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

THE MATERIALS RESEARCH SOCIETY

1980

Annual

Meeting

November 16-20

Copley Plaza Hotel

Boston, Massachusetts

PRELIMINARY

PROGRAM

&

REGISTRATION INFORMATION

CONTENTS

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 rate, and it will speed you through the registration process. Registration will take place in the hotel lobby on Sunday evening from 6:00 to 10:00, and daily thereafter from 8:00 a.m. to 5:00 p.m.

   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:
   Member $95; Non-member $110; or Student $40.

3. **MRS Membership.** If you join the Society or renew your membership now, you can register for this meeting at a reduced rate (see Registration Form in centerfold).

4. **Room Accommodation.** The host hotel, the Copley Plaza (800/225-7654), has reserved a block of rooms for meeting attendees (see reservation card attached). The Boston Park Plaza (617/426-2000), a block away, will accommodate overflow registrants. 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 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).

5. **Proceedings.** Symposia A, B, D, and J intend to publish their proceedings individually. Persons interested in purchasing proceedings of Symposium A, B and J should contact the respective symposium(a) chairperson(s). *Proceedings of Symposium D will be available at a special conference rate only to those registering for that symposium (see item 2 above).*

1980 ANNUAL MEETING
PROGRAM CO-CHAIRMEN

C. J. Northrup, Sandia Laboratories
K. N. Tu, IBM

SYMPOSIUM A

LASER AND ELECTRON-BEAM SOLID INTERACTIONS AND MATERIALS PROCESSING

Chairmen: J. F. Gibbons, L. D. Hess and T. W. Sigmc

November 17-19, 1980

SESSION A-1

FUNDAMENTAL MECHANISMS

Chairman: C. W. White, Oak Ridge National Laboratory
Organizer: G. L. Olson, Hughes Research Laboratories

Monday, November 17, 1980

In. 8:30— *Fundamental Mechanisms In Laser And Electron Beam Processing of Materials,* **W. L. Brown,** Bell Laboratories, Murray Hill, NJ 07974

1.1 8:55— *Pulsed Raman Temperature Measurements Of Laser-Heated Crystalline Silicon,* **A. Compaan** and **H. W. Lo,** Department of Physics, Kansas State University, Manhattan, KS 66506

1.2 9:10— *Computer Model Of The Temperature Rise and Carrier Concentration Induced In Si By Nanosecond Laser Pulses,* **A. Lietoila** and **J. F. Gibbons,** Stanford Electronics Laboratories, Stanford, CA 94305

1.3 9:25— *Threshold Energy Density For Pulsed Laser Annealing Of Silicon,* **D. Hoonhout** and **F. W. Saris,** FOM-Institute for Atomic and Molecular Physics, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands

1.4 9:40— *Experimental Observation Consistent With Surface Melting During Laser Annealing Of Damaged Silicon,* **G. G. Bentini** and **R. Nipoti,** C.N.R.-Instituto LAMEL-Via Castagnoli 1-40126 Bologna (Italy); **C. Cohen,** Ecole Normale Superieure-Paris VII; **A. Desalvo,** Ist. Chimico Fac. Ingegneria, Universita di Bologna; and **A. V. Drigo,** Ist. Fisica, Universita di Padova

1.5 9:55— *Phase Transitions In Amorphous Si Produced By Electron Or Laser Irradiation,* **P. Baeri, G. Foti** and **J. M. Poate,** Bell Laboratories, Murray Hill, NJ 07974; **A. G. Cullis,** Royal Signals and Radar Establishment, Malvern, England

10:10— BREAK

In. 10:25— *Generation Of Electron Beams For Materials Processing,* **R. F. W. Pease,** Stanford Electronics Laboratories, Stanford, CA 94305

1.6 10:50— *Kinetic Effects and Mechanisms Limiting Substitutional Solubility In The Formation Of Supersaturated Alloys By Pulsed Laser Annealing,* **C. W. White, B. R. Appleton, B. Stritzker*, D. M. Zehner,** Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830 and **S. R. Wilson,** Semiconductor Research and Development Lab, Motorola, Inc., Phoenix, AZ 85008. *Guest scientist from Institut fur Festkorperforschung, KFA, Julich, FRG.

1.7 11:05— *Dependence Of Trapping And Segragation Of Impurities In Si On The Velocity Of The Liquid-Solid Interface,* **P. Baeri, G. Foti** and **J. M. Poate,** Bell Labora-

tories, Murray Hill, NJ 07974; **S. U. Campisano** and **E. Rimini,** Instituto di Struttura della Materia, Universita di Catania, Catania, Italy; **A. G. Cullis,** Royal Signals and Radar Establishment, Malvern, England

1.8 11:20— *Convection In Pulsed Laser Formed Melts,* **G. E. Possin** and **H. G. Parks,** General Electric Company, Corporate Research and Development, Schenectady, NY

1.9 11:35— *Optical Measurement Of Phase Boundary Dynamics During Laser Crystallization Of Amorphous Ge Films,* **R. L. Chapman, John C. C. Fan, H. J. Zeiger** and **R. P. Gale,** Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA 02173

1.10 11:50— *Explosive Crystallization Of Amorphous Ge Films,* **H. J. Leamy, W. L. Brown, G. K. Celler, G. Foti,** and **G. H. Gilmer,** Bell Laboratories, Murray Hill, NJ 07974 and **J. C. C. Fan,** Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA 02173

12:05— LUNCH

SESSION A-2
ELEMENTAL SEMICONDUCTORS

Chairman: S. U. Campisano, Universita di Catania
Organizer: S. S. Lau, University of California, San Diego

In. 1:45— *Laser And Electron Beam Interactions In Elemental Semiconductors,* **K. Gamo,** Faculty of Engineering Science, Osaka University, Toyonaka, Osaka, Japan

2.1 2:10— *A LEED Investigation of (111) Oriented Si, Ge And GaAs Surfaces Following Pulsed Laser Irradiation,* **D. M. Zehner, J. R. Noonan, H. L. Davis, C. W. White** and **G. W. Ownby,** Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

2.2 2:25— *Adsorption Of Oxygen In Laser-Induced Amorphous Silicon,* **Y. S. Liu, S. W. Chiang** and **F. Bacon,** General Electric Research and Development Center, Schenectady, NY 12301

2.3 2:40— *Direct Measurement Of CW Laser-Induced Crystal Growth Dynamics By Time Resolved Opitcal Reflectivity,* **G. L. Olson, S. A. Kokorowski, R. A. McFarlane** and **L. D. Hess,** Hughes Research Laboratories, Malibu, CA 90265

2.4 2:55— *Real Time Monitoring Of The Optical Properties Of CW Laser Annealed Silicon,* **J. F. Ready** and **B. T. McClure,** Honeywell Corporate Technology Center, 10701 Lyndale Ave. S., Bloomington, MN 55420, and **Terry Brewer** and **William Larson,** Honeywell Solid State Electronics Center, 12001 Highway 55, Plymouth, MN 55441

2.5 3:10— *Thermal Analysis Of CW Laser Annealing Beyond The Melt Temperature,* **S. A. Kokorowski, R. A. McFarlane, G. L. Olson** and **L. D. Hess,** Hughes Research Laboratories, Malibu, CA 90265

2.6 3:25— *A Simple Optical Pyrometer For In Situ Temperature Measurement During CW Argon Laser Annealing,* **T. O. Sedgwick,** IBM T. J. Watson Research Center, Yorktown Heights, NY 10598

3:40— BREAK

2.7 3:55— *EBIC Investigation Of Defects Induced In Beam-Annealed Si,* **N. H. Sheng, M. Mizuta,** and **J. L. Merz,** University of California, Santa Barbara, CA 93106

In. Invited paper

2.8 4:10— *Infrared Optical Properties Of Ion Implanted And Laser Annealed Silicon,* **M. Miyao, T. Motooka, N. Natsuaki** and **T. Tokuyama,** Central Research Laboratory, Hitachi Ltd., Kokubunji, Tokyo, Japan

2.9 4:25— *Pulsed Laser Annealing Effects In High-Dose Rate Silicon Implants,* **J. S. Williams*, D. G. Beanland*, D. J. Chivers+, M J. Kenny°, A. Rose°, M. D. Scott°,** *Royal Melbourne Institute of Technology, Victoria, Australia.
+Harwell Research Laboratories, Didcot, England,
°Australian Atomic Energy Commission Research Establishment, Lucas Heights, Australia

2.10 4:40— *Heterogeneous Nucleation Of Spatially Coherent Damage Structures In Crystalline Silicon With Picosecond 1.06μm And 0.53μm Laser Pulses,* **R. M. Walser, M. F. Becker, J. G. Ambrose,** and **D. Y. Sheng,** Electronics Research Center, University of Texas at Austin, Austin, TX 78712

2.11 4:55— *Defect-Induced Photoluminescence From Laser Annealed Si.,* **M. S. Skolnick, A. G. Cullis,** and **H. C. Webber,** Royal Signals And Radar Establishment, St. Andrews Road, Malvern, Worcs., U.K.

2.12 5:10— *Microscopy Of CW Laser Annealed Silicon,* **G. A. Rozgonyi, H. Baumgart,** Max-Planck-Institut fur Festkorperforschung, Heisenbergstr. 1, 7000 Stuttgart 80, FRG, **F. Phillipp, U. Gosele,** Max-Planck-Institut fur Metallforschung, 7000 Stuttgart 80, FRG

2.13 5:25— *Multiple-Scan E-Beam Method Applied To A Range Of Semiconducting Materials,* **N. J. Shah*, R. A. McMahon*, A. G. Cullis+** and **H. Ahmed***
*Engineering Department, Cambridge University, Trumpington Street, Cambridge, CB2 1PZ
+Royal Signal and Radar Establishment, St. Andrews Road, Great Malvern, Worcs., WR14 3PS

5:40— Refreshments, Discussion of Figures and Late News Papers

SESSION A-3
COMPOUND SEMICONDUCTORS

Chairman: C. L. Anderson, Hughes Research Laboratories
Organizer: J. L. Merz, University of California, Santa Barbara

Tuesday, November 18, 1980

In. 8:30— *Laser And Furnace Annealing Of Implanted Gallium Arsenide,* **J. S. Williams,** Department of Communication and Electronic Engineering, Royal Melbourne Institute of Technology Limited, Melbourne, Australia

3.1 8:55— *Pulsed Ruby Laser Annealing Of Zn, Mg And Se Ion Implants In Semiconducting GaAs,* **D. H. Lowndes, R. D. Westbrook,** and **J. W. Cleland,** Solid State Division, and **W. H. Christie,** Analytical Chemistry Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

3.2 9:10— *Pulsed Laser Annealing Of Ion-Implanted GaAs: Theory And Experiment,* **R. F. Wood** and **D. H. Lowndes,** Solid State Division, and **W. H. Christie,** Analytical Chemistry Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830

In. Invited paper

3.3 9:25— *Behavior Of Metastable Te Donor Concentrations In Q-Switched Ruby Laser Annealed GaAs,* **P. Pianetta, J. Amano, G. Woolhouse** and **C. A. Stolte,** Solid State Laboratory, Hewlett-Packard Laboratories, 1501 Page Mill Road, Palo Alto, CA 94304

3.4 9:40— *Pulse Diffused n+ Layers In GaAs,* **D. E. Davies, E. F. Kennedy, T. G. Ryan** and **J. P. Lorenzo,** Rome Air Development Command, Hanscom AFB, Bedford, MA 01731

3.5 9:55— *Laser Annealing Of Defects In VPE And Cz GaAs With A Pulsed Nd:YAG Laser,* **P. M. Mooney, J. C. Bourgoin,** Groupe de Physique des Solides de 1'E.N.S., Universite Paris VII, Tour 23, 2 place Jussieu, 75221 Paris Cedex 05, France, **J. Icole,** Laboratoire Central de Recherche, Domaine de Corbeville, D.T. 10, 91401 Orsay, France

10:10— BREAK

In. 10:25— *Laser Processing Of Compound Semiconductors,* **J. C. C. Fan,** Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA 02173

3.6 10:50— *CW Laser Annealing Of Low Dose Si Implants In GaAs,* **Y. I. Nissim** and **J. F. Gibbons,** Stanford Electronics Laboratories, Stanford, CA 94305

3.7 11:05— *Liquid Phase Recrystallization Of InSb By CW Laser Irradiation,* **D. H. Lee,** Santa Barbara Research Center, Goleta, CA 93017; **G. L. Olson** and **L. D. Hess,** Hughes Research Laboratories, Malibu, CA 90265

3.8 11:20— *Laser-Annealed GaP Ohmic Contacts For High-Temperature Devices,* **O. Eknoyan, W. Van der Hoeven, T. Richardson** and **W. A. Porter,** Institute for Solid State Electronics, Texas A & M University, College Station, TX 77843

3.9 11:35— *Device Performance Of Laser-Annealed Double Heterostructure GaA1As Materials,* **J. A. Rostworowski, M. Brett,** and **R. R. Parsons,** Dept. of Physics, University of British Columbia, Vancouver, B.C. V6T1W5, Canada; and **A. J. Springthorpe, C. M. Look,** and **J. C. Dyment,** Bell-Northern Research, Ottawa, Canada

3.10 11:50— *Optimization Of Pulsed Annealing Techniques For GaAs Integrated Circuits,* **G. M. Martin, A. Mitonneau, M. Cathelin, S. Makram-Ebeid** and **C. Venger,** Laboratoires d'Electronique et de Physique Appliquee, 3 avenue Descartes, 94450 Limeil Brevannes, France; **D. Barbier** and **A. Laugier,** L.P.M. Laboratory, INSA, 20 avenue Albert Einstein, 69621 Villeurbanne, France

