

**THE  
MATERIALS  
RESEARCH  
SOCIETY**

**1978  
Annual  
Meeting**

**Nov. 28 - Dec. 1  
Boston Sheraton Hotel  
Boston  
MA.**

**PROGRAM  
&  
Registration Information**

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

Non-Profit Org.  
U.S. Postage  
**PAID**  
The Pennsylvania  
State University

## GENERAL INFORMATION

- Schedule.** The Activities Locations Grid appears as the centerfold. It indicates time periods and places for all the symposia and meeting events. Because of the unexpectedly large attendance at some symposia and prior scheduling of certain hotel facilities, the meeting room locations vary, so you will need to follow the Grid carefully.
- Registration.** Pre-registration is strongly recommended since advance interest (e.g. some 270 papers) is high and it will save time when you check in at the registration desk. Early registration will take place on Monday afternoon and evening in the Sales Office Foyer, Third Floor. During the meeting there will be registration in the Conference Room on the Conference Level, Third Floor, 8:00 a.m. - 6:00 p.m. daily.
- MRS Membership.** If you join or renew your membership now, you can register for this meeting at the reduced rates (see Registration Form).
- Room Accommodations.** The host hotel has reserved a block of rooms for meeting attendees. These will be available until **November 1**, after which requests will be handled on a space available basis. **To use these accommodations call the Boston-Sheraton Hotel at 617/236-2800.** Other nearby hotels include: Colonnade Hotel (617/261-2800), Copley Square Hotel and Motor Inn (617/536-9000), Copley Plaza Hotel (617/267-5300).
- Von Hippel Award.** The von Hippel Award for pioneering contribution to the cause of interdisciplinary materials research will be presented to this year's winner, Dr. William O. Baker, President of the Bell Telephone Laboratories, at the Award Luncheon on Thursday noon in the Fairfax Room. Indicate your intention to attend on your registration form.
- Proceedings.** Two of the symposia (A and F) will publish their proceedings. You may reserve a copy at a special Conference pre-publication price in the following manner:
  - Radioactive Waste Management**— Register for Symposium A, check the appropriate box on the registration form, and include an additional \$20 in your payment.
  - In-Situ Composites - III**— Check the appropriate box on the registration form and include an additional \$35 in your payment.

## SYMPOSIUM A SCIENCE UNDERLYING RADIOACTIVE WASTE MANAGEMENT

SYMPOSIUM CHAIRMAN: **G. J. McCARTHY**,  
The Pennsylvania State University

Tuesday, November 28, 1978

- 8:15 a.m. Introductory Remarks, **G. J. McCarthy**, Program Chairman
- 8:30 a.m. \*AA1 "Science Underlying Radioactive Waste Management: Status and Needs," **RUSTUM ROY** and **G. J. McCARTHY**, Materials Research Laboratory, The Pennsylvania State University

### SESSION A The Solid Waste Form: Selection and Processing

Presiding

<b>J. G. MOORE</b> Oak Ridge National Laboratory Oak Ridge, TN	<b>J. A. STONE</b> Savannah River Laboratory Aiken, SC
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- 8:55 a.m. \*AA2 "Techniques for High Level Waste Solidification in Europe," **WILFRIED HEIMERL**, Gelsenberg Company, Belgium
- 9:20 a.m. AA3 "Non-radioactive Operation Experience Obtained with a Joule Heated Ceramic Melter for Direct Feeding and Vitrification of High-Level Liquid Waste," **S. WEISENBURGER**, Kernforschungszentrum Karlsruhe, West Germany
- 9:40 a.m. AA4 "Development of Glass Compositions for Immobilization of Savannah River Plant Waste," **M. J. PLODINEC**, Savannah River Laboratory, Aiken, SC
- 10:00 a.m. AA5 "Preparation and Characterization of an Improved Borosilicate Glass Matrix for the Incorporation of High Level Radioactive Waste (HAW)," **W. GUBER, M. HUSSIAN, L. KAHL, G. ONDRACEK** and **J. SAIDL**, Nuclear Research Centre Karlsruhe, Germany
- 10:20 a.m. COFFEE AND DISCUSSION
- 10:35 a.m. \*AA6 "Development of Multibarrier Nuclear Waste Forms," **J. M. RUSIN**, Battelle Pacific Northwest Laboratories, Richland, WA; **M. F. BROWNING**, Battelle Columbus Laboratories, Columbus, OH; **G. J. McCARTHY**, The Pennsylvania State University, University Park, PA
- 11:00 a.m. AA7 "Cermet High Level Waste Forms," **W. S. AARON, T. C. QUINBY**, and **E. H. KOBISK**, Oak Ridge National Laboratory, Oak Ridge, TN

\*Invited Papers

- 11:20 a.m. AA8 "Progress Towards a Radioactive Waste Solidification System Resulting in a Final Product of Extreme Stability: A Titanate Ion Exchanger Fixation Process Combined with Hot Isostatic Pressing," **S. FORBERG** and **T. WESTERMARK**, The Royal Institute of Technology, Stockholm, Sweden; and **H. LARKER** and **B. WIDELL**, ASEA, Västerås, Sweden
- 11:40 a.m. AA9 "Hot Isostatic Pressing for Consolidation and Containment of Radioactive Waste," **HANS LARKER**, ASEA, Robertsfors, Sweden
- 12:00 p.m. AA10 "Elaboration of Scientific Disposal of Liquid Radioactive Waste in the USSR," **V. I. SPITSYN**, Institute of Physical Chemistry, Academy of Sciences, Moscow, USSR
- 12:20 p.m. LUNCH
- 1:30 p.m. \*AA11 "Studies of Concrete as a Host for Savannah River Plant Radioactive Waste," **J. A. STONE**, Savannah River Laboratory, Aiken, SC
- 1:55 p.m. AA12 "Role of Admixtures in Preparing Dense Cements for Radioactive Waste Isolation," **D. M. ROY**, **M. DAIMON**, **B. E. SCHEETZ** and **D. WOLFE-CONFER**, The Pennsylvania State University, University Park, PA
- 2:15 p.m. AA13 "Physicochemical Characterization of Solidification Agents Used and Products Formed with Radioactive Wastes at LWR Nuclear Power Plants," **A. H. KIBBEY** and **H. W. GODBEE**, Oak Ridge National Laboratory, Oak Ridge, TN
- 2:35 p.m. AA14 "Confinement of Volatilized Ruthenium Oxides," **EDWARD T. MAAS, Jr.** and **JOHN M. LONGO**, Exxon Research Laboratory, Linden, NJ
- 2:55 p.m. COFFEE AND DISCUSSION

