom - Wine/Cheese	Stanbro Hall			Stanbro Hall		
H. *Application of Synchrotron Radiation to Materials Science*		Parlor B			Parlor B			Parlor B					
I. *Microscopy/Chem. Anal. of Segregation/Clustering in Crystalline Solids*		Room 433											
J. *Polymers as Electronic Materials*		Parlor C											
K. *Solid State Transducers*								Room 436			Room 436		
L. *In Situ Composites*		Room 436			Room 436		VON HIPPEL AWARD						
M. *Magnetic/Optical Materials for Information Storage*									Parlor B		Parlor B		
N. *Effects of Flyash Incorporated in Cement and Concrete*		Room 437			Room 437			Room 437					
REGISTRATION	LOBBY 6:00-10:00 P.M.	LOBBY Daily 8:00 a.m. – 5:00 p.m.											

Materials Research Society
Annual Meeting 1981

REGISTRATION FORM

Name _____

Position _____

Affiliation _____

Address _____

City _____

State _____ Zip Code _____

Registration Fees - Please check symposia of interest to you

Symposium		Fee (Check One)	Totals
A ____	H ____		
B ____	I ____		
C ____	J ____	____ $95.00 regular	_____
E ____	K ____		
F ____	L ____	____ $40.00 student	_____
G ____	M ____		
	N ____		
D ____ (Includes one copy of Conference Proceedings)		____ $125.00 regular	_____
		____ $70.00 student	_____

Payment of one registration fee allows participant to attend all symposia.

Conference Proceedings

Symposia A, B, C, E, F, G, L, N will publish conference proceedings individually in the MRS series. Copies of these proceedings can be purchased by participants at $15.00 for the first copy. Additional copies (of the same Proceedings or copies of Proceedings from a different symposium) can be purchased for a fee of $30.00 per copy.

Symposia	Number of Copies	Fees	Totals
A	_____		
B	_____	Cost of first copy $15.00	_____
C	_____		
E	_____		
F	_____	Additional Copies at $30.00 each	_____
G	_____		
L	_____		
N	_____		
Total copies	_____		

Total Registration & Proceedings Fees _____

Discount for Advance **Paid** Registration ($-5.00) _____

TOTAL FEES _____

Make check payable to Materials Research Society

PLEASE DO NOT PAY WITH CHECKS ISSUED BY NON-U.S. BANKS

Return this form with payment **promptly** to:

Aram Tarpinian, Registrar
Army Materials and Mechanics Research Center
Arsenal Street
Watertown, Massachusetts 02172
U.S.A.