12:05— LUNCH

SESSION A-4
DEVICE APPLICATION

Chairman: T. Tokayama, Hitachi Ltd., Tokyo
Organizer: P. Pianetta, Hewlett-Packard Laboratories

In. 1:45— *Laser Processing Of Silicon For Advanced Microelectronic Devices And Circuits,* **L. D. Hess, S. A. Kokorowski, G. L. Olson** and **G. Yaron*,** Hughes Research Laboratories, Malibu, CA 90265
*Currently at National Semiconductor, Santa Clara, CA 95051

In. Invited paper

4.1 2:10— *Pulsed Electron Beam Processing Of Silicon Devices,* **A. C. Greenwald, R. Dolan,** and **S. Tobin,** Spire Corporation, Bedford, MA 01730

4.2 2:25— *Characterization Of Al-Si Ohmic Contacts Obtained On Shallow Junctions By Laser And Electron Beam Annealing,* **A. Armigliato, R. De Luca, M. Finetti** and **S. Solmi,** CNR-Instituto Lamel, Via Castagnoli, 1 40126 Bologna (Italia)

4.3 2:40— *CW Argon Ion Laser Annealed B And As Implanted Diodes In Oxide Defined Si Devices,* **T. O. Sedgwick, P. M. Solomon** and **H. J. Vollmer,** IBM T. J. Watson Research Center, Yorktown Heights, NY 10598

4.4 2:55— *Scanned Electron Beam Annealing Of Boron-Implanted Diodes,* **T. O. Yep, R. T. Fulks,** and **R. A. Powell,** Varian Associates, Inc., Corporate Solid State Laboratory, Palo Alto, CA 94303 and Extrion Division, Gloucester, MA 01930

4.5 3:10— *C-V And Capacitance Transient Analysis Of Self-Implanted Amorphous Si Layers Regrown By Swept Line Electron Beam Annealing,* **K. J. Soda, R. M. DeJule,** and **B. G. Streetman,** Coordinated Science Laboratory and Department of Electrical Engineering, University of Illinois at Urbana-Champaign

3:25— BREAK

In. 3:40— *Beam Processing In Silicon Device Technology,* **C. Hill,** Plessey Research (Caswell) Limited, Allen Clark Research Centre, Caswell, Towcester, Northants., England

4.6 4:05— *Silicon Bipolar Transistors Fabricated By Using Ion Implantation and Laser Annealing,* **N. Natsuaki, T. Miyazaki, M. Ohkura, T. Nakamura, M. Tamura,** and **T. Tokuyama,** Central Research Laboratory, Hitachi Ltd., Kokubunji, Tokyo 185, Japan

4.7 4:20— *Electron Beam Annealing Of MOS Devices,* **J. D. Speight, R. M. Dobson,** Post Office Research Centre, Martlesham Heath, Ipswich, England and **R. A. McMahon, H. Ahmed,** Cambridge University Engineering Labs, Trumpington Street, Cambridge, England

4.8 4:35— *Characterization Of Ion-Implanted SiO_2 Properties Applicable To Laser Processing,* **T. C. Teng, Y. Shiau, Y. S. Chen, C. Skinner, C. Sporck,** National Semiconductor, Semiconductor Drive, Santa Clara, CA 95051; **J. Peng, L. Palkuti,** Advanced Research and Applications Corporation, Sunnyvale, CA 94086

4.9 4:50— *Effects Of Pulsed Laser Irradiation On Thermal Oxides Of Silicon,* **D. L. Crosthwait, R. R. Shah,** and **G. A. Brown,** Semiconductor Research and Development Laboratory, Texas Instruments, Inc., P.O. Box 225012, Dallas, TX 75265

4.10 5:05— *Formation Of SiC, Si_3N_4 and SiO_2 By Ion Implantation And Laser Annealing,* **S. W. Chiang, Y. S. Liu** and **R. F. Reihl;** General Electric Research and Development Center. Schenectady, NY 12301

5:20— VON HIPPEL AWARD

7:30— Snacks and Refreshments, Discussion of Presented Figures and Late News Papers

In. Invited paper

SESSION A-5
DEPOSITED FILMS AND SILICON ON INSULATORS

Chairman: H. J. Leamy, Bell Laboratories
Organizer: J. C. Bean, Bell Laboratories

Wednesday, November 19, 1980

In. 8:30— *Laser-Induced Solid-Phase Epitaxy Of Silicon Deposited Films,* **J. A. Roth,** Hughes Research Laboratories, Malibu, CA 90265

5.1 8:55— *Laser Epitaxy Over Buried Layers,* **S. P. Weeks*, G. K. Celler** and **H. J. Leamy,** *Bell Laboratories, Allentown, PA 18103; Bell Laboratories, Murray Hill, NJ 07974

5.2 9:10— *Laser Crystallization Of Deposited Silicon Films,* **G. K. Celler, H. J. Leamy, D. E. Aspnes, C. J. Doherty,** and **T. T. Sheng,** Bell Laboratories, Murray Hill, NJ 07974

5.3 9:25— *Laser Induced Controlled Nucleation And Growth Process For Large Grained Polycrystalline Silicon,* **S. C. Danforth, J. S. Haggerty, F. Van Gieseon, I. Kohatsu,** Energy Laboratory and Department of Materials Science and Engineering, Massachusetts Institute of Technology, Room 12-063, Cambridge, MA 02139

5.4 9:40— *Annealing Of Thin Films And Semiconductors By Pulsed Ion Beam,* **J. E. E. Baglin*, R. T. Hodgson*, W. K. Chu**, J. M. Gibson*, T. I. Chappell*, J. Neri***, R. Pal***** and **D. Hammer*****
*IBM Thomas J. Watson Research Center, Yorktown Heights, NY 10598
**IBM Systems Products Division, East Fishkill, NY 12533
***Laboratory for Plasma Studies, Cornell University, Ithaca, NY 14853

9:55— BREAK

In. 10:10— *Beam-Recrystallized Polysilicon As A Device-Worthy Material,* **J. F. Gibbons,** Stanford Electronics Laboratories, Stanford, CA 94305

5.5 10:35— *Processing And Properties Of CW Laser-Recrystallized Silicon Films On Amorphous Substrates,* **N. M. Johnson, D. K. Biegelsen, D. J. Bartelink, M. D. Moyer,** and **H. Singh,** Xerox Palo Alto Research Center, Palo Alto, CA 94304

5.6 10:50— *Pulsed Laser Recrystallization Of Polysilicon: Analysis Via A Novel SEM Technique,* **R. R. Shah** and **D. Loyd Crosthwait,** Semiconductor Research and Development Laboratory, Texas Instruments, Inc., P. O. Box 225012, Dallas, TX 75265

5.7 11:05— *Characterization Techniques For Laser-Annealed Polysilicon On Insulating Layers,* **J. T. Schott,** Sperry Research Center, 100 North Road, Sudbury, MA 01776

5.8 11:20— *Laser-Induced Crystal Growth Of Silicon Islands On Amorphous Substrates,* **D. K. Biegelsen, N. M. Johnson, D. J. Bartelink,** and **M. D. Moyer,** Xerox Palo Alto Research Center, Palo Alto, CA 94304

5.9 11:35— *Laser Growth Of Thin Silicon Crystals In Patterned Structures,* **R. Fastow, H. J. Leamy, G. K. Celler, Y. H. Wong,** and **T. T. Sheng,** Bell Laboratories, Murray Hill, NJ 07974

In. Invited paper

5.10 11:50— *Thermally-Assisted Pulsed-Laser Annealing Of SOS,* **M. Yamada, K. Yamazaki, H. Kotani, K. Yamamoto** and **K. Abe,** Department of Electronics, Faculty of Engineering, Kobe University, Rokkodai, Nada, Kobe 657, Japan

12:05— LUNCH

SESSION A-6
SILICIDES AND METALS

Chairman: J. M. Poate, Bell Laboratories
Organizer: R. B. Gold, Stanford Electronics Laboratory

In. 1:45— *Silicide Formation Using Laser And Electron Beams,* **T. W. Sigmon,** Stanford Electronics Laboratories, Stanford, CA 94305

6.1 2:10— *Laser Annealing Of The Double-Hetero Si(111)/ $CoSi_2$/Si Structure,* **H. Ishiwara, S. Saitoh, K. Mitsui** and **S. Furukawa,** Tokyo Institute of Technology, 4259 Nagatsuda, Midoriku, Yokohama 227, Japan

6.2 2:25— *Post-Irradiation Annealing Of Laser-Formed Silicide Layers,* **M. Wittmer,** Brown Boveri Research Center, CH-5405 Baden, Switzerland, and **M. von Allmen,** Institute of Applied Physics, University of Bern, CH-3012 Bern, Switzerland

6.3 2:40— *Formation Of Polycide With CW Laser Annealing,* **J. D. Peng, L. J. Palkuti,** Advanced Research and Applications Corporation, Sunnyvale, California; **Clark Beck,** Synertek, Santa Clara, CA

2:55— BREAK

In. 3:10— *Beam Induced Reactions In Metal-Film Systems,* **S. S. Lau,** Department of Electrical Engineering and Computer Science, University of California, San Diego, La Jolla, CA 92093; **Martti Maenpaa,** Electrical Engineering Department, California Institute of Technology, Pasadena, CA 91125, and **J. W. Mayer,** Department of Materials Science, Bard Hall, Cornell University, Ithaca, NY 14853

6.4 3:35— *Laser Quenched Metal-Silicon Alloys: V-Si And Nb-Si,* **M. von Allmen,** Institute of Applied Physics, University of Bern, CH-3012 Bern, Switzerland, and **M. Wittmer,** Brown Boveri Research Center, CH-5405 Baden, Switzerland

6.5 3:50— *Pulsed Laser Annealing Of Aluminum,* **P. S. Peercy, D. M. Follstaedt,** and **W. R. Wampler,** Sandia National Laboratories, Albuquerque, NM 87185 USA

6.6 4:05— *High Power Laser Effects On Unimplanted And Implanted Al Single Crystals,* **G. Battaglin, A. Carnera, G. D. Mea, P. Mazzoldi,** Unita GNSM-CNR, Istituto di Fisica, Universita di Padova, Italy; **A. K. Jain, V. N. Kulkarni, D. K. Sood,** Nuclear Physics Division, Bhabba - Atomic Research Center, Bombay, India

6.7 4:20— *Metastable Alloy Formation In Electron Beam Pulsed Al,* **D. M. Follstaedt, S. T. Picraux, W. R. Wampler, J. A. Knapp,** and **E. Rimini,** Sandia Laboratories, Albuquerque, NM 87185

6.8 4:35— *Laser Irradiation of Ni: Defect Structures And Surface Alloying,* **L. Buene, D. C. Jacobson, S. Nakahara, J. M. Poate,** Bell Laboratories, Murray Hill, NJ 07974; **C. W. Draper,** Western Electric Engineering Research Center, Princeton, NJ 08540; **J. K. Hirvonen,** NRL, Washington, DC 20375

In. Invited paper

6.9 4:50— *Laser Pulse Melting And Allotropy,* **L. Buene+, E. N. Kaufmann+** and **C. W. Draper*,** +Bell Laboratories, Murray Hill, NJ 07974, *Western Electric Engineering Research Center, Princeton, NJ 08540

6.10 5:05— *Laser Mixing Of Ni-Au Surface Films Using Q Switched Ruby Pulses,* **P. P. Pronko, H. Wiedersich, A. L. Helling, T. A. Lograsso,** and **P. M. Baldo,** Materials Science Division, Argonne National Laboratory, Argonne, IL 60439

6.11 5:20— *Laser Induced Materials Alterations In Superconduction Alloys,* **B. R. Appleton, B. Stritzker*, C. W. White, J. Narayan, J. Fletcher,** Solid State Division, Oak Ridge National Laboratory, Oak Ridge TN 37830; **S. S. Lau,** California Institute of Technology, Pasadena, CA 91109; **A. I. Braginski** and **J. R. Gavaler,** Westinghouse R&D, Pittsburgh, PA 15235. *Guest scientist from Instutit fur Festkorperforschung, KFA, Julich, FRG.

5:35— Refreshments, Discussion of Presented Figures, and Late News Papers.