## SESSION B Characterization of Nuclear Waste Forms

Presiding

**R. L. SCHWOEBEL**  
Sandia Laboratories  
Albuquerque, NM

**W. LUTZE**  
Hahn-Meitner-Institut  
Berlin, Germany

Tuesday

- 3:15 p.m. \*AB1 "Glass and Glass Ceramic Waste Form Characterization," **W. LUTZE**, Hahn-Meitner-Institut, Berlin, Germany
- 3:40 p.m. AB2 "Glass-Ceramics, A Good Bet for Waste Encapsulation: Preliminary Estimations of Long-Term Corrosion," **JOEL D. SUNDQUIST**, Corning Glass Works, Corning, NY
- 4:00 p.m. \*AB3 "Bonding of Metal Oxides in Sodium Silicate Glass," **D. J. LAM**, **B. W. VEAL**, **H. CHEN** and **G. S. KNAPP**, Argonne National Laboratory, Argonne, IL
- 4:25 p.m. AB4 "Some Solid-State Transport Phenomena and Their Significance for Radioactive Waste Glasses," **G. MALOW**, Hahn-Meitner-Institut, Berlin, Germany
- 4:45 p.m. AB5 "Raman Spectra of Cesium Aluminosilicate Waste Forms," **CHARLES M. HARTWIG**, Sandia Laboratories, Livermore, CA

- 5:05 p.m. AB6 "Investigations of the Volatility of Cesium from Aluminosilicates by Mass Spectrometry," **REINHARD ODOJ**, Nuclear Research Center Jülich, Germany
- 5:25 p.m. AB7 "Incorporation of High-Level Radwaste in Synrock" **A. E. RINGWOOD**, Australian National University, Canberra
- 5:45 p.m. DINNER

## SESSION C Informal Review of Existing Wastes And Management Plans

Presiding

**R. B. LEACHMAN**  
Office of Technology  
Assessment  
Washington, D.C.

**D. FERGUSON**  
Oak Ridge National  
Laboratory  
Oak Ridge, TN

Tuesday

- 8:30 p.m. AC1 "Waste Disposal by Shale Fracturing at ORNL," **H. O. WEEREN**, **J. G. MOORE**, and **E. W. McDANIEL**, Oak Ridge National Laboratory, Oak Ridge, TN
- 8:55 p.m. AC2 "Waste Management of Actinide Contaminated Soil," **JAMES D. NAVRATIL**, **GARY H. THOMPSON**, and **ROBERT L. KOCHEN**, Rockwell International, Golden, CO
- 9:30 p.m. AC3 "Technological Challenges in the Immobilization of Hanford Defense Waste," **MICHAEL J. KUPFER**, **DENIS M. STRACHAN**, and **WALLACE W. SCHULZ**, Rockwell Hanford Operations, Richland, WA
- 9:45 p.m. AC4 "Preliminary Safety Analysis of the Waste Isolation Pilot Plant: I. Analysis and Design; II. Implementation and Results," **J. P. BRANNEN** and **L. R. HILL**, Sandia Laboratories, Albuquerque, NM
- 10:10 p.m. AC5 "An Evaluation of the Storage of Radioactive Waste Within Silicic Pyroclastic Rocks," **J. R. SMYTH**, **B. M. CROWE**, and **P. M. HALLECK**, Los Alamos Scientific Laboratory, Los Alamos, NM
- 10:35 p.m. ADJOURN

## SESSION D Characterization of Nuclear Waste Forms (Continued)

Presiding

**R. L. SCHWOEBEL**  
Sandia Laboratories  
Albuquerque, NM

**W. LUTZE**  
Hahn-Meitner-Institut  
Berlin, Germany

Wednesday, November 29, 1978

- 8:15 a.m. \*AD1 "Microstructural Characterization of Solidified Simulated Reactor Wasteforms," **JOHN T. HEALEY, THOMAS J. HEADLEY, and PAUL F. HLAVA**, Sandia Laboratories, Albuquerque, NM; and **DENIS M. STRACHAN and MICHAEL F. KUPFER**, Rockwell Hanford Operations, Richland, WA
- 8:40 a.m. AD2 "Characterization of a Titanate Based Ceramic for High Level Nuclear Waste Solidification," **J. K. JOHNSTONE, T. J. HEADLEY, P. F. HLAVA, and F. V. STOHL**, Sandia Laboratories, Albuquerque, NM
- 9:00 a.m. \*AD3 "Application of Mass Transport Theory to the Leaching of Radionuclides from Waste Solids," **H. W. GODBEE, A. H. KOBBEY, J. G. MOORE, and D. S. JOY**, Oak Ridge National Laboratory, Oak Ridge, TN
- 9:25 a.m. AD4 "Characterization of Leached Surface Layers on Waste Encapsulant Glasses by Sputter-Induced Optical Emission," **C. A. HOUSER, I. S. T. TSONG, and W. B. WHITE**, The Pennsylvania State University, University Park, PA
- 9:45 a.m. COFFEE AND DISCUSSION
- 10:05 a.m. AD5 "Chemistry of Nuclear Waste Glass Reactions: Problems and Potential of Prediction," **P. BRUCE ADAMS**, Corning Glass Works, Corning, NY
- 10:25 a.m. AD6 "Long-Term Elevated Temperature Leaching of Solid Waste Forms," **B. T. KENNA, K. D. MURPHY, and H. S. LEVINE**, Sandia Laboratories, Albuquerque, NM
- 10:45 a.m. AD7 "Leaching Characteristics of Simulated Reactor Waste Glass," **H. C. WEED, D. G. COLES, R. W. MENSING, and J. S. SCHWEIGER**, Lawrence Livermore Laboratory, Livermore, CA; and **D. J. BRADLEY**, Battelle Pacific Northwest Laboratories, Richland, WA
- 11:05 a.m. AD8 "Low-Level Solidified Waste Characterization. The Scientific Basis for Physical and Chemical Testing," **O. U. ANDERS**, Dow Chemical USA, Midland, MI
- 11:25 a.m. AD9 "Physico-Chemical Aspects of Encapsulating Radioactive Wastes in Glass," **N. A. BREZHNEVA, A. A. MINEAZ, and S. N. OZIRANER**, Institute of Physical Chemistry, Academy of Sciences, USSR, and Leningrad Institute of Technology
- 11:45 a.m. LUNCH

- 1:30 p.m. AD10 "Leach Rate Characterization of Solid Radioactive Waste Forms," **K. F. FLYNN, L. J. JARDINE, R. E. BARLETTA, and M. J. STEINDLER**, Argonne National Laboratory, Argonne, IL
- 1:50 p.m. AD11 "Studies on the Immobilization of Strontium and Cesium at the Cement Fixation of Medium Level Waste Solutions," **R. KÖSTER and G. RUDOLPH**, Nuclear Center Karlsruhe, Germany
- 2:10 p.m. AD12 "The Disposal of Iodine-129," **M. T. MORGAN, J. G. MOORE, H. E. DEVANEY, G. C. ROGERS, C. WILLIAMS, and E. NEWMAN**, Oak Ridge National Laboratory, Oak Ridge, TN
- 2:30 p.m. COFFEE AND DISCUSSION

## SESSION E Radioactive Wastes In The Geologic Setting

Presiding

**R. W. POTTER, II**  
United States Geological  
Survey  
Menlo Park, CA

**R. ROY**  
The Pennsylvania State  
University  
University Park, PA

Wednesday

- 2:50 p.m. \*AE1 "Natural Glasses: Their Long-Term Stability," **RODNEY C. EWING**, University of New Mexico, Albuquerque, NM
- 3:15 p.m. AE2 "Pollucite and Its Alteration: Natural vs Synthetic Phase Behavior," **P. CERNY**, University of Manitoba, Winnipeg, Canada
- 3:35 p.m. \*AE3 "Hydrothermal Interactions Among Nuclear Wastes, Containment, and Host Rocks in Geologic Repositories," **G. J. MCCARTHY, B. E. SCHEETZ, W. B. WHITE, S. KOMARNENI, D. K. SMITH, W. P. FREEBORN, and M. W. BARNES**, The Pennsylvania State University, University Park, PA
- 4:00 p.m. AE4 "Interaction of a Glass-Based Nuclear Waste Simulant and Natural Rock," **P. F. HLAVA and W. F. CHAMBERS**, Sandia Laboratories, Albuquerque, NM
- 4:20 p.m. AE5 "High Temperature Emplacement of Nuclear Waste in Geologic Media," **JERRY J. COHEN**, Lawrence Livermore Laboratories, Livermore, CA
- 4:40 p.m. AE6 "Permeability Measurements on Cementitious Materials for Nuclear Waste Isolation," **B. E. SCHEETZ, E. L. WHITE, D. M. ROY, and K. G. ZIMMERMAN**, The Pennsylvania State University, University Park, PA
- 5:00 p.m. AE7 "Investigation of the Action of Radiation on Geologic Formations," **V. I. SPITSYN, V. D. BALUKOVA, S. A. KABAKCHI, and M. L. MEDVEDEVA**, Institute of Physical Chemistry, Academy of Sciences, Moscow, USSR
- 5:20 p.m. ADJOURN (Wine and Cheese Party at 6 p.m.)

## SESSION F Metallurgical Considerations

Presiding

**R. W. STAEHLE**  
Ohio State University  
Columbus, OH

**T. WESTERMARK**  
Royal Institute of  
Technology  
Stockholm, Sweden

Thursday, November 30, 1978

- 8:30 a.m. \*AF1 "A Perspective of Metal Encapsulation of Waste," **L. J. JARDINE** and **M. J. STEINDLER**, Argonne National Laboratory, Argonne, IL
- 8:55 a.m. \*AF2 "Corrosion Resistance of Canisters for Final Disposal of Spent Nuclear Fuel," **EINAR MATSSON**, Swedish Corrosion Institute, Stockholm, Sweden
- 9:20 a.m. AF3 "Corrosion Considerations for Nuclear Waste Isolation Canisters," **J. W. BRAITHWAITE** and **N. J. MAGNANI**, Sandia Laboratories, Albuquerque, NM
- 9:40 a.m. AF4 "Corrosion of Metals in a Hot, High Pressure Brine Environment," **N. H. MACMILLAN** and **R. ROY**, The Pennsylvania State University, University Park, PA
- 10:00 a.m. AF5 "The Development of Process and Storage Materials Suitable for Krypton-85 Waste Management," **T. R. PINCHBACK** and **D. A. KNECHT**, Allied Chemical Corporation, Idaho Falls, ID
- 10:20 a.m. COFFEE AND DISCUSSION

## SESSION G Radionuclide Transport In Geomedia

Presiding

**A. M. FRIEDMAN**  
Argonne National Laboratory  
Argonne, IL

**J. M. RUSIN**  
Battelle Pacific  
Northwest Laboratories  
Richland, WA

Thursday

- 10:40 a.m. \*AG1 "Review of Needs and Current Experimental Methodologies to Assess Long-Term Nuclide Transport in Geomedia Session," **R. J. SERNES**, **DHANPAT RAI**, **J. F. RELYEA**, and **L. L. AMES**, Battelle Northwest Laboratories, Richland, WA
- 11:05 a.m. \*AG2 "Thermodynamic Considerations Underlying the Migration of Radionuclides in Geomedia," **DOUGLAS G. BROOKINS**, University of New Mexico, NM
- 11:30 a.m. \*AG3 "Measurements of Parameters Essential to Predicting Nuclide Migration," **S. FRIED**, **A. M. FRIEDMAN**, **F. SCHREINER**, **R. SJOBLUM**, **J. HINES**, **R. STRICKERT**, and **P. RICKERT**, Argonne National Laboratory, Argonne, IL
- 11:55 a.m. LUNCH

2:00 p.m. AG4 "Nuclide Transport by Groundwater in Swedish Bedrock," **B. ALLARD**, **H. KIPATSI**, **B. TORSTENFELT** and **J. RYDBERG**, Chalmers University of Technology, Goteborg, Sweden

2:20 p.m. AG5 "In Situ Experiments on Nuclide Migration in Fractured Crystalline Rocks," **O. LANDSTROM**, **K. E. HOLMBERG**, and **S. WESTERBERG**, Studsvik Energiteknik AB, Nykoping; and **C. E. KLOCKARS**, The Geological Survey of Sweden, Uppsala, Sweden

2:40 p.m. AG6 "Analysis of Some Tracer Runs in Granite Rock Using a Fissure Model," **IVARS NERETNIEKS**, The Royal Institute of Technology, Stockholm, Sweden