SYMPOSIUM B
DEFECTS IN SEMICONDUCTORS

Co-Chairmen: J. Narayan, SSD/ORNL
T. Y. Tan, IBM

November 18-20, 1980

SESSION B-1
DEFECTS, AND CHARACTERIZATION TECHNIQUES

Co-Chairmen: P. B. Hirsch, University of Oxford, Oxford, England
W. L. Brown, Bell Laboratories, Murray Hill, NJ

Tuesday Morning, November 18, 1980

8:20— OPENING REMARKS

8:30— **Electron Paramagnetic Resonance Studies of Defects in Semiconductors,* **James W. Corbett,** SUNY, Albany, NY

9:00— **Defect Characterization by Junction Spectroscopy,* **L. C. Kimerling,** Bell Laboratories, Murray Hill, NJ

9:30— **Microanalysis Using STEM,* **D. M. Maher,** Bell Laboratories, Murray Hill, NJ

10:00— **Ion Channeling Techniques for Defect Studies,* **B. R. Appleton,** ORNL, Oak Ridge, TN

10:30— COFFEE BREAK

10:40— **On the Mechanism of Formation of Secondary Defects,* **J. Narayan** and **J. Fletcher,** ORNL, Oak Ridge, TN

11:10— **X-Ray Diffuse Scattering for the Study of Defect Clusters in Silicon,* **B. C. Larson,** ORNL, Oak Ridge, TN

11:40— **Application of Channeling to Defect Studies in Crystals,* **W. K. Chu,** IBM, Hopewell Junction, NY

12:10— LUNCH

*Invited Talk

SESSION B-2
FUNDAMENTALS OF DEFECTS – I

Co-Chairmen: F. W. Young, Jr., ORNL, Oak Ridge, TN
M. L. Swanson, Chalk River Laboratories, Canada

Tuesday Afternoon, November 18, 1980

2:00– ******Negative-U Properties for Point Defects in Silicon,* **George D. Watkins,** Lehigh University, Bethlehem, PA

2:30– ******Self-Interstitials in Silicon Between Absolute Zero and the Melting Point,* **A. Seeger/W. Frank,** Max-Planck-Instutut fur Metallforschung, Germany

3:00– ******Ion Channeling Analysis of Disorder,* **S. T. Picraux,** Sandia Laboratories, Albuquerque, NM

3:30– COFFEE BREAK

3:40– ******Dislocation Nucleation Models from Point Defect Condensations in Silicon,* **T. Y. Tan,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:10– *Undissociated Dislocations and Intermediate Defects in As^+ Ion Damaged Silicon,* **H. Foell, T. Y. Tan,** and **W. Krakow,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:25– *Channeling Studies of Defect-Boron Complexes in Silicon,* **M. L. Swanson, L. M. Howe, F. W. Saris,** and **A. F. Quenneville,** Chalk River Nuclear Laboratories, Chalk River, Canada

4:40– *A Tentative Identification of the Structure of /113/ Stacking Faults in Silicon,* **T. Y. Tan, H. Foell,** and **W. Krakow,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:55– *Detection of Di-Interstitial Chains in Ion Irradiated Silicon,* **W. Krakow, T. Y. Tan,** and **H. Foell,** IBM T. J. Watson Research Center, Yorktown Heights, NY

5:10– *Donors Generated at 750°C, Relation with Oxygen Precipitation and Carbon,* **V. Cazcarra,** European Materials Competence Center

SESSION B-3
FUNDAMENTALS OF DEFECTS – II

Co-Chairmen: R. W. Balluffi, MIT, Cambridge, MA
J. H. Crawford, Jr., Univ. NC, Chapel Hill, NC

Wednesday Morning, November 19, 1980

8:30– ******Electronic and Mechanical Properties of Dislocations in Semiconductors,* **P. B. Hirsch,** University of Oxford, England

9:00– ******Dislocation Defect States in Deformed Silicon,* **J. R. Patel,** Bell Laboratories, Murray Hill, NJ

9:30– ******On the Formation and Effects of Secondary Defects in Ion Implanted Silicon,* **J. Washburn,** Lawrence Berkeley Labs., Berkeley, CA

10:00– *Characterization of Dislocations and Interfaces in Semiconductors by HREM,* **J. C. H. Spence** and **A. Olsen,** Arizona State University, Tempe, AZ

10:15– *Structure Imaging by High Resolution Transmission Electron Microscopy of the Silicon on Sapphire*

*Invited Talk

Interface, **F. A. Ponce,** Hewlett-Packard Labs., Palo Alto, CA

10:30– COFFEE BREAK

10:40– **Point Defects, Diffusion Mechanisms and the Nucleation and Growth of Extended Defects in Silicon,* **U. Goesele,** IBM T. J. Watson Research Center, Yorktown Heights, NY

11:10– **A Review of NTD-Induced Defects in Silicon,* **J. M. Meese,** University of Missouri Research Reactor, Columbia, MO

11:40– *Transient Capacitance Studies of a Low-Lying Electron Trap in Electron-Irradiated n-Type Silicon,* **G. E. Jellison, Jr., J. W. Cleland,** and **R. T. Young,** ORNL, Oak Ridge, TN

11:55– *Reduction of α-Particle Sensitivity in Dynamic Semiconductor Memories (16 K d-RAMs) by Neutron Irradiation,* **Charles E. Thompson,** Burroughs Corp., San Diego, CA, and **Jon Meese,** University of Missouri, Columbia, MO

12:10– LUNCH

SESSION B-4
DEFECTS RELATED TO CRYSTAL GROWTH, AND DEVICE PROCESSING – I

Co-Chairmen: G. Thomas, University of California, Berkeley, CA
C. W. White, ORNL, Oak Ridge, TN

Wednesday Afternoon, November 19, 1980

2:00– **Swirl Defects in As-Grown Silicon Crystals,* **A. J. R. De Kock,** Philips Research Labs., Eindhoven, Netherlands

2:30– **Precipitation of Oxygen and Intrinsic Gettering in Silicon,* **W. K. Tice,** IBM, Essex Junction, VT

3:00– *Nucleation of Oxygen Precipitation in Silicon,* **H. F. Schaake, R. F. Pinizzotto** and **S. C. Baber,** Texas Instruments Inc., Dallas TX

3:15– *The Effect of Nucleation Temperature on the Morphology of Stacking Faults in CZ Silicon,* **R. F. Pinizzotto** and **H. F. Schaake,** Texas Instruments Inc., Dallas, TX

3:30– COFFEE BREAK

3:40– **Electron Microscope Characterization of the Microstructure of Pulse-Annealed Semiconductors,* **A. G. Cullis,** Royal Signals and Radar Establishment, England

4:10– *Laser Annealing and Growth Processes at Crystallization Interfaces in a-Si:H,* **C. S. Murty** and **R. Gronsky,** Lawrence Berkeley Labs., Berkeley, CA

4:25– *Defects in Ion Implanted, Laser Annealed Silicon,* **J. Fletcher** and **J. Narayan,** ORNL, Oak Ridge, TN

4:40– *TEM Investigation of the Microstructure in Laser-Crystallized Ge Films,* **R. P. Gale, John C. C. Fan, R. L. Chapman,** and **H. J. Zeiger,** MIT, Lexington, MA

*Invited Talk

4:55— *Electrically Active Defects Induced by Pulsed Laser Annealing of Virgin and Heavily Doped Silicon,* **A. Mesli, E. Buttung, J. C. Muller, J. P. Ponpon,** and **P. Siffert,** Centre de Recherches Nucleaires, France

SESSION B-5
DEFECTS RELATED TO CRYSTAL GROWTH, AND DEVICE PROCESSING — II

Co-Chairmen: G. W. Cullen, RCA Labs., Princeton, NJ
K. A. Jackson, Bell Labs., Murray Hill, NJ

Thursday Morning, November 20, 1980

8:30— ******Real-Time X-Ray Topographic Observation of Melting and Growth Processes of Silicon Crystals,* **J. Chikawa** and **F. Sato,** NHK Broadcasting Science Research Labs., Japan

9:00— *Microstructure of Polycrystalline SiC Containing Excess Si after Neutron and Ion Irradiation,* **S. D. Harrison** and **J. C. Corelli,** Rensselaer Polytechnic Institute, Troy, NY

9:15— *Processing Effects on the Electrical and Optical Properties of Sulfur-Related Defect Centers in Silicon and Similarities to the Oxygen Donor,* **Richard A. Forman, Robert D. Larrabee, David R. Myers, Willie E. Phillips,** and **W. Robert Thurber,** NBS, Washington, DC

9:30— *TEM/STEM Study of Grain Boundary Structure and Segregation in CVD Thin-Film Silicon,* **J. H. Rose** and **R. Gronsky,** Lawrence Berkeley Labs., Berkeley, CA

9:45— *Characterization of the Defect Structure of Si-SiO_2 Interfaces,* **J. H. Mazur** and **R. Gronsky,** Lawrence Berkeley Labs., Berkeley, CA

10:00— *Defect Structure of the Epitaxial Pd_2Si-Silicon Interface,* **D. Cherns,** Oxford University, Oxford, UK and **D. A. Smith,** IBM T. J. Watson Research Center, Yorktown Heights, NY

10:15— *Studies of Fracture and Plastic Deformation in Silicon,* **S. M. Ohr** and **J. Narayan,** ORNL, Oak Ridge, TN

10:30— COFFEE BREAK

10:40— ******Oxygen, Oxidation Stacking Faults, and Related Phenomena in Silicon,* **S. M. Hu,** IBM, Hopewell Junction, NY

11:10— *The Effect of Impurity Concentration on the Morphology of Microdefects in CZ Silicon,* **R. F. Pinizzotto** and **H. F. Schaake,** Texas Instruments Inc., Dallas, TX

11:25— *On the Formation of Double Damage Layers in Ion Implanted Si,* **D. K. Sadana,** Lawrence Berkeley Labs., Berkeley, CA and **G. R. Booker,** University of Oxford, England

11:40— *Characterization of Defects in Silicon Ribbons by Combined TEM and EBIC,* **H. Strunk,** Max-Planck-Institut fur Metallforschung, Germany; **B. Cunningham,** and **D. Ast,** Cornell University, Ithaca, NY

*Invited Talk

11:55– *An EBIC Investigation of Hydrogen Passivated Structural Defects in EFG Silicon Ribbon,* **Tim D. Sullivan,** and **Dieter G. Ast,** Cornell University, Ithaca, NY

12:10– LUNCH

SESSION B-6
DEFECTS IN COMPOUND SEMICONDUCTORS

Co-Chairmen: K. N. Tu, IBM, Yorktown Heights, NY
R. Sinclair, Stanford University, Stanford, CA

Thursday Afternoon, November 20, 1980

1:45– **Luminescence and Structural Properties of $Ga_{1-x}Al_xAs$ Double Heterostructures and Multiple Quantum Well Structures,* **P. M. Petroff,** Bell Labs., Murray Hill, NJ

2:15– *Electronic Defects in Metalorganic GaAlAs,* **N. M. Johnson, R. D. Burnham,** and **D. Fekete,** Xerox Palo Alto Research Center, Palo Alto, CA

2:30– *Effect on Electrical Properties of Segregation of Implanted Se^+ at Defect Sites in GaAs,* **D. K. Sadana, J. Washburn, M. Strathman,** Lawrence Berkeley Labs., Berkeley, CA; **G. R. Booker,** University of Oxford, England, and **M. H. Badawi,** University of Surrey, England

2:45– *Effect of Electric Field and Current Injection on the Main Electron Trap in Bulk GaAs,* **S. Makram-Ebeid,** Laboratories d'Electronique et de Physique Appliquee, France

3:00– *Submillimeter EPR Observation of the As Antisite Defect in GaAs,* **R. J. Wagner, J. J. Krebs,** and **G. H. Stauss,** Naval Research Lab., Washington, DC

3:15– COFFEE BREAK

3:25– **The Correlation of Structure and Electrical Behavior of InP and InGaAsP Materials,* **S. Mahajan,** Bell Labs., Murray Hill, NJ

3:55 – *High Resolution TEM Imaging of Defects and Interfaces in II-VI Compound Semiconductors,* **F. A. Ponce, T. Yamashita, R. Sinclair** and **R. H. Bube,** Stanford University, Stanford, CA

4:10– *Investigation of Defect Concentration Distributions in Ion-Implanted and Annealed GaAs,* **K. L. Wang, G. P. Li,** University of California, Los Angeles, CA; **P. Asbeck** and **G. Kirkpatrick,** Rockwell International, Thousand Oaks, CA

4:25– *Scanning Cathodoluminescence Microscopy of Grain Boundaries in GaAs,* **J. P. Salerno, R. P. Gale,** and **John C. C. Fan,** MIT, Lexington, MA

4:40– *Study of Grain Boundary Phase in $PbZr_{.48}Ti_{.52}O_3$,* **R. K. Mishra, E. K. Goo,** and **G. Thomas,** Lawrence Berkeley Labs., Berkeley, CA

4:55– *Characterization of Defects in Laser Annealed GaAs,* **J. Fletcher** and **J. Narayan,** ORNL, Oak Ridge, TN

5:10– *Defects in GaInAs Epitaxial Layer Device Structures,* **M. M. Al-Jassim, M. Hockley,** and **G. R. Booker,** University of Oxford, Oxford, England

*Invited Talk

SYMPOSIUM C
SEMICONDUCTOR INTERFACES

Chairmen: W. K. Chu, IBM
J. W. Mayer, Cornell
November 17-18, 1980

SESSION C-1
METAL/Si AND SILICIDE/Si STRUCTURES

Monday Morning, November 17, 1980

9:00

1. *Use of Electron Spectroscopies to Understand Metal Si Contacts,* **W. E. Spicer, G. Rossi, Peter Lew, C. R. Helms** (Stanford), **L. Braicovich** and **I. Abbati** (Polytech, Milano, Italy)
2. *Channeling Studies of Silicide - Silicon Interfaces,* **Nathan W. Cheung** and **J. W. Mayer** (Caltech)
3. *The Formation of the Silicon-Silicide Interface,* **J. L. Freeouf** (IBM)
4. *Transmission Electron Microscopy Study of Silicide - Silicon Interfaces,* **Helmut Foell** (IBM)
5. *XPS Study of Metal/Semiconductor Interfaces: The Ni/Si System,* **P. J. Grunthaner, F. J. Grunthaner** (JPL), and **J. W. Mayer** (Cornell)

SESSION C-2
METAL/GaAs AND METAL/Si

Monday Afternoon, November 17, 1980

2:00

1. *Atomic Redistribution at Metal/III-V Compound Semiconductor Interfaces,* **L. J. Brillson** (Xerox)
2. *Defect Mechanism for Schottky Barrier Formation on III-V Compounds,* **P. Skeath, C. Y. Su, P. W. Chye, I. Lindau,** and **W. E. Spicer** (Stanford)
3. *Interfacial Structure and Reactivity of Ni on Si (111),* **Robert J. Culbertson** (Bell Labs)
4. *A Review of Electrical and Metallurgical Properties of Silicides with Emphasis on Interfaces,* **G. Ottaviani** (Physics Inst. Modena, Italy)

SESSION C-3
HETEROJUNCTIONS

Tuesday Morning, November 18, 1980

9:00

1. *Formation and Electronic Structure of Ge Hetero-Junctions with GaAs (110) and AlAs (110),* **Robert S. Bauer** (Xerox)
2. *Backscattering and Channeling Study of Superlattice Interfaces,* **W. K. Chu** (IBM)
3. *The Silicon - Germanium Interface from a Microscopic Viewpoint,* **G. Margaritondo** (Wisconsin)

4. *Epitaxial Growth of Ge on Si,* **Liang-Sun Hung, Martti Maenpaa** and **S. S. Lau** (Caltech)

Tuesday Afternoon, November 18, 1980

A joint session with Symposium M on the subject of Synthetic Modulated Materials. A: Semiconductor.