3:00 p.m. AG7 "Interactions of Simulated Waste Radionuclides and Rocks," **THOMAS E. HINKEBEIN** and **PAUL F. HLAVA**, Sandia Laboratories, Albuquerque, NM

3:20 p.m. COFFEE AND DISCUSSION

3:40 p.m. AG8 "Direct and Indirect Effects of Dissolved Oxygen on the Retention of Radionuclides in Geologic Media," **C. W. FRANCIS** and **E. A. BONDIETTI**, Oak Ridge National Laboratory, Oak Ridge, TN

4:00 p.m. AG9 "Variables Affecting Sorption and Transport of Radionuclides in Hanford Subsoils," **G. S. BARNEY**, Rockwell Hanford Operations, Richland, WA

4:20 p.m. AG10 "Analysis of Pu-release Consequences on the Environmental Geochemistry," **A. T. JAKUBICK**, Kernforschungszentrum Karlsruhe, Germany

4:40 p.m. AG11 "Sorption and Migration of Radionuclides in Geologic Media," **B. R. ERDAL**, **W. R. DANIELS**, **D. C. HOFFMAN**, **F. O. LAWRENCE**, and **K. WOLFSBERG**, Los Alamos Scientific Laboratory, Los Alamos, NM

5:00 p.m. AG12 "Radionuclide Migration Studies Associated with the WIPP Site in Southeastern New Mexico," **R. G. DOSCH** and **A. W. LYNCH**, Sandia Laboratories, Albuquerque, NM

5:25 p.m. AG13 "Long-Term Geochemical Interactions of High Active Waste with Crystalline Rock Repository Media," **JOHN W. WINCHESTER**, Florida State University, Tallahassee, FL

5:45 p.m. DINNER

## SESSION H Radioactive Wastes In The Geologic Setting (Continued)

Presiding

**R. W. POTTER, II**  
United States  
Geological Survey  
Menlo Park, CA

**R. ROY**  
The Pennsylvania State  
University  
University Park, PA

Thursday

- 8:30 p.m. \*AH1 "Application of Physical Chemistry of Fluids in Rock Salt at Elevated Temperature and Pressure to Repositories for Radioactive Waste," **D. B. STEWART**, US Geological Survey, Reston, VA; and **R. W. POTTER, II**, US Geological Survey, Menlo Park, CA
- 8:55 p.m. AH2 "Application of Studies of Fluid Inclusions in Permian Salado Salt, New Mexico, to Problems of Siting a Nuclear Waste Repository," **EDWIN ROEDDER** and **H. E. BELKIN**, US Geological Survey, Reston, VA
- 9:15 p.m. AH3 "Hydrothermal Glass Reactions in Salt Brine," **J. H. WESTSIK, JR.** and **R. P. TURCOTTE**, Battelle Pacific Northwest Laboratories, Richland, WA
- 9:35 p.m. AH4 "Deformation Mapping of Polycrystalline Salt," **J. M. BIND** and **J. V. BIGGERS**, The Pennsylvania State University, University Park, PA
- 9:55 p.m. AH5 "Radiation Damage Studies on Natural and Synthetic Rock Salt for Waste Disposal Applications," **K. J. SWYLER**, **R. W. KLAFFKY**, and **P. W. LEVY**, Brookhaven National Laboratory, Upton, NY
- 10:15 p.m. AH6 "P-T-X Relations of Anhydrite and Brine and Their Implications for the Suitability of Anhydrite as a Nuclear Waste Repository Medium," **M. A. CLYNNE** and **R. W. POTTER, II**, US Geological Survey, Menlo Park, CA
- 10:35 p.m. ADJOURN

## SESSION J Modeling And Safety Assessment

Presiding

**HARRY C. BURKHOLDER**  
Battelle Pacific  
Northwest Laboratories  
Richland, WA

**D. B. STEWART**  
United States  
Geological Survey  
Reston, VA

Friday, December 1, 1978

- 8:30 a.m. \*AJ1 "An Analysis of the Geological Stability of a Radioactive Waste Repository in a Bedded Salt Formation," **MARTIN S. TIERNEY**, Sandia Laboratories, Albuquerque, NM; and **HERB R. SHAW**, US Geological Survey, Menlo Park, CA
- 8:55 a.m. \*AJ2 "Computer Simulation of a Geologic Nuclear Waste Repository: A Potential Safety Assessment Tool," **JAMES A. STOTTLEMYRE** and **MARK W. MULLEN**, Battelle Pacific Northwest Laboratories, Richland, WA

9:20 a.m. AJ3 "Mathematical Modeling in Low-Level Radioactive Waste Management," **D. S. WARD** and **G. T. YEH**, Oak Ridge National Laboratory, Oak Ridge, TN

9:40 a.m. "Methodology for Estimating Accidental Radioactive Releases in Nuclear Waste Management," **HARRIS B. LEVY**, Lawrence Livermore Laboratory, Livermore, CA

10:00 a.m. "The Effect of Retardation Factors on Radionuclide Migration," **MICHAEL S. GUIFFRE** and **BENJAMIN ROSS**, The Analytic Sciences Corporation

10:20 a.m. COFFEE AND DISCUSSION

10:40 a.m. AJ6 "Utilization of HOL Data Structure in Consequence Analysis for WIPP Repository," **R. J. BALESTRI** and **B. W. TORRES**, The BDM Corporation, Albuquerque, NM

11:00 a.m. AJ7 "Calculation of Radioactivity Release Due to Leaching of Vitrified High Level Waste," **E. EWEST**, Hahn-Meitner-Institut, Berlin, Germany

11:20 a.m. AJ8 "Release of Radionuclides from High Level Waste During Transportation Fires," **DANIEL A. ENSMINGER**, **RICHARD A. VAN KONYNENBURG**, and **ARTHUR A. SUTHERLAND, JR.**, The Analytic Sciences Corporation

11:40 a.m. AJ9 "Comparison of Some Geological and Ocean Disposal Concepts Regarding Realistic Modeling that Allows Objective Risk Assessment to be Made," **SIGURD O. NIELSEN**, Symplexor Engineering Consultants, Holte, Denmark

NOON CLOSE OF SYMPOSIUM

**SYMPOSIUM B  
MATERIALS  
CHARACTERIZATION  
IN ARCHAEOLOGY,  
HISTORIC PRESERVATION  
AND THE FINE ARTS**

**SYMPOSIUM CHAIRMAN: WENDELL S. WILLIAMS,**  
*University of Illinois*

**Wednesday, November 29, 1978**

9:00 a.m. BA1 *Concept of the Symposium,* **WENDELL S. WILLIAMS,** Program Chairman

**SESSION A  
Materials Problems  
In The Museum**

Presiding

**WENDELL S. WILLIAMS**  
*University of Illinois*

9:10 a.m. BA2 *"Technical Problems in the Museum,"* **ROBERT ORGAN** and **JAQUELINE OLIN,** Smithsonian Institution, Washington, D.C.