Chairman: L. L. Chang (IBM)

SYMPOSIUM D
INTERNATIONAL SYMPOSIUM ON THE SCIENTIFIC BASIS FOR NUCLEAR WASTE MANAGEMENT

Chairman: John G. Moore, Oak Ridge National Laboratory, Oak Ridge, TN

November 17-20, 1980

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 waste and their management. The presentations will emphasize scientific foundations underlying such subjects areas as:

- treatment and disposal of non-high-level radioactive waste
- waste-near-field interaction
- waste form processes and 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

J. G. Moore, Oak Ridge National Laboratory, USA (Chairman)
E. A. Bryant, Los Alamos Scientific Laboratory, USA
J. O. Duguid, Office of Nuclear Waste Isolation, USA
C. J. Northrup, Jr., Sandia Laboratories, USA
L. D. Ramspott, Lawrence Livermore Laboratory, USA
W. A. Ross, Nuclear Waste Materials Characterization Center, USA
J. G. Steger, Los Alamos Scientific Laboratory, USA
S. V. Topp, Savannah River Laboratory, USA

STEERING COMMITTEE

K. J. Notz, Oak Ridge National Laboratory, USA (Chairman)
G. H. Daly, Department of Energy, USA
D. E. Ferguson, Oak Ridge National Laboratory, USA
R. H. Flowers, Atomic Energy Research Establishment, UK
F. Girardi, Ispra Establishment, Italy
T. Ishihara, Radioactive Waste Management Center, Japan
R. W. Lynch, Sandia Laboratories, USA
S. A. Mayman, Atomic Energy of Canada Ltd., Canada
G. J. McCarthy, North Dakota State University, USA
E. Merz, Kernforschunganlage Julich, FRG
L. Nilsson, KBS Project, Sweden
D. M. Rohrer, Nuclear Regulatory Commission, USA
R. Roy, Pennsylvania State University, USA
T. E. Scott, Ames Laboratory, USA
C. Sombret, Centre d'Etudes Nuclaiues, France
W. S. Twenhoeffel, U.S. Geological Survey, USA
V. I. Spitsyn, Academy of Sciences, USSR

SESSION D-A
REPOSITORY CHARACTERIZATION

Presiding: J. O. Duguid, ONWI, Columbus, OH
S. A. Mayman, AECL, Canada

Monday, November 17, 1980

8:15–11:45

GREETINGS AND OPENING REMARKS – J. G. Moore

A1– *Development of Reference Conditions for Geologic Repositories for Nuclear Waste in the USA,* **G. E. Raines,** Office of Nuclear Waste Isolation, Columbus, OH; **L. D. Rickertsen,** Science Applications, Inc., Oak Ridge, TN; **J. L. McElroy,** Battelle Pacific Northwest Laboratories, Richland, WA; and **R. W. Lynch,** Sandia Laboratories, Albuquerque, NM.

A2– *Physicochemical Conditions in a Nuclear Waste Repository Situated in Columbia River Basalt,* **W. E. Coons,** Rockwell Hanford Operations, Richland, WA

A3– *Evaluation of Product Specifications with Safety Analysis for a Disposal Mine,* **E. Warnecke** and **H. Illi,** Physikalisch - Technische Bundesanstalt, Braunschweig, FRG

A4– *Predicting the Reaction State of Brines in Proposed Regions of Nuclear Waste Disposal Sites,* **R. L. Bassett, E. Duncan,** and **J. Griffin,** Bureau of Economic Geology, The University of Texas at Austin, TX

10:00–10:25– COFFEE BREAK

SESSION D-B
GLASS WASTE FORMS

Presiding: C. J. Northrup, Sandia Laboratories
Albuquerque, NM
C. Sombret, Centre de Marcoule, France

B1– *A Small-Scale Integrated Demonstration of High-Level Radioactive Waste Processing and Vitrification Using Actual SRP Waste,* **R. B. Ferguson, G. B. Woolsey, P. K. Baumgarten, R. M. Galloway,** and **R. E. Eibling,** Savannah River Laboratory, Aiken, SC

B2—*Advanced Method for Making Vitreous Waste Forms,* **J. M. Pope** and **D. E. Harrison,** Westinghouse Research and Development Center, Pittsburgh, PA

B3—*An ESCA Investigation of Molybdenum Containing Silicate Glasses,* **R. Nyholm,** Univeristy of Uppsala, Uppsala, Sweden, and **L. O. Werme,** KBS Nuclear Fuel Safety Project, Stockholm, Sweden

SESSION D-C
CRYSTALLINE WASTE FORMS

Presiding: G. J. McCarthy, North Dakota State University Fargo, ND
J. D. Tewhey, Lawrence Livermore Laboratory, Livermore, CA

1:15—5:30

C1—*Titanate Waste Forms for High Level Waste - An Evaluation of Materials and Processes,* **R. G. Dosch, P. F. Hlava** and **T. J. Headley,** Sandia National Laboratories, Albuquerque, NM

C2—*The Stability of Titanium Minerals in the Presence of Backfill and Repository Materials: A General Approach,* **H. W. Nesbitt, G. M. Bancroft, S. Karkhanis,** and **W. S. Fyfe,** University of Western Ontario, London, Ontario, Canada

C3—*Tailored Ceramic Nuclear Waste Forms: Preparation and Characterization,* **A. Harker, C. M. Jantzen, P. E. D. Morgan,** and **D. Clarke,** Rockwell International Science Center, Thousand Oaks, CA

C4—*Immobilization of High Level Nuclear Reactor Waste in Synroc: Current Status,* **A. E. Ringwood,** Australian National University, Canberra, Australia

C5—*Matrix-encapsulated Waste Forms: Theory and Application to Idealized Systems, Hydrated Radio- and Encapsulant Phases and SRP/NEL Waste,* **R. Roy, E. R. Vance, W. B. White,** Materials Research Laboratory, Penn State University, University Park, PA, and **G. J. McCarthy,** Dept. of Chemistry and Geology, North Dakota State University, Fargo, ND

3:30—3:50— BREAK

SESSION D-D
NATURAL ANALOGUES

Presiding: N. J. Hubbard, ONWI, Columbus, OH
R. C. Ewing, University of New Mexico, Albuquerque, NM

D1—*Alkali and Alkaline Earth Element Studies at OKLO,* **D. G. Brookins,** Department of Geology, University of New Mexico, Albuquerque, NM

D2—*Durability of Rhyolitic Obsidian Glass Inferred from Hydration Dating Research,* **J. E. Ericson,** Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge, MA

D3—*Geologic Stability of Monazite and its Bearing on Immobilization of Actinide Wastes,* **R. J. Floran, M. M. Abraham, L. A. Boatner,** and **M. Rappaz,** Oak Ridge National Laboratory, Oak Ridge, TN

D4—*Backfill Barriers: The Use of Engineered Barriers Based on Geologic Materials to Assure Isolation of Radioactive Wastes in a Repository,* **J. A. Apps,** Law-

rence Berkeley Laboratory and **N. G. W. Cook,** University of California, Berkeley, CA

SESSION D-E
LEACH STUDIES

Presiding: W. A. Ross, Pacific Northwest Laboratory, Richland, WA
F. Girardi, CEC, Italy

Tuesday, November 18, 1980

8:00–11:40

E1– *Surface Analysis–Its Uses and Abuses in Waste Form Evaluation,* **G. L. McVay** and **L. R. Pederson,** Pacific Northwest Laboratory, Richland, WA

E2– *Are Solubility Limits of Importance to Leaching?,* **Allen Ogard, G. Bentley, E. Bryant, C. Duffy, J. Grisham, E. Norris, C. Orth,** and **K. Thomas,** Los Alamos Scientific Laboratory, Los Alamos, NM

E3– *Leach and Corrosion Tests Under Normal and Accident Conditions on Cement Products from Simulated Intermediate Level Evaporator Concentrates,* **G. Rudolph, P. Vejmelka,** and **R. Koster,** Kernforschungszentrum Karlsruhe, Karlsruhe, FRG

E4– *Standard Leach Tests for Nuclear Waste Materials,* **D. M. Strachan, R. P. Turcotte, B. O. Barnes, L. A. Bray,** and **J. H. Westsik,** Pacific Northwest Laboratory, Richland, WA

9:45–10:10– COFFEE BREAK

SESSION D-F
RADIATION EFFECTS

Presiding: S. V. Topp, Savannah River Laboratory, Aiken, SC
P. W. Levy, Brookhaven National Laboratory Upton, NY

F1– *Spontaneous Fragmentation of an Alpha-Active Ceramic–A Mechanism for Dispersion of Solid Waste,* **F. W. Clinard, Jr.** and **D. L. Rohr,** Los Alamos Scientific Laboratory, Los Alamos, NM

F2– *Experimental Study of Structural Damage in Crystalline Nuclear Waste Phases from Fission Fragment Irradiation,* **E. R. Vance** and **K. K. S. Pillay,** Pennsylvania State University, University Park, PA

F3– *Metamictization by Heavy Ion Bombardment of α Quartz, Zircon, Monazite and Nitride Structures,* **L. Cartz, F. G. Karioris, R. A. Fournelle, A. Gowda, K. Ramasami,** Marquette University, Milwaukee, WI and **M. Billy,** Universite de Limoges, Limoges, France

SESSION D-G
POSTER SESSION
REPOSITORY CHARACTERIZATION, WASTE FORMS AND LEACH STUDIES

Presiding: K. J. Notz, Oak Ridge National Laboratory Oak Ridge, TN

R. W. Lynch, Sandia Laboratories Albuquerque, NM

2:30–5:00

G1 – *Laboratory Investigations on the Water Content*

Within the Rock-salt and Its Behavior in a Temperature Field of Disposed High Level Waste, **N. Jockwer,** Institut fur Tieflagerung, Braunschweig, FRG

G2 – *Thermal Conductivity of Selected Repository Minerals,* **M. J. Skvarla, J. W. Vandersande, M. Linvill,** and **R. O. Pohl,** Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca, NY

G3 – *Phase Chemistry of the Umtanum Basalt, A Preferred Repository Host in the Columbia Plateau,* **A. F. Noonan,** Rockwell Hanford Operations, Richland, WA, **K. Fredricksson** and **J. Nelen,** Smithsonian Institution, Washington, DC

G4 – *Geoscientific Evaluation of the Radioactive Waste Isolation in Japan,* **K. Doi,** Radioactive Waste Management Center, Tokyo, Japan

G5 – *Structural and Redox Properties of Uranium in Ca-Mg-A1-Silicate Glasses,* **H. D. Schreiber, G. B. Balags, B. J. Williams** and **S. M. Andrews,** Department of Chemistry, Virginia Military Institute, Lexington, VA

G6 – *Stable Product Low-Leach Glasses,* **S. Karkhanis, P. J. Melling, G. M. Bancroft,** and **W. S. Fyfe,** Department of Chemistry, Department of Geology and Centre for Chemical Physics, University of Western Ontario, London, Ontario, Canada

G7 – *Development of An Improved Ion-Exchange Process for Removing Cesium and Strontium from High-Level Radioactive Liquid Wastes,* **R. M. Wallace** and **R. B. Ferguson,** Savannah River Laboratory, Aiken, SC

G8 – *Immobilization of Savannah River Plant Sludge Waste by Consolidation with Calcium Titanate,* **A. W. Lynch,** Sandia National Laboratories, Albuquerque, NM

G9 – *Ceramic Processing, Phase Equilibria and Leaching Characteristics of Synroc D for U.S. Defense Wastes,* **H. Newkirk, D. Coles, F. Ryerson, R. Rozsa,** and **J. Tewhey,** Lawrence Livermore National Laboratory, Livermore, CA

G10– *Sol-Gel Technology Applied to Crystalline Ceramics,* **P. Angelini, W. D. Bond, A. J. Caputo, J. E. Mack, W. J. Lackey, D. A. Lee,** and **D. P. Stinton,** Oak Ridge National Laboratory, Oak Ridge, TN

G11– *Preliminary Evaluation of Alternative Forms for Immobilization of Hanford High-Level Wastes,* **W. W. Schulz, M. M. Beary, S. A. Gallagher, B. A. Higley, R. G. Johnston, M. J. Kupfer,** and **R. A. Palmer,** Rockwell Hanford Operations, Richland, WA