10:00 a.m. BA3 *"Technical Studies of Art Objects at the Metropolitan Museum of Art,"* **PIETER MYERS,** Metropolitan Museum of Art, NYC

10:50 a.m. BREAK

11:00 a.m. BA4 *"Authentication of Works of Art,"* **STUART FLEMING,** U. of Pennsylvania Museum, PA

11:50 a.m. BA5 *"Preservation of Historic Textiles,"* **PAUL TUCKER** and **SOL HERSCH,** North Carolina State University, NC

12:40 p.m. LUNCH

2:00 p.m. BA6 *"Materials Characterization of Chinese Bronzes,"* **THOMAS CHASE,** Freer Gallery of Art, Washington, D.C.

2:50 p.m. BA7 *"Infra Red/Fourier Transform Spectroscopy in Analysis of Art Objects,"* **MANFRED LOW,** New York University, NYC

3:40 p.m. BREAK

3:50 p.m. BA8 *"Neutron Activation Analysis and X-Ray Fluorescence Spectroscopy of Archaeological Ceramics,"* **JAY FRIERMAN,** UCLA, CA

4:40 p.m. BA9 *"Characterization of Ancient Pottery and Related Clays by Means of Neutron Activation Analysis,"* **EDWARD V. SAYRE,** Brookhaven National Laboratory, NY, and The Museum of Fine Arts, Boston, MA

5:30 p.m. DINNER

**SESSION B  
Archaeological Dating**

Presiding

**ALAN FRANKLIN**  
*National Bureau of Standards  
Washington, D.C.*

**Thursday, November 30, 1978**

8:30 a.m. BB1 *"Thermoluminescence Applications in Geoscience and Archaeology,"* **PAUL LEVY,** Brookhaven National Laboratory, NY

9:20 a.m. BB2 *"Thermoluminescence Dating of Archaeological Ceramics,"* **DAVID ZIMMERMAN,** Washington University, St. Louis, MO

10:10 a.m. BREAK

10:20 a.m. BB3 *"Electron Spin Resonance as Potential Dating Technique,"* **CHRISTOPHER MAURER** and **WENDELL WILLIAMS,** University of Illinois, IL

11:10 a.m. BB4 *"Surface Characterization of Weathered Cherts,"* **DAVID CLARK,** University of Florida, FL

12:00 p.m. LUNCH

2:00 p.m. BB5 *"Hydrogen Profile Dating,"* **WILLIAM LANFORD,** Yale University

2:50 p.m. BB6 *"Obsidian Hydration Studies by Sputter-Induced Optical Emission,"* **IGNATIUS TSONG,** and **J. W. MICHELS,** Penn State University, PA

3:40 p.m. BREAK

3:50 p.m. BB7 *"Carbon 14 Dating Using Accelerators,"* **HARRY GOVE,** University of Rochester, NY

4:40 p.m. ADJOURN

**SESSION C  
Early Materials Development**

Presiding

**WENDELL WILLIAMS**  
*University of Illinois*

**Friday, December 1, 1978**

9:00 a.m. BC1 *"Materials and Civilization,"* **HEATHER LECHTMAN,** MIT, MA

9:50 a.m. BC2 *"Iron Age Metallurgy,"* **ROBERT MAD-DIN,** University of Pennsylvania, PA

10:40 a.m. BREAK

10:50 a.m. BC3 *"Medieval Materials Technology,"* **PETER PRATT,** Imperial College, University of London

11:40 a.m. LUNCH

2:00 p.m. BC4 *"Metallurgy of Harpsichord Wires,"* **MARTHA GOODWAY,** Smithsonian Institution, Washington, D.C.

2:50 p.m. BC5 *"Metallurgical Analysis of Japanese Sword Fittings,"* **MICHAEL NOTIS,** Lehigh University, PA

3:40 p.m. BC6 Closing Remarks, **CYRIL STANLEY SMITH,** MIT, MA

**SYMPOSIUM C**  
**INVESTIGATION OF THE**  
**STRUCTURE OF CATALYSTS**  
**AND CHEMISORBED SPECIES**  
**BY THE EXAFS TECHNIQUE**

SYMPOSIUM CHAIRMAN: FARREL W. LYTLE,  
*The Boeing Company*

Wednesday, November 29, 1978

- 8:30 a.m. \*C1 "Surface-EXAFS Studies of Atoms on Single Crystal Substrates," P. CITRIN and P. EISENBERGER, Bell Labs, Murray Hill, NJ
- 9:10 a.m. \*C2 "EXAFS Above the K-edge of Carbon, Nitrogen and Oxygen Atoms in Solids and on Surfaces," J. STÖHR, SSRL, Stanford, CA
- 9:50 a.m. \*C3 "The Characterization of Adsorbed Systems Using EXAFS: Bromine Adsorbed on Graphite," E. A. STERN, University of Washington, Seattle, WA
- 10:30 a.m. BREAK
- 10:50 a.m. \*C4 "Biological Catalysts: Mn in Photosynthetic Oxygen Evaluation," M. KLEIN, University of California, Berkeley, CA
- 11:30 a.m. \*C5 "The Interaction of Cupric Ions with Alumina Supports: A View from Many Probes," B. R. STULTS and R. M. FRIEDMAN, Monsanto, St. Louis, MO
- 12:10 p.m. C6 "EXAFS of Small Cu and Ni Clusters on Carbon Substrates: Evidence for Bond-Length Changes with Particle Size," G. APAI, J. F. HAMILTON, Eastman Kodak, Rochester, NY, J. STÖHR, SSRL, Stanford, CA and A. THOMPSON, Lawrence Berkeley Laboratory, University of California, Berkeley, CA
- 12:30 p.m. LUNCH
- 2:00 p.m. \*C7 "X-ray Absorption Edge of Pt Clusters in Zeolite," P. GALLEZOT, R. A. DALLA BETTA, R. WEBER and M. BOUDART, Stanford University, Stanford, CA
- 2:40 p.m. \*C8 "EXAFS of Supported Metal Catalysts," J. H. SINFELT, Exxon Research and Engineering Co., Linden, NJ
- 3:20 p.m. \*C9 "Structure and Electronic Properties of Supported Pt," J. KATZER, University of Delaware, Newark, DL
- 4:00 p.m. BREAK
- 4:10 p.m. \*C10 "EXAFS Determination of Size and Shape of Metallic Catalyst Clusters," R. B. GREGOR, Boeing Co., Seattle, WA
- 4:50 p.m. \*C11 "Determination of the Structure of Ni, Mo-Alumina Hydrodenitriification Catalyst," D. M. BLAKELY, Chevron Research and Engineering Co., Richmond, CA
- 5:30 p.m. ADJOURN (Wine and Cheese Party 6:00-7:30 p.m.)

**SYMPOSIUM D**  
**PATHWAYS TO NEW**  
**CATALYTIC MATERIALS**

SYMPOSIUM CHAIRMAN: WILLIAM R. MOSER,  
*The Badger Company, Cambridge, MA 02142*

Thursday, November 30, 1978

- 8:25 a.m. Introductory Remarks, W. R. MOSER
- 8:30 a.m. D1 "Low Temperature Precipitation of Layered Transition Metal Sulfide Catalytic Materials," R. R. CHIANELLI, T. A. PECORARO and M. B. DINES, Exxon Research and Engineering Co., Linden, NJ
- 9:05 a.m. D2 "Production of Monodisperse Metal Clusters for Supported Metal Catalysis," G. L. GRIFFIN and R. P. ANDRES, Princeton University, Princeton, NJ
- 9:40 a.m. D3 "Shape Selective Phenomena in Zeolite Catalysis," W. HAAG, Mobil Research and Development Corp., Princeton, NJ
- 10:20 a.m. BREAK
- 10:50 a.m. D4 "Catalytic Properties of Porphyrins and Other Transition Metal Complexes on Glass Supports," D. G. WHITTEN, University of North Carolina, Chapel Hill, NC
- 11:25 a.m. D5 "Catalytic Activity of Transition Metal Complexes in Zeolites," J. H. LUNSFORD, Texas A&M University, TX
- 12:05 p.m. LUNCH
- 1:45 p.m. D6 "Strong Metal Support Interaction Catalysts," S. J. TAUSTER, S. C. FUNG, R. L. GARTEN, and R. T. BAKER, Exxon Research and Engineering Co., Linden, NJ
- 2:15 p.m. D7 "Recent Advances in Supported Catalysis for Olefin Polymerization," J. CHIEN, University of Massachusetts, Amherst, MA
- 2:55 p.m. BREAK
- 3:15 p.m. D8 "Methanol Synthesis/Promotion Effects in the Ternary Oxide Low Pressure Catalyst," K. KLIER, G. W. SIMMONS, R. G. HERMAN, Lehigh University, Bethlehem, PA
- 3:55 p.m. D9 "Catalytic Conversion of Graphite to Methane by Group VIII Catalysts," R. M. FISHER, V. U. S. RAO, and A. SZIRMAE, U.S. Steel Corp., Monroeville, PA
- 4:35 p.m. D10 "Is Tris (p-Bromophenyl) Ammoniumyl Radical Cation, a Novel Catalyst for Oxidation of Conjugated Dienes," H. YUE, R. LAPINSKI, G. BABBITT, R. TANG, J. WOLF, and F. MARES, Allied Chemical Corp., Morristown, NJ
- 5:05 p.m. D11 "Analysis of Sulfur Induced Deactivation of Ni/ZrO<sub>2</sub> Methanation Catalysts," H. WINDAWI and J. R. KATZER, University of Delaware, Newark, DL
- 5:35 p.m. DINNER

**SYMPOSIUM E**  
**CHARACTERIZATION OF**  
**SMALL METAL CLUSTERS**  
**INTERACTING WITH**  
**SIMPLE MOLECULES**

SYMPOSIUM CHAIRMAN: **P. A. MONTANO**,  
West Virginia University, Morgantown, W. VA

Friday, December 1, 1978

Presiding  
**P. A. MONTANO**

- 9:00 a.m. E1 "Selective Photo-Aggregation of Metal Atoms to Small Metallic and Bimetallic Clusters of Known Size," **G. A. OZIN**, University of Toronto, Canada
- 9:20 a.m. DISCUSSION
- 9:30 a.m. E2 "Interactions of Iron Monomers and Dimers with Simple Molecules in a Low Temperature Matrix," **P. H. BARRETT**, University of California, Santa Barbara, CA
- 9:50 a.m. DISCUSSION
- 10:00 a.m. E3 "Spectroscopy of Small Metal Clusters," **MARTIN MOSKOVITZ**, University of Toronto, Toronto
- 10:20 a.m. DISCUSSION
- 10:30 a.m. BREAK
- 10:40 a.m. E4 "UV-VIS, Raman and IR-Spectra of Silver Molecules  $Ag_n$  ( $n < 10$ )," **W. SCHULZE**, Fritz-Haber-Institute, Berlin
- 11:00 a.m. DISCUSSION
- 11:10 a.m. E5 "Optical Absorption of Metal Crystals Containing from One to One Million Atoms," **T. WELKER**, Max-Planck-Institut für Festkörper, Forschung, Stuttgart
- 11:30 a.m. DISCUSSION
- 11:40 a.m. E6 "Bimetallic Aggregation of Silver with Transition Metal Atoms," **WERNER E. KLOTZBÜCHER** and **G. A. OZIN**, University of Toronto, Canada
- 12:00 p.m. DISCUSSION
- 12:10 p.m. LUNCH

Friday p.m.