G12– *The Characterization of Nuclear Waste Forms by EPR Spectroscopy,* **L. A. Boatner, M. M. Abraham,** and **M. Rappoz,** Oak Ridge National Laboratory, Oak Ridge, TN

G13– *Valence States of Actinides in Synthetic Monozites,* **G. W. Beall** and **F. L. Kelley,** Radian Corp., Austin, TX, **J. A. Young,** and **L. A. Boatner,** Oak Ridge National Laboratory, Oak Ridge, TN

G14– *Crystal Chemistry and Phase Relations in the Synthetic Minerals of Ceramic Waste Forms: II. The Crystal Chemical Role of Cerium and Monozite Structure Orthophosphates of U^{4+} and Th^{4+},* **J. G. Pepin, E. R. Vance, D. D. Davis,** Materials Research Laboratory, Penn State University, University Park, PA, and **G. J. McCarthy,** Departments of Chemistry and Geology, North Dakota State University, Fargo, ND

G15— *Predicting Long-Term Leaching Behavior Using High-Temperature Leach Tests,* **J. H. Westsik, Jr.,** Pacific Northwest Laboratories, Richland, WA

G16— *The Mechanisms for Hydrothermal Leaching of Glass and Glass-Ceramic Nuclear Waste Forms,* **F. K. Altenhein, W. Lutze, G. Malow,** Hahn-Meitner-Institute fur Kernforschung Berlin, Berlin, FRG

G17— *The Influence of Surface Processes in Waste Form Leaching,* **A. J. Machiels** and **C. Pescatore,** University of Illinois, Urbana, IL

G18— *Probable Leaching Mechanisms for UO_2 and Spent Fuel,* **R. Wang** and **Y. B. Katayama,** Pacific Northwest Laboratory, Richland, WA

G19— *Kinetics and Mechanisms for the Dissolution of Pollucite Under Ambient and Hydrothermal Conditions,* **S. Komarneni, T. Adl, C. C. Pantano, I. S. T. Tsong, M. W. Barnes, S. D. Atkinson,** and **W. B. White,** Materials Research Laboratory, Penn State University, University Park, PA

G20— *XPS and Ion Beam Scattering Studies of Leaching in Simulated Waste Glass Containing Uranium,* **D. P. Karim, P. P. Pronko, T. L. M. Marcuso, D. J. Lam** and **A. P. Paulikas,** Argonne National Laboratory, Argonne, IL

G21— *Factors Controlling the Release Source-Term in a Granite Waste Repository,* **D. Savage** and **N. A. Chapman,** Harwell Laboratory, Harwell, Oxfordshire, UK

SESSION D-H
NON-HIGH LEVEL WASTE

Presiding: J. G. Stiger, Los Alamos Scientific Laboratory
Los Alamos, NM
E. Merz, KFA Julich, Germany

Wednesday, November 19, 1980

8:00—11:25

H1— *Characterization of Iron-Enriched Synthetic Basalt for TRU Containment,* **J. E. Flinn, S. P. Henslee, P. V. Kelsey, R. L. Tallman,** and **J. W. Welch,** EG&G Idaho, Inc., Idaho Falls, ID

H2— *Treatment of Cladding Hulls by the HIPOW Process,* **H. T. Larker,** and **R. Tegman,** ASEA AB, Robertsfors, Sweden

H3— *Bituminization of Low-Level Liquid Waste,* **H. Kunihayashi, T. Yagi** and **T. Kagawa,** JGG Corporation; **T. Tokubuchi** and **S. Kitajima,** Kyushu Electric Power, Co., Japan

H4— *Studies on Sintered Titanates and Zeolites as Hosts for Mean Level Radioactive Waste,* **S. Forberg** and **T. Westermark,** Royal Institute of Technology, Stockholm, Sweden and **L. Falth,** Institute of Technology, Lund, Sweden

9:45—10:10— COFFEE BREAK

H5— *Diffusion of Cs and I in Concrete,* **K. Anderson, B. Torstenfelt** and **B. Allard,** Chalmers University of Technology, Goteborg, Sweden

H6— *Precipitation of Radiostrontium in Soil,* **B. P. Spalding,** Oak Ridge National Laboratory, Oak Ridge, TN

H7 – *Synthesis, Characterization and Soil Interactions of Etheylene-diamine-tetraacetic Acid (EDTA) and Diethylenetriaminepentoacetic Acid (DTPA) Complexes of ^{99}Technetium,* **L. Y. Martin, D. Rai,** and **J. A. Franz,** Pacific Northwest Laboratory, Richland, WA

SESSION D-I
RADIONUCLIDE MIGRATION

Presiding: E. A. Bryant, Los Alamos Scientific Laboratory Los Alamos, NM
T. Ishihara, Radioactive Waste Management Center Tokyo, Japan

1:00–2:45

I1 – *Prediction of Sorption Behavior of Actinides on Geologic Media,* **G. W. Beall,** Radian Corporation, Austin, TX and **B. Allard,** Chalmers University of Technology, Goteberg, Sweden

I2 – *Cesium Migration Through Solid Cores of Magenta Dolomite,* **A. W. Lynch** and **R. G. Dosch,** Sandia National Laboratories, Albuquerque, NM

I3 – *Sorption Studies of $H^{14}CO_3$ On Some Geologic Media and Concrete,* **B. Allard, B. Torstenfelt,** and **K. Anderson,** Chalmers University of Technology, Goteberg, Sweden

I4 – *Some Difficulties in Interpreting In-Situ Tracer Tests,* **Ivars Neretnieks,** Royal Institue of Technology, Stockholm, Sweden

POSTER SESSION D-J
NATURAL ANALOGUES, RADIATION EFFECTS, NON-HIGH LEVEL WASTES ENGINEERED BARRIERS, NUCLIDE MIGRATION AND PERFORMANCE ASSESSMENT

Presiding: T. Scott, Ames Laboratory, Ames, Iowa
W. S. Twenhoeffel, USGS, Denver, Colorado

3:00–5:30

J1 – *Natural Analogues for Crystalline Radioactive Waste Forms, Part II: Non-Actinide Phases,* **R. A. Haaker,** and **R. C. Ewing,** University of New Mexico, Albuquerque, NM

J2 – *Geochemical Study of a Lamprophyre Dike Near the WIPP Site,* **D. G. Brookins,** University of New Mexico, Albuquerque, NM

J3 – *Nuclear Waste Glasses and Volcanic Glasses: A Comparison of their Stabilities,* **G. Malow,** Hahn-Meitner-Institut fur Kernforschung Berlin, Berlin, FRG and **R. C. Ewing,** University of New Mexico, Albuquerque, NM

J4 – *Radiation Hardening of Rocksalt,* **G. W. Arnold,** Sandia National Laboratories, Alburquerque, NM

J5 – *Radiation Effects in Crystalline High-Level Nuclear Waste Solids,* **W. J. Weber, J. W. Wald,** and **W. J. Gray,** Pacific Northwest Laboratory, Richland, WA

J6 – *Ion Implantation Effect on the Leach Resistance of Glasses and Minerals: Implications for Radioactive Waste Storage,* **J. C. Dran, M. Maurette, B. V. Assent,** Laboratoire Rene Bernas, Orsay, France and **J. C. Petit,** Service Radiochimie (CEA), Montrouge, France

J7 – *Loading and Leakage of Krypton Immobilized in Zeolite and Glass,* **A. B. Christensen, J. A. Del Debbio, D. A. Knecht** and **J. E. Turner,** Exxon Nuclear Idaho Co. Inc., Idaho Falls, ID

J8 – *Low Temperature Process for Contaminated Sodium Encapsulation in Glass,* **R. W. Chickering, W. L. Lyon** and **B. H. Neuman,** Westinghouse Electric Corporation, Madison, PA

J9 – *Disposal of Intermediate-Level Radioactive Sludge by Hydrofracturing at Oak Ridge National Laboratory,* **E. W. McDaniel, H. O. Weeren** and **J. G. Moore,** Oak Ridge National Laboratory, Oak Ridge, TN

J10– *The LASL Experimental Engineered Waste Burial Facility: Design Considerations and Preliminary Plan,* **G. L. DePoorter,** Los Alamos Scientific Laboratory, Los Alamos, NM

J11– *Melting Process to Condition Decladding Hulls Generated by the Reprocessing of LWR and FBR Spent Fuels,* **N. Jacquet-Francillon, G. Rabot, C. Sombret** and **R. Bonniaud,** Gommissariat a L'Energie Atomique, Bagnols sur Ceze, France

J12– *Selecting Zeolites for Adsorption and/or Fixation of Cesium and Strontium,* **S. Komarneni** and **R. Roy,** Materials Research Laboratory, Penn State University, University Park, PA

J13– *Radial Permeameter Testing of Borehole Plug Performance,* by **D. L. South** and **J. J. K. Daemen,** University of Arizona, Tucson, AZ

J14– *Evaluation of Metallic Materials for Use in Engineered Barrier Systems,* **S. G. Pitman** and **B. Griggs,** Pacific Northwest Laboratory, Richland, WA

J15– *Evaluation of Ceramic and Polymeric Materials for Use in Engineered Barrier Systems,* **H. T. Fullam** and **W. E. Skiens,** Pacific Northwest Laboratory, Richland, WA

J16– *Radionuclide Transport and Retardation in Tuff,* **E. N. Vine, B. P. Bayhurst, W. R. Daniels, S. J. Devilliers, B. R. Erdal, F. O. Lawrence,** and **K. Wolfsberg,** Los Alamos Scientific Laboratory, Los Alamos, NM

J17– *Analysis of Radionuclide Transport in Jointed Geologic Media,* **K. L. Erickson,** Sandia National Laboratories, Albuquerque, NM

J18– *Seabed Smectite Clay: Temperature and pH Effects on Adsorption of Cs, Ba, Eu,* **B. T. Kenna,** Sandia National Laboratories, Albuquerque, NM

J19– *The Characterization of Sorption in a Rock/Water/Nuclide System,* **I. G. McKinley,** Harwell Laboratory, Harwell, Oxfordshire, UK

J20– *$SrCl_2$ Solubility in Complex Brines,* **M. A. Clynne,** USGS, Menlo Park, CA, **I. Ming Chou** and **J. L. Haas, Jr.,** USGS, Reston, VA

J21– *Thermal Analysis for a Spent Reactor Fuel Storage Test in Granite,* **D. N. Montan,** Lawrence Livermore Laboratory, Livermore, CA

J22– *Sensitivity of Calculated Pore Fluid Pressure Repository Fracture Geometry,* **R. R. Eaton, D. E. Larson,** and **C. M. Korbin,** Sandia National Laboratories, Albuquerque, NM

SESSION D-K
ENGINEERED BARRIERS

Presiding: L. D. Ramspott, Lawrence Livermore Laboratory, Livermore, CA
L. Nilsson, KBS Project, Stockholm, Sweden

Thursday, November 20, 1980

8:00–12:15

K1– *Development of Engineered Barriers for the Long-term Containment of Nuclear Wastes,* **R. E. Westerman,** Pacific Northwest Laboratory, Richland, WA

K2– *Technical Barriers Against a Spreading of Disposed Radioactive Waste,* **Ernnst-Peter Uerpmann,** Institute fur Tieflagerung, Braunschweig, FRG

K3– *Composite Backfill Materials for Radioactive Waste Isolation by Deep Burial in Salt,* **E. J. Nowak,** Sandia National Laboratories, Albuquerque, NM

K4– *Highly Compacted Bentonite–A Self-Healing Substance for Nuclear Waste Isolation,* **R. Pusch,** University of Lulea , Lulea , Sweden and **A. Bergstrom,** Nuclear Fuel Safety Project, Stockholm, Sweden

K5– *The Bell Canyon Test and Results,* **C. L. Christensen** and **T. O. Hunter,** Sandia National Laboratories, Albuquerque, NM

10:05–10:30– COFFEE BREAK

SESSION D-L
PERFORMANCE ASSESSMENT

Presiding: J. F. Kircher, ONWI, Columbus, OH
R. H. Flowers, AERE, Harwell, UK

L1– *Modeling of Rock Mass Deformation for Radioactive Waste Repositories in Hard Rock,* **O. Stephansson, P. Jonasson,** University of Lulea , Lulea , Sweden and **T. Groth,** Royal Institute of Technology, Stockholm, Sweden

L2– *A Combined Fracture/Porous Media Model for Contaminant Transport of Radioactive Ions,* **H. E. Nuttall** and **A. K. Ray,** The University of New Mexico, Albuquerque, NM

L3– *An Evaluation of the Predictive Ability of Radionuclide Transport in Groundwater Flow Systems,* **F. W. Schwartz,** *University of Alberta, Edmonton, Canada and* **L. Smith,** University of Utah, Salt Lake City, UT

L4– *An Analysis of the Use of Engineered Barriers for Geologic Isolation of Spent Fuel,* **M. O. Cloninger,** Pacific Northwest Laboratory, Richland, WA

SESSION D-M
CURRENT TOPICS IN RADIOACTIVE WASTE MANAGEMENT

Presiding: J. G. Moore, Oak Ridge National Laboratory
Oak Ridge, TN
S. V. Topp, Savannah River Laboratory, Aiken, SC

2:00–5:00

M1– *Clean-up Problems at Three Mile Island,* **R. E. Brooksbank,** Oak Ridge National Laboratory, Oak Ridge, TN