Presiding  
**G. A. OZIN**  
University of Toronto

- 2:00 p.m. E7 "Generation and ESR Studies of Intermetallic Molecules," **PAUL KASAI**, Union Carbide Corporation
- 2:20 p.m. DISCUSSION
- 2:30 p.m. E8 "Matrix Isolation Studies of Bimetallic Molecules and Their Interactions with Simple Gases," **P. A. MONTANO**, West Virginia University, W. VA
- 2:50 p.m. DISCUSSION

3:00 p.m. E9 "Theoretical Studies of Metal Clusters: Electronic and Chemisorptive Properties," **WILLIAM A. GODDARD III**, California Institute of Technology, CA

3:20 p.m. DISCUSSION

3:30 p.m. E10 "Electronic Structure and Catalytic Activity of Metal Clusters," **K. H. JOHNSON**, MIT, MA

3:50 p.m. DISCUSSION

4:00 p.m. E11 " $^{195}Pt$  NMR of Platinum Clusters," **WILLIAM HALPERN**, Northwestern University, Evanston, IL

4:20 p.m. DISCUSSION

4:30 p.m. End of Symposia on Catalytic Materials

**SYMPOSIUM F**  
**CONFERENCE ON**  
**IN SITU COMPOSITES**  
**(CISC-III)**

SYMPOSIUM CHAIRMEN:

**H. BIBRING**  
ONERA, France

**B. F. OLIVER**  
Univ. of Tennessee

**SESSION A**  
**Structure, Synthesis**  
**And Solidification**

Presiding

**F. D. LEMKEY**  
United Technologies  
Research Center

**J. L. WALTER**  
General Electric  
CR&D

Wednesday, November 29, 1978

- 9:00 a.m. \*FA1 Keynote: *Fundamental Aspects of Aligned Growth*, **MATS HILLERT**, Royal Institute of Technology, Stockholm, Sweden
- 9:45 a.m. FA2 "The Directional Solidification of Quaternary Eutectics," **W. T. KING** and **B. F. OLIVER**, Dept. of Chem. Met. & Polymer Eng., The Univ. of Tennessee, Knoxville, TN
- 10:10 a.m. FA3 "Effect of Gravity on the Solidification of Irregular Silver Germanium Eutectics," **C. LEMAIGNAN** and **Y. MALMEJAC**, French Atomic Energy Commission, Grenoble Cedex, France
- 10:35 a.m. COFFEE
- 10:50 a.m. FA4 "Directional Solidification in Monotectic Systems — Comparisons with the Eutectic Reaction," **A. HELLAWELL**, University of Wisconsin, Milwaukee, Milwaukee, WI
- 11:15 a.m. FA5 "Directional Solidification of Aligned Monotectic & Hyper-Monotectic Materials," **M. H. JOHNSTON** and **R. A. PARR**, Marshall Space Flight Center, AL

- 11:40 a.m. FA6 "Directional Solidification of Filamentary Shapes of Pb-Cd and Pb-Sn Eutectic Alloys," **J. D. VERHOEVEN** and **B. K. DHINDAW**, Iowa State University, Ames, IA
- 11:55 a.m. FA7 "A New Furnace for High Gradient Directional Growth," **M. C. FLEMINGS**, **D. S. LEE**, **M. A. NEFF**, **K. P. YOUNG** and **B. A. RICKINSON**, MIT, Cambridge, MA
- 12:10 p.m. FA8 "Directional Solidification of Eutectic Alloys According to a Controlled Floating Zone Technique," **J. M. QUENISSET**, **J. GIROL** and **R. NASLAIN**, Laboratoire de Chimie du Solide du CNRS, Univ. de Bordeaux-I, Talence, France
- 12:25 p.m. DISCUSSION OF PAPERS FA6-8
- 12:35 p.m. LUNCH

## SESSION B Structural Stability

Presiding

**G. A. CHADWICK**  
Univ. of South Hampton  
England

**B. F. OLIVER**  
Univ. of Tennessee

Wednesday p.m.

- 2:00 p.m. FB1 "A Model for Capillary Induced Instabilities in Directionally Solidified Eutectic Alloys," **T. F. MARINIS** and **R. F. SEKERKA**, Dept. of Metallurgy & Materials Sciences, Carnegie-Mellon Univ., Pittsburgh, PA
- 2:25 p.m. FB2 "The Thermal Stability of the Unidirectionally Solidified Cu-Cr Eutectic Alloy," **B. LAVELLE** and **F. DABOSI**, Laboratoire de Metallurgie Physique de l'Ecole Nationale Supérieure de Chimie de Toulouse, Toulouse, France
- 2:50 p.m. FB3 "The Thermal Stability and Associated Mechanical Properties of Zn-Cd Alloys," **R. VAN DE MERWE** and **R. W. SMITH**, Queen's University, Kingston, Canada
- 3:15 p.m. FB4 "Elevated Temperature Stability of a Co-Cr-C In-Situ Composite," **Y. TANIYAMA**, Kanebo Ltd., Osaka, Japan and **A. LAWLEY**, Dept. of Materials Eng., Drexel Univ., Philadelphia, PA
- 3:40 p.m. COFFEE
- 4:00 p.m. FB5 "Structural Stability of  $\gamma/\gamma'$ -NbC Eutectic Composites," **JEAN-FRANCOIS STOHR**, Office National d'Etudes et de Recherches Aérospatiales (ONERA), Chatillon, France
- 4:25 p.m. FB6 "Investigation of the Fibre/Matrix Interface Structure in CoTaC Composites," **E. MARONI**, **J-F STOHR** and **M. AUCOUTURIER**, Office National d'Etudes et de Recherches Aérospatiales (ONERA), Chatillon, France
- 4:50 p.m. FB7 "Directionally Solidified High Temperature Alloys in a Transverse Thermal Gradient," **G. STANIEK**, DFVLR, Institut für Werkstoff-Forschung, Koln, West Germany
- 5:15 p.m. ADJOURN (Wine and Cheese Party 6:00-7:30 p.m.)

## SESSION C Composites For Nonstructural Applications

Presiding

**J. J. HUTTA**  
Hanscom AFB

**R. V. SISSON, JR**  
WPI

Thursday, November 30, 1978

- 9:00 a.m. \*FC1 Keynote: A Review of In Situ Composites for Nonstructural Applications, **A. S. YUE**, Univ. of California, Los Angeles, CA
- 9:45 a.m. FC2 "High Rate Directional Solidification of MnBi/Bi Magnetic Composites," **D. J. LARSON, JR.**, **R. G. PINCH**, **G. BUSCH**, Grumman Aerospace Corp., Bethpage, NY
- 10:10 a.m. FC3 "New Developments in the IZG of Metal Oxide-Metal Eutectic Composites," **J. D. HOLDER** and **G. W. CLARK**, Oak Ridge National Laboratory, Oak Ridge, TN
- 10:35 a.m. COFFEE
- 10:50 a.m. FC4 "Emission Characteristics of W-UO<sub>2</sub> Cold Cathode," **J. W. GOODRUM** and **T. B. ELFE**, Georgia Institute of Technology, Atlanta, GA and **J. J. HUTTA**, Hanscom AFB
- 11:15 a.m. FC5 "Fabrication of Low Voltage Field Emitter Arrays from Metal Oxide-Metal Composites," **J. D. LEE**, **J. K. COCHRAN**, Georgia Institute of Technology, Atlanta, GA
- 11:40 a.m. FC6 "Fibrous Eutectic Alloy Catalysts," **C. S. BROOKS**, **F. D. LEMKEY** and **G. S. GOLDEN**, United Technologies Research Center, East Hartford, CT
- 12:05 p.m. LUNCH

## SESSION D Component Development, Processing and Applications

Presiding

**M. GELL**  
Pratt & Whitney Aircraft

**H. BIBRING**  
ONERA

Thursday p.m.