M2– *Activities of the State Planning Council on Low-level Radioactive Waste Management,* **John Stucker,** Executive Director, State Planning Council, Washington, DC

M3– *EPA'S Environmental Standards for Management and Disposal of High Level Radioactive Waste,* **Daniel J. Egan, Jr.,** Environmental Protection Agency, Washington, DC

CLOSING REMARKS – J. G. Moore

SYMPOSIUM E
PHOTO-THERMAL MATERIALS

Chairman: B. O. Seraphin
Optical Sciences Center, University of Arizona
Thursday Morning, November 20, 1980

8:30– *Reflectors for Solar Concentrators,* **Patrick J. Call,** Materials Branch, Solar Energy Research Institute, Golden, CO 80401

9:15– *The Spectral Selectivity of High Temperature Composite Materials,* **A. J. Sievers** and **D. M. Trotter,** Department of Physics, and **R. A. Buhrman** and **H. G. Craighead,** Department of Applied and Engineering Physics, Cornell University, Ithaca, NY 14853

10:00– BREAK

10:30– *Chemical Vapor Deposited Spectrally Selective Surfaces for High Temperature Photo-Thermal Conversion,* **David D. Allred,** Optical Sciences Center, University of Arizona, Tucson, AZ 85721

11:15– *Is Black Chrome a Viable High Temperature Spectrally Selective Coating?,* **A. Ignatiev,** Department of Physics, University of Houston, Houston, TX 77004

SYMPOSIUM F
ELECTRON MICROSCOPE IMAGING AND DIFFRACTION TECHNIQUES IN MATERIALS SCIENCE

Program Chairman: D. W. Krakow, IBM Corporation
T. J. Watson Research Center, Yorktown Heights, NY

Monday, November 17, 1980

9:00– **John M. Cowley,** Arizona State University
STEM Imaging and Microdiffraction in the ASU National Science Foundation Regional Instrumentation Facility

9:30– **Gareth Thomas,** University of California, Berkeley
High Voltage Electron Microscopy and the National Center for Electron Microscopy

10:00– **Michael Isaacson,** Cornell University
Atomic Level STEM Imaging

10:30– BREAK

10:45– **Roger Morton,** Bausch and Lomb Analytical Systems Division
A Review of Automated Image Analysis Techniques in Electron Microscopy

11:15– **R. W. Carpenter,** Oak Ridge National Laboratory
Microdiffraction and Microchemical Analysis

11:45– LUNCH

2:00– **Sumio Iijima,** Arizona State University
High Resolution Transmission Electron Microscopy of Lattices and Surfaces

2:30– **W. C. Nixon,** Cambridge University
The 600kV High Voltage High Resolution TEM

3:00– **Alec Broers,** IBM Corporation
High Resolution Electron Beam Lithography

3:30– BREAK

3:45– **R. Sinclair,** Stanford University
Lattice Imaging and Electronic Materials

4:15– **William Krakow,** IBM Corporation
Diffuse Scattering and Image Calculations of Short Range Order

4:45– End of Symposium

SYMPOSIUM G
SPECTROSCOPIC CHARACTERIZATION OF HETEROGENEOUS CATALYSTS

Chairman: G. L. Schrader, Iowa State University

Monday, November 17, 1980

8:45– **R. Van Duyne,** Northwestern University
Recent Developments in Surface-Enhanced Raman Spectroscopy

9:30– **T. E. Furtak,** Rensselaer Polytechnic
J. Kester, Ames Laboratory-USDOE and Iowa State University
Surface Enhanced Raman Scattering from Pyridine Adsorbed onto Silver Palladium Alloy Surfaces

10:15– BREAK

10:45– **A. W. Klaassen** and **C. G. Hill, Jr.,** University of Wisconsin
Raman Studies of Aldol Condensation Reactions on Sodium Hydrodroxide Treated Silica Gel

11:15– **C. P. Cheng,** University of Delaware
G. L. Schrader, Iowa State University
Raman Spectroscopy of the Sulfidation of Cobalt Molybdate Hydrodesulfurization Catalysts

12:00– LUNCH

1:30– **C. L. Angell,** Union Carbide Corporation
Application of FT/IR Spectrometry to Catalyst Studies and Surface Reactions

2:15– **J. Onuferko, S. H. Moon, H. Windawi** and **J. R. Katzer,** University of Delaware
An FTIR Study of Adsorption of CO on Alumina Supported Cobalt and Cobalt Oxide Surfaces

3:00– BREAK

3:30– **R. Kellerman,** Xerox Webster Research Center
Diffuse Reflectance Spectroscopy

4:00– **C. E. Lyman,** DuPont Experimental Station
X-ray Emission Spectroscopy and Electron Energy Loss Spectroscopy

4:45– End of Symposium

SYMPOSIUM H
CATALYST SUPPORTS AND SUPPORT EFFECTS

Chairmen: D. R. Monroe, General Motors Research Laboratories, Warren, MI 48090
S. J. Tauster, Exxon Research and Engineering, Linden, NJ 07036

Tuesday November 18, 1980

9:00– Opening Remarks - **S. J. Tauster,** Exxon

9:05– *A New Type of Metal-Support Interaction Between Platinum and Electronic Conductor Supports Like Carbides of W, Ti, Ta and Nb,* **A. Bertrand, M. Astier** and **S. J. Teichner,** Labatoire de Catalyse Appliquee et Cinetique Heterogene, Universite Claude Bernard, France

9:35– *Bimetalic Ruthenium-Gold Catalysts: Effect of the Support,* **J. Schwank,** University of Michigan, **S. Galvagno** and **F. Garbassi,** Instituto G. Donegani S.P.A., Novara Research Center, Italy.

10:05– *Adsorption Behavior and Nickel Crystallite Sizes in Ni/TiO_2 Catalyst Systems,* **J. Smith** and **M. A. Vannice,** Pennsylvania State University

10:35– COFFEE BREAK

11:00– *Rhodium Support Interactions,* **D. E. Resasco, S. H. Chien, A. Rouco, B. Schelimov** and **G. L. Haller,** Yale University

11:30– *Stabilization of High Surface Area Aluminas,* **B. R. Powell, Jr., D. R. Monroe** and **J. L. Johnson,** General Motors Research Laboratories

12:00– LUNCH

2:00– *Thermodynamics and Kinetics of Platinum-Oxide Support Interactions,* **W. L. Worrell,** University of Pennsylvania

2:30– *Iron-Support Interactions Studied by Mossbauer Spectroscopy,* **J. Phillips** and **J. A. Dumesic,** University of Wisconsin

3:00– *Influence of Alkali Metal Ions (Li^+, K^+) Content in γ-Al_2O_3 on the Dispersion of the Supported "NiO" Phase and Its Interaction with the Carrier,* **M. Houlla, J. Lemaitre** and **B. Delmon,** Groupe de Physico-Chimie Minerale et de Catalyse, Universite Catholique de Louvan, Belgium

3:30– COFFEE BREAK

4:00– *Crystallite Size and Support Effects in CO Hydrogenation,* **C. H. Bartholomew,** Brigham Young University

4:30– *On the Problem of Determining the Percentage Exposed of Platinum on Alumina-Supported Catalysts–A Strong Metal-Support Interaction,* **K. Kunimori, T. Okouchi** and **T. Uchijima,** Institute of Materials Science, University of Tsukuba, Japan

5:00– *Studies on the Structure of the Supporting Rhodium Catalyst for Carbonylation of Menthanol to*

Acetic Acid in the Vapor Phase I, **Liang Yixun, Shi Xiaotian, Li Zaichen, Zang Zhixian** and **Lu Shumu,** Chinese Academy of Sciences, Chengdu, China

SYMPOSIUM I
HYDROGEN AT SURFACES AND INTERFACES

Chairmen: L. C. Feldman, Bell Labs
M. L. Knotek, Sandia

November 17-19, 1980

SESSION I-1
ANALYSIS AND DETECTION OF HYDROGEN

Monday, November 17

9:00— *Analysis of Hydrogen by Secondary Ion Mass Spectrometry,* **Charles W. Magee,** RCA Labs

9:45— *Nuclear Reaction Analysis of Hydrogen in Solids: Applications in Physics, Chemistry and Archaeometry,* **W. A. Lanford,** SUNY/Albany

10:30— COFFEE BREAK

10:50— *Hydrogen Detection by Electron and Photon Stimulated Desorption,* **M. M. Traum,** Bell Labs

11:35— *Elastic Recoil Detection Analysis of Aqueous Corrosion of Phosphate Glasses,* **B. C. Bunker,** Sandia

12:00— *Optical Radiation from Electron Stimulated Desorption of Excited Particles,* **N. H. Tolk, L. C. Feldman, J. S. Kraus, M. M. Traum,** and **J. C. Tully,** Bell Labs

SESSION I-2
INTERACTION OF HYDROGEN WITH CLEAN SURFACES

2:00— *H-Induced Reconstruction of Metal Surfaces,* **P. Estrup,** Brown University

2:45— *The Electronic Structure of Chemisorbed Hydrogen,* **D. R. Hamann,** Bell Labs

3:30— COFFEE BREAK

4:00— *The Bonding States of H on Ni, Pd and Pt Surfaces,* **E. W. Plummer** and **W. Eberhardt,** University of Pennsylvania

4:45— *Hydrogen Dissociation of Pd Overlayers on Nb: The Influence of Electronic and Geometrical Structure,* **Myron Strongin, M. El-Batanouny** and **M. A. Pick,** Brookhaven National Laboratory

SESSION I-3
CATALYSIS

Tuesday, November 18

9:00— *Interactions of Hydrogen, Oxygen and Hydrogen-Containing Molecules at Pt Surfaces,* **Galen B. Fisher,** General Motors Labs

9:45— *Hydrogenation of CO Over Single Crystal Catalysts,* **D. W. Goodman,** National Bureau of Standards

10:30— COFFEE BREAK

10:50— *Confined Molecules: N.M.R. Studies of Ammonia Intercalation Compounds and Water in Coal Pores,* **B. Silbernagel,** Exxon

11:35— *Study of Hydrogen on Oxide Surfaces by E.S.D. and P.S.D.,* **M. L. Knotek, G. M. Loubriel, R. Stulen, G. D. Stucky** and **B. E. Koel,** Sandia; **V. Rehn, V. O. Jones, A. Green** and **R. Rosenberg,** Michelson Lab; **C. Park,** Lawrence, Berkeley

SESSION I-4
FIRST WALL PROBLEMS

2:00— *The Flux of Hydrogen from Tokamak Devices,* **S. A. Cohen,** Plasma Physics Laboratory, Princeton

2:45— *Physical Interactions of Low-Energy Hydrogen at Surfaces,* **J. B. Roberto,** Oak Ridge National Laboratory

3:30— COFFEE BREAK

4:00— *First Wall Hydrogen Chemistry,* **Robert R. Rye,** Sandia

4:45— *Interaction of Hydrogen with Radiation Defects in Metals,* **A. P. Zakharov, A. E. Gorodetsky** and **V. M. Sharapov,** Inst. of Physical Chemistry, Moscow

SESSION I-5
SEMICONDUCTORS: INTERFACES AND GRAIN BOUNDARIES

Wednesday, November 19, 1980

9:00— *The Effect of Hydrogen on the Properties of Amorphous and Polycrystalline Si,* **B. G. Bagley,** Bell Labs

9:45— *A.E.S. Investigations of Ordered and Disordered Silicon/Hydrogen Surfaces,* **H. H. Madden,** Sandia

10:10— COFFEE BREAK

10:30— *Hydrogen in Silicon-Based Insulators Used in Microelectronics,* **H. J. Stein,** Sandia

11:15— *Investigation of Hydrogen at the SiO_2/Si Interface,* **I. S. T. Tsong,** Penn State University

SESSION I—6
HYDROGEN IN METALS

2:00— *Surface Segregation and Hydrogen Related Fracture of Nickel,* **H. Birnbaum,** University of Illinois

2:45— *A Quantum Chemical Atomistic Model of Hydrogen Interaction with Metals,* **C. F. Melius,** Sandia

3:30— COFFEE BREAK

3:50— *Hydrogen-induced Degradation of Iron and Steel,* **H. H. Johnson,** Cornell

4:35— *Secondary Ion Mass Spectrometry Determination of Hydrogen Within Zirconium and Zirconium Alloy Microstructures,* **N. S. McIntyre, C. D. Cann** and **K. Nuttall,** Whiteshell Nuclear Research Establishment, Canada; **C. A. Evans** and **V. R. Deline,** Charles Evans and Associates, San Mateo, CA

5:00— *Scanning E.S.D. Studies of H_2, O_2 and H_2O on Polycrystalline Ta.,* **Lawrence A. Larson,** NASA/AMES

SYMPOSIUM J
NUCLEAR AND ELECTRON RESONANCE SPECTROSCOPIES APPLIED TO MATERIALS SCIENCE

Chairpersons: E. N. Kaufmann, Bell Laboratories
G. K. Shenoy, Argonne National Laboratory

November 18-20, 1980

PLENARY SESSION J-1
MOSSBAUER EFFECT

Tuesday Afternoon, November 18, 1980

2:00— Introductory Remarks, **E. N. Kaufmann,** Bell Laboratories

2:10— *The Mossbauer Effect and Some Applications,* **G. K. Shenoy,** Argonne National Laboratory

2:55— *Coal and The Mossbauer Effect,* **P. A. Montano,** University of West Virginia

3:30— COFFEE BREAK

3:50— *Mossbauer Studies of Ion-Implanted Alloys,* **G. Longworth,** AERE Harwell

4:25— *Mossbauer Spectroscopy Studies of Amorphous Metallic Solids,* **C. L. Chien,** Johns Hopkins University

10:30— RECEPTION

PLENARY SESSION J-2
ELECTRON RESONANCE

Wednesday Morning, November 19

8:45— *EPR of Material Properties and Processes,* **K. L. Brower,** Sandia Laboratories

9:30— *Catalysts Examined by ESR,* **B. G. Silbernagel,** Exxon Research Laboratory

10:05— COFFEE BREAK

10:25– *Defects in III-V Semiconductors Studied through EPR,* **T. A. Kennedy,** Naval Research Laboratory

11:00– *ESR Studies in Amorphous Insulators,* **D. L. Griscom,** Naval Research Laboratory

11:35– *Electron Spin Resonance Studies of Amorphous Silicon,* **D. K. Biegelsen,** Xerox Palo Alto Research

12:10– LUNCH

PLENARY SESSION J-3
SPIN PRECESSION (A)

Wednesday Afternoon, November 19

2:00–*Some Applications of Spin Precession Methods to Problems in Materials Science,* **E. N. Kaufmann,** Bell Laboratories

2:45– *Defects in Metals Detected by Spin Precession Methods,* **E. Recknagel,** University Konstanz

3:20– POSTER SESSION – I (Refreshments)

5:30– DINNER

8:30– DISCUSSION SESSION (Followed by wine and cheese)

PLENARY SESSION J-4
NUCLEAR RESONANCE

Thursday Morning, November 20

8:45– *Nuclear Resonance and Its Application to Alloys,* **L. H. Bennett,** National Bureau of Standards

9:30– *Magnetic Resonance as a Probe of Anisotropic Conductors,* **W. G. Clark,** UCLA

10:05– COFFEE BREAK

10:25– *NMR Techniques for Studying Ionic Diffusion in Solids,* **D. C. Ailion,** University of Utah

11:00– *Nuclear Magnetic Resonance Studies of Type I, Superconductors,* **F. Y. Fradin,** Argonne National Laboratory

11:35– *Hydrides Examined by Nuclear Magnetic Resonance,* **R. G. Barnes,** Ames Laboratory – USDOE and Iowa State University

12:10– LUNCH

PLENARY SESSION J-5
SPIN PRECESSION (B)

Thursday Afternoon, November 20

2:00– *Helium in Metals,* **H. de Waard,** University of Groningen

2:35– *Muons as Light Hydrogen Probes–Diffusion and Trapping,* **D. Richter,** KFA Julich

3:10– POSTER SESSION - II (Refreshments)

5:20– Symposium Closing

POSTER SESSION PAPERS

Electronic Interactions and Phase Segregation in Ternary Iron Rich Fe M Sb Solid Solutions (M = Ti, V, Cr, Mn, Co, Ni). **J. M. Friedt, M. Maurer** and **M. C. Cadeville,** Centre de Recherches Nucleaires and Laboratoire de Magnetisme et Structure Electronique des Solides, Strasbourg, France

Isotope Effect on the Electronic Structure of Hydrogen in Metals. **P. Jena,** Physics Department, Michigan Technological University, Houghton, MI 49931 and Physics Department, Virginia Commonwealth University, Richmond, VA 23284

Quadrupole Hyperfine Interaction and Magnetic Hyperfine Field in FeOC1 and its Intercalates. **Yonezo Maeda** and **Rolfe H. Herber,** Department of Chemistry, Rutgers University, New Brunswick, NJ 08903

Radiation Damage Studies of USn_3. **T. K. McGuire** and **Rolfe H. Herber,** Department of Chemistry, Rutgers University, New Brunswick, NJ 08903

Muon Spin Depolarization in Metals with Dilute Magnetic Impurities. **J. A. Brown, R. H. Heffner, R. L. Hutson, M. Leon, C. E. Olsen, M. E. Schillaci,** Los Alamos Scientific Laboratory, Los Alamos, NM 87545; **S. A. Dodds, T. L. Estle,** Rice University, Houston, TX 77001; **P. M. Richards,** Sandia Laboratories, Albuquerque, NM 87185

Proton NMR Spin-Lattice Relaxation Time Characterization of a-Si:H Structure. **M. E. Lowry, R. G. Barnes, D. R. Torgeson,** and **F. R. Jeffrey,** Ames Laboratory-USDOE and Department of Physics, Iowa State University, Ames, IA 50011

The Nature of Fluorine Modified Oxide Surfaces: An NMR Study. **John R. Schlup** and **Robert W. Vaughan,** Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena, CA 91125

Motional Correlation Time of Dilute ^{111}Cd *Impurities in Se-Rich Liquid Se-Te Alloys.* **D. K. Gaskill, J. A. Gardner, K. S. Krane, K. Krusch,** Department of Physics, Oregon State University, Corvallis, OR 97331 and **R. L. Rasers,** Department of Physics, Oregon State University and University of Maryland, Baltimore County, Catonsville, MD 21228

NMR in Liquid Semiconducting Se_xTe_{1-x}. **R. Dupree, John A. Gardner,** and **D. J. Kirby,** University of Warwick, Coventry CV4 7AL, England

The Influence of Impurities on the Workhardening Behavior of Alkalihalide Single Crystals Investigated by Nuclear Spin Relaxation Measurements. **W. H. M. Alsem*, J. Th. M. de Hosson*, H. Tamler+, H. J. Hackeloer+, O. Kanert+.** *Dept. of Applied Physics, Materials Science Centre, University of Groningen, Nyenborgh 18, 9747 AG Groningen, The Netherlands. +Institute of Physics, University of Dortmund, W. Germany

Dislocation Motion in Metals Investigated by Means of Pulsed Nuclear Magnetic Resonance Technique. **H. Tamler+, W. H. M. Alsem*, H. J. Hackeloer+, O. Kanert+** and **J. Th. M. De Hosson*.** *Dept. of Applied Physics, Materials Science Centre, University of Groningen, Nyenborgh 18, 9747 AG Groningen, The Nether-

lands. [+]Institute of Physics, University of Dortmund, W. Germany

A Method for Determining Impurity - Host Force Constant Ratios. **Berend Kolk,** Physics Department, Boston University, Boston, MA 02215

Hydrogen Location, Phases and Electron Density of States in Metal Hydrides from Electron Spin Resonance Spectra of Dilute Rare Earth Impurities. **E. L. Venturini,** Sandia National Laboratories, Albuquerque, NM 87185

Solid State NMR Studies of the Adsorbed States of Formic Acid on Y Zeolites. **T. Michael Duncan** and **Robert W. Vaughan,** California Institute of Technology, Pasadena, CA 91125

Impurity Diffusion by NMR. **James R. Beckett, Jean Pourquie,** and **David C. Ailion,** Department of Physics, University of Utah, Salt Lake City, UT 84112

NMR Measurements of Sodium Ion Motion and Site Structure in a Single Crystal of Naβ"-Alumina. **Cecil E. Hayes** and **David C. Ailion,** Department of Physics, University of Utah, Salt Lake City, UT 84112

Electric Quadrupole Interactions at ^{181}Ta in RNi_5 Inter-Metalic Compounds. **M. B. Kurup, K. G. Prasad, S. K. Malik** and **R. P. Sharma,** Tata Institute of Fundamental Research, Bombay 400005, India

NMR of Small Platinum Particles. **Harold T. Stokes, Howard E. Rhodes, Po-Kang Wang,** and **Charles P. Slichter,** Dept. of Physics, University of Illinois, Urbana IL, and **J. H. Sinfelt,** Exxon Research and Engineering Co., Linden, NJ 07036

Study of Internal Indium Oxidation in Silver by TDPAC. **A. F. Pasquevich, F. H. Sanchez, A. G. Bibiloni, C. P. Massolo** and **A. Lopez-Garcia,** Departamento de Fisica, Universidad Nacional de La Plata, Argentina

The Utility of the Mossbauer Effect in the Assessment of Chemical Transformations in Unsupported Catalyst Systems as a Function of the Metal Salt. **Mary L. Good, M. D. Patil** and **J. T. Donner,** Division of Engineering Research, Louisana State University, Baton Rouge, LA 70803

Atomic Transport Mechanism Investigated by Mossbauer Spectroscopy, Positron Annihilation and NMR Experiments. **Christian Janot,** Laboratoire de Physique du Solide, (L.A. 155), Universite de NANCY, France

Spin Susceptibility of Intercalated Graphite and Doped Polyacetylene. **James W. Kaufer** and **Seiichiro Ikehata,** Department of Physics, University of Pennsylvania, Philadelphia, PA 19104

EPR of Mn^{2+} In $Ni(CH_3COO)_2.4H_2O$ and $K_2Ni(SO_4)_2.6H_2O$. **Sushil K. Misra** and **M. Jalochowski,** Physics Department, Concordia University, Montreal, Canada

Channeling Studies of Lattice Defects Controlled by Hyperfine Interaction. **G. Lindner, K. Bendel, M. Deicher, E. Recknagel,** and **Th. Wichert,** Fakultat fur Physik, Universitat Konstanz, 7750 Konstanz, Germany

Geometrical Structure of Lattice Defect-Impurity Configurations Determined by TDPAC. **M. Deicher, O. Echt, E. Recknagel,** and **Th. Wichert,** Fakultat fur Physik, Universitat Konstanz, 7750 Konstanz, Germany

TDPAC-Studies of Electric Field Gradients in Amorphous

Metallic Systems. **P. Heubes, D. Korn, G. Schatz,** and **G. Zibold,** Fakultat fur Physik, Universitat Konstanz, 7750 Konstanz, Germany

NMR Investigation of Lithium Intercalated Lamellar Compounds. **Y. Chabre, C. Berthier** and **P. Segransan,** Laboratoire de Spectrometrie Physique, Grenoble, France

Microstructural Chemistry Changes During Two Phase Tempering; A Mossbauer Study of Hyperfine Fields in FE-9% NI Steel. **B. Fultz** and **J. W. Morris, Jr.,** Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Dept. of Materials Science & Mineral Engineering, University of California, Berkeley, CA 94720

A Mossbauer Study of the Amorphous System $(Fe_xNi_{1-x})_{75}P_{16}B_6Al_3$. **S. Bjarman** and **R. Wappling,** Institute of Physics, Uppsala University, Uppsala, Sweden and **K. V. Rao,** Department of Physics, University of Illinois at Urbana, Urbana, IL 61801

Isothermal Recovery of a Quenched AG Foil. **M. Behar, C. Alonso Arias, A. Filevich, G. Garcia Bermudez,** Department of Physics, Comision Nacional de Energia Atomica, Buenos Aires, Argentina

Study of Internal Motion in Materials by Means of Direct Observation of Relaxation Resonances in NMR (NMRRR). **L. Van Gerven** and **P. Coppens,** Laboratorium voor Vaste Stof-Fysika en Magnetisme, Katholieke Universiteit Leuven, Belgium

^{57}Fe *and* ^{125}Te *Mossbauer Study of* $LiFeNi_3TeO_8$ *and* $LiFeCo_3TeO_8$. **A. Gerard, F. Grandjean** and **C. Flebus,** Institute of Physics, University of Liege, Belgium

Proton NMR Studies of Amorphous Plasma-Deposited Films. **Jeffrey A. Reimer, Robert W. Vaughan,** and **John C. Knights,** Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena, CA 91125

Nuclear Magnetic Resonance on Rare Earth Nuclei in $RE\text{-}Fe_2$ *Intermetallic Compounds.* **Y. Berthier,** Laboratoire de Spectrometrie Physique, Grenoble, France; **R. A. B. Devine,** Physics Department, University of Miami, Coral Gables, FL 33124; and **R. Butera,** Department of Chemistry, University of Pittsburgh, Pittsburgh, PA 15260

Mossbauer Study of Bed-Moist and Ion-Exchanged Victorian Brown Coal. **J. D. Cashion, P. E. Clark, P. Cook, F. P. Larkins, M. Marshall, B. Maguire,** Monash University, Clayton, Victoria, Australia; **L. T. Kiss,** S. E. C. Herman Research Labs, Richmond, Victoria, Australia

Mossbauer Effect Investigation of the Properties of Ternary Hydrides. **P. J. Viccaro, D. Niarchos, G. K. Shenoy, B. D. Dunlap,** Argonne National Laboratory, Argonne, IL 60439

Mossbauer Effect Study of Superconductivity and Magnetism in the Series $R_2Fe_3Si_5$. **J. D. Cashion, G. K. Shenoy, D. Niarchos, P. J. Viccaro, Charles M. Falco,** and **A. T. Aldred,** Argonne National Laboratory, Argonne, IL 60439

Silicide Formation at Fe-Si Interfaces Studied by Mossbauer Spectroscopy and Rutherford Backscattering. **R. L. Cohen, L. C. Feldman** and **K. W. West,** Bell Laboratories, Murray Hill, NJ 07974

EPR Investigations of Impurities in the Lanthanide Orthophosphates. **M. M. Abraham, L. A. Boatner,** and **M. Rasera,** Department of Physics, Oregon State University Laboratory, Oak Ridge, TN 37830

Investigation of Lattice Defects in HCP Metals. **R. Keitel, W. Engel, S. Hoth, W. Klinger, R. Seebock** and **W. Witthuhn,** Physikalisches Institut der Universitat Erlangen-Nurnberg, Erlangen, Germany