- 2:00 p.m. \*FD1 Keynote: Practical Aspects of Eutectic Composite Applications in Jet Engine Blades and Vanes, **R. BRUNETAUD**, SNECMA, Paris, France
- 2:45 p.m. FD2 "A Novel Technique for the Production of Directionally Cast to Size Turbine Blades," **MAURICE RABINOVITCH** and **JEAN-MICHEL HAUSER**, Office National d'Etudes et de Recherches Aérospatiales (ONERA), Chatillon, France
- 3:10 p.m. FD3 "Development and Testing of a Solid NiTaC-13 Turbine Blade," **C. A. BRUCH**, **R. W. HARRISON**, **M. F. X. GIGLIOTTI**, **M. F. HENRY**, **R. C. HAUBERT** and **C. H. GAY**, General Electric Aircraft Engine Division, Evendale, OH
- 3:35 p.m. COFFEE

- 4:00 p.m. FD4 "Precision Cast Directionally Solidified Co-Cr<sub>7</sub>C<sub>3</sub> Eutectic In-Situ Composites for Stationary Gas Turbine Blades," **P. R. SAHM**, Brown Boveri & Cie, Central Research Lab, Heidelberg, Germany and **FL. SCHUBERT**, Thyssen Giesserei AG, Thyssen Precision Casting Foundry, Bochum, Germany
- 4:25 p.m. FD5 "Precision Cast  $\gamma/\gamma'+\delta$  Solid Turbine Blades," **R. W. SALKELD**, **A. F. GIAMEI** and **K. E. TAYLOR**, Pratt & Whitney Aircraft, East Hartford, CT
- 4:50 p.m. FD6 "Component Evaluation and Engine Demonstration of  $\gamma/\gamma'-\delta$  D.S. Eutectic Solid Turbine Blades," **A. D. CETEL** and **M. GELL**, Pratt & Whitney Aircraft, East Hartford, CT and **J. W. GLATZ**, NADC, Trenton, NJ
- 5:15 p.m. DINNER

## SESSION E Posters

Thursday, 8:00 p.m.

- FE1 "The Effect of Hot Rolling on Unidirectionally Solidified Al-Al<sub>3</sub>Ni Eutectic Alloy," **F. S. J. JABCZYNSKI**, **B. CANTOR**, The University of Sussex, Brighton, England
- FE2 "The Effect of Mold Shape on The Structure of Directionally Solidified Al-Ni and Al-Ni-Cu Alloys," **N. A. EL-MAHALLAWY**, Ain Shams University, Cairo, and **M. M. FARAG**, American University, Cairo, Egypt
- FE3 "Faceting and Morphological Regularity of Eutectic Structures, The AuSn<sub>4</sub>-Sn System," **JEAN-JACQUES FAVIER**, French AEC, Grenoble Cedex, France
- FE4 "Creep Experiments on Lamellar Al-Al<sub>2</sub>Cu Composites," **M. IGNAT**, **R. BONNET** and **F. DURAND**, Laboratoire de Thermodynamique et Physico-Chemie Metallurgiques, St. Martin D'Herès, **D. PROULX**, Université de Sherbrooke, Canada, **D. CAILLARD** and **J. L. MARTIN**, Laboratoire d'Optique Electronique du C.N.R.S., Toulouse, France
- FE5 "Thermal Measurements of the Internal Yield Strength of a Fibrous Eutectic," **CLEMENT LEMAIGNAN**, French AEC, Grenoble, France
- FE6 "Oxygen Partial Pressure: A Key to Alloying and Discovery in Metal Oxide-Metal Eutectic System," **J. D. HOLDER** and **G. W. CLARK**, ORNL and **B. F. OLIVER**, University of Tennessee

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## ACTIVITIES LOCATIONS GRID

SYMPOSIUM	TUESDAY NOVEMBER 28			WEDNESDAY NOVEMBER 29			THURSDAY NOVEMBER 30			FRIDAY DECEMBER 1	
	AM	PM	Evening	AM	PM	Evening	AM	PM	Evening	AM	PM
<b>A. Radioactive Waste Management</b>	Independence Center and East			Fairfax till 12:00	Berklee Performance Center*		Independence Center and East		Constitution	Fairfax	
<b>B. Materials in Archeology</b>				Exeter A & B			Liberty C & D			Exeter A & B	
<b>Catalytic Materials</b> <b>C. EXAFS Studies</b> <b>D. New Catalysts</b> <b>E. Small Metal Clusters</b>				Dalton A & B (Symp. C)			Liberty B & G (Symp. D)			Dalton A & B (Symp. E)	
<b>F. In-Situ Composites</b>				Gardner till 12:00	Beacon C & H		Independence West		Republic Foyer (Posters)	Hampton	
<b>G. Oriented Reactions of Polymers</b>				Beacon D & E							
<b>H. Laser-Solid Interactions</b>	Republic Ballroom  (Beer in Grand Ballroom)			Republic Ballroom			Commonwealth till 12:00	Grand Ballroom till 4:00	Grand Ballroom 7:30 (Beer)	Commonwealth till 4:00	
<b>J. Interfaces</b>				Beacon A & B			Liberty E & F				
<i>Committees</i>	Room 570 12:00-2:00			Room 570 12:00-2:00						Room 570 12:00-2:00	
<i>Von Hippel Award</i>							Fairfax 12:00-2:00				
<i>Registration**</i>	Conference Room on Conference Level, Third Floor Daily 8:00 AM to 6:00 PM										

WINE AND CHEESE RECEPTION  
Commonwealth Room 6:00-7:30

\*Not in Sheraton Hotel: Berklee Performance Center is on Boylston Street, a 3 minute stroll from the Sheraton  
 \*\*Early registration: Monday afternoon and evening in Sales Office Foyer, Third Floor

SESSION F  
**High Temperature  
Eutectics — I**

Presiding

**I. MACHLIN**  
NASC

**C. SCHEURM**  
NASA Lewis