The Electric Field Gradient in Noncubic Metals and Alloys. **W. Witthuhn, W. Engel, S. Hoth, R. Keitel, W. Klinger** and **R. Seebock,** Physikalisches Institut der Universitat Erlangen-Nurnberg, Erlangen, Germany

μ^+e^- *Hyperfine Interactions in Quartz Crystals.* **J. H. Brewer, D. P. Spencer,** and **D. G. Fleming,** Departments of Physics and Chemistry, University of British Columbia and TRIUMF, Vancouver, B.C., Canada

SYMPOSIUM K
MAGNETIC AND OPTICAL MATERIALS FOR INFORMATION STORAGE

Chairman: Theodore Davidson
Xerox Webster Research Center
Webster, NY

November 18-20, 1980

SESSION K-1
MAGNETICS

Wednesday, November 19, 1980

9:00— Keynote Lecture: *Information Storage: Magnetic, Optical, and Natural,* **G. Bate,** Verbatim Corporation, Sunnyvale, CA

10:00— *Metallic Particles: Preparation, Properties, and Information Storage Potential,* **J. E. French** and **S. J. Andress,** Hercules, Inc., Wilmington, DE

10:30— *Magnetic Recording Media Using Fine Metal Particles,* **Y. Imaoka, A. Hosaka, Y. Tokuoka,** and **R. Horimoto,** TDK Electronics Co., Ltd., Nagano-ken, Japan

11:00— *The Strength and Deformation of Magnetic Tape,* **Y. Shiraishi, A. Hirota,** and **K. Ashida,** Victor Company of Japan, Yokohama, Japan

11:30— *Environmental Expansion of Floppy Disk Media,* **S. M. Desai** and **K. Spitler,** Shugart Associates, Sunnyvale, CA

2:00— *Metallic Thin Film Media: Microstructure, Magnetic Properties, and the Limit of Recording Density,* **Tu Chen,** Xerox Palo Alto Research Center, Palo Alto, CA

2:30— *Impact Wear of Thin NiCo Film on Magnetic Recording Disk Surface,* **T. F. Chen,** Sperry Univac, Blue Bell, PA

3:00— *Adsorption of Polymeric Functional Groups on Magnetic Particles,* **R. S. Haines,** IBM, Boulder, CO

SESSION K-2
OPTICAL MATERIALS

3:30— Keynote Lecture: *Archival Ablative Optical Recording Media—A Status Review,* **Di Chen,** Honeywell/ Magnetic Peripherals Inc., Colorado Springs, CO, and **H. Haskell,** Chestnut Hills, MA

4:30— *Antireflective Structures for Optical Disk,* **A. T Ward, T. W. Smith, G. E. Johnson,** and **D. J. Luca,** Xerox Webster Research Center, Webster, NY

Thursday, November 20, 1980

9:00— *Requirements for Opitcal Data Recording Media,* **Leonard J. Laub,** Star Systems Division, Exxon Enterprises, Pasadena, CA

9:30— *Optical Recroding Characteristics of Thin Films Cast from Colloids of Zero Valent Iron,* **T. W. Smith** and **A. T. Ward,** Xerox Webster Research Center, Webster, NY

10:00— *High Density Optical Recording in Organic Films,* **Joseph J. Wrobel, Dennis G. Howe, Allan B. Marchant,** and **Harold T. Thomas,** Kodak Research Laboratories, Rochester, NY

10:30— *Properties of Tellurium Films for Optical Storage,* **David Y. Lou** and **G. M. Blom,** Philips Laboratories, Briarcliff Manor, NY

11:00— *Laser Writings on Tellurium Films,* **M. Chen, V. Marrello, W.-Y. Lee,** IBM Research Laboratory, San Jose, CA

11:30— *Degradation of Thin Tellurium Films,* **Wen-Yaung Lee** and **Roy H. Geiss,** IBM Research Laboratory, San Jose, CA

SYMPOSIUM L
ADVANCES IN CEMENT MATRIX COMPOSITES

Program Committee: D. M. Roy (Chairman)
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S. P. Shah, J. A. Manson

November 17-18, 1980

A. Kelly— *Fibre Reinforced Cements in Context*

J. D. Birchall— *The Nature and Role of the Matrix in Cement/Fibre Composites*

A. J. Majumdar— *Some Aspects of Glass Reinforced Cement Research*

J. P. Skalny— *Cement Hydration: An Overview*

K. L. Litherland, D. R. Oakley, B. R. Proctor—
The Use of Accelerated Ageing Procedures to Predict the Long Term Strength of GRC Composites

D. J. Pinchin, E. S. Flowers—
Evaluation of Surface—Modified Asbestos

S. P. Shah— *Fracture in Fiber Reinforced Concrete*

D. J. Pinchin— *Fibre-Cement Bond, Frictional Stress Transfer and Composite Properties; A Discussion*

P. Bartos— *Pullout Failure of Fibres Embedded in Cement-Based Matrices*

P. E. Petersson— *Fracture Mechanical Calculations and Tests for Fibre-Reinforced Cementitious Materials*

H. Schorn, H. W. Vissmann—
Complete Stress-Strain Relationship of Steel Fibre Reinforced Composites

Y. Tanigawa, K. Yamada, S. Hatanaka—
Inelastic Behavior of Steel Fiber Reinforced Concrete Under Compression

R. H. Mills— *Preferential Precipitation of Calcium Hydroxide On Alkali-Resistant Glass Fibres*

R. N. Swamy— *Prospects of Fibre Reinforcement in Structural Applications*

D. J. Hannant— *Polymer Fibre Reinforced Cement and Concrete*

A. G. Tallentire— *Scope of Applications for Glass Fibre Reinforced Cement in the Civil Engineering Materials Industry*

B. P. Hughes— *AGRC Composites for Thin Structural Sections*

K. D. Raithby, J. W. Galloway, R. I. T. Williams—
Potential Uses of Polypropylene-Reinforced Cement and Concrete as Surface Reinforcement for Concrete Structures

R. H. Mills— *Age Embrittlement of Glass-Reinforced Concrete Containing Blastfurnace Slag*

J. A. Manson— *New Developments in Polymer Concrete Systems*

T. Sugama, L. E. Kukacka—
The Cross-Linking and Catalytic Effects of Ca^{2+} Released from Cement on the Properties of Unsaturated Polyester and Resorcinol Phenol-Formaldehyde Polymer Concrete

J. Bijen— *Glass Fibre Reinforced Cement; Improvements by Polymer Additions*

D. J. Cook— *Natural Fibre Reinforced Concrete and Cement: Recent Developments*

R. M. L. Foote, B. Cotterell, Y. W. Mai—
Crack Growth Resistance Curve for a Cement Composite (asbestos-cellulose)

Y. Ohama, H. Asaki—
Basic Properties of Paraffin-Modified Mortar

S. Popovics— *Composite Averages for the Estimation of Moduli of Elasticity of Composite Materials*

SYMPOSIUM M
SYNTHETIC MODULATED MATERIALS

November 18-19, 1980

SESSION M-1
SEMICONDUCTORS

(Joint Session with Symposium C — Semiconductor Interfaces)

Chairman: L. L. Chang, IBM, T. J. Watson Research Center

Tuesday, November 18, 1980

2:00— *Growth and Properties of Periodically Modulated Semiconductor Structures - Superlattices,* **Chin-An Chang,** IBM T. J. Watson Research Center, Yorktown Heights, NY

2:25— *Doping Modulation of Semiconductor Structures,* **A. C. Gossard, C. L. Allyn** and **W. Wiegmann,** Bell Labs., Murray Hill, NJ

2:50— *Electronic Structure and Properties of Modulated Semiconductor Structures,* **A. Madhukar,** University of Southern California, Los Angeles, CA

3:15— *Light Scattering by Carriers in Modulation Doped Superlattices,* **A. Pinczuk** and **J. M. Worlock,** Bell Labs, Holmdel, NJ, and **H. L. Stormer, R. Dingle, A. C. Gossard** and **W. Wiegmann,** Bell Labs, Murray Hill, NJ

3:35— BREAK

3:50— *Electronic Structure of Idealized Si/SiO_2 Superlattices and Interfaces,* **Frank Herman** and **Douglas J. Henderson,** IBM Research Lab, San Jose, CA, and **Robert V. Kasowski,** Central Research and Development Dept., E. I. duPont de Nemours Co., Wilmington, DE

4:10— *The Growth of Silicon Doping Modulated Superlattices,* **T. de Jong, V. Korablev, L. Smit** and **F. W. Saris,** FOM-Institute for Atomic and Molecular Physics, Amsterdam, Netherlands

4:30— *Crystal Structures of Al on GaAs(100) by Molecular Beam Epitaxy,* **G. Landgren, R. Ludeke** and **L. L. Chang,** IBM T. J. Watson Research Center, Yorktown Heights, NY

4:50— *Bonding of Column III and V Adatoms on GaAs (110) in Relation to Molecular Beam Epitaxy,* **P. Skeath, C. Y. Su, I. Lindau** and **W. E. Spicer,** Stanford University, Stanford, CA

SESSION M-2
METALS

Chairmen: F. Spaepen, Harvard University, Cambridge, MA
B. C. Giessen, Northeastern University, Boston, MA

Wednesday, November 19, 1980

9:00— *Synthesis and Structure of Layered Synthetic Microstructures,* **T. R. Barbee,** Center for Materials Research, Stanford University, Stanford, CA (invited)

9:30— *Properties of Superconducting Layered Composites,* **M. R. Beasley,** Stanford University, Stanford, CA (invited)

10:00— *Structure and Properties of Modulated Films,* **R. H. Willens, L. R. Testardi, E. M. Gyorgy, J. F. Dillon, S. Nakahara,** and **D. B. McWhan,** Bell Laboratories, Murray Hill, NJ

10:30—*Mechanical, Magnetic and Superconducting Properties of Some Artificial Modulated Metals,"* **J. E. Hilliard,** Northwestern University, Evanston, IL (invited)

11:00— *Interdiffusion in Compositionally Modulated Amorphous Metals Films,* **M. P. Rosenblum,** Xerox PARC, Palo Alto, CA, and **F. Spaepen,** Division of Applied Sciences, Harvard University, Cambridge, MA

11:20— *Magnetization and Mossbauer Study of Compositionally Modulated Pd-Fe, Cu-Fe and Amorphous* $Pd_{85}Si_{15}$-$Fe_{80}B_{20}$ *Films,* **G. Dublon** and **M. P. Rosenblum,** McKay Lab, Harvard University, and **W. T. Vettering,** Lyman Lab, Harvard University, Cambridge, MA

11:40— *Preparation of Compositionally Modulated Metals and Alloys by Electrodeposition From Solution,* **D. J. Churella, C. L. Tsai** and **B. C. Giessen,** Institute of Chemical Analysis and Department of Chemistry, Northeastern University, Boston, MA

12:00— LUNCH

SESSION M-3
ROUND TABLE DISCUSSION

Chairmen: L. L. Chang, IBM Research Center, Yorktown Heights, NY
B. C. Giessen, Northeastern University, Boston, MA
F. Spaepen, Harvard University, Cambridge, MA

Wednesday, November 19, 1980

2:00—4:00

PANEL:

T. R. Barbee, Stanford University, Stanford, CA

M. R. Beasley, Stanford University, Stanford, CA

C. A. Chang, IBM Research Center, Yorktown Heights, NY

A. C. Gossard, Bell Laboratories, Murray Hill, NJ

J. E. Hilliard, Northwestern University, Evanston, IL

A. Madhukar, University of Southern California, Los Angeles, CA

R. H. Willens, Bell Telephone Labs., Murray Hill, NJ

NOTES

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SYMPOSIA	SUNDAY NOVEMBER 16 Evening	MONDAY NOVEMBER 17 AM	MONDAY NOVEMBER 17 PM	MONDAY NOVEMBER 17 Evening	TUESDAY NOVEMBER 18 AM	TUESDAY NOVEMBER 18 PM	TUESDAY NOVEMBER 18 Evening	WEDNESDAY NOVEMBER 19 AM	WEDNESDAY NOVEMBER 19 PM	WEDNESDAY NOVEMBER 19 Evening	THURSDAY NOVEMBER 20 AM	THURSDAY NOVEMBER 20 PM	THURSDAY NOVEMBER 20 Evening
A. *Laser-Solid Interaction*		Oval Room			Oval Room		Oval Room	Oval Room					
B. *Defects in Semiconductors*					Foyer			Foyer			Foyer		
C. *Semiconductor Interfaces*		State Room			State Room Suite	State Room B							
D. *Nuclear Waste Management*		Ballroom			Ballroom			Ballroom			Ballroom		
E. *Photo-Thermal Materials*											Venetian Room		
F. *EM Imaging & Diffraction Techniques*		Foyer											
G. *Spectro. Charact. of Hetero. Catalysts*		Forum Room											
H. *Catalyst Supports/ Effects*					Forum Room								
I. *Hydrogen/Surfaces/ Interfaces*		Venetian Room			Venetian Room			Venetian Room					
J. *Nuclear/Electron Reson. Spectroscopies*						State Room A		State Room			State Room		
K. *Magnetic/Optical Mats. for Info. Storage*								Forum Room			Forum Room		
L. *Cement Matrix Composites*		Back Bay Room			Back Bay Room								
M. *Synthetic Modulated Materials*						State Room B		Back Bay Room					
Registration	LOBBY 6:00-10:00 pm	**LOBBY Daily 8:00 a.m. to 5:00 p.m.**											

VON HIPPEL AWARD RECEPTION — Wine and Cheese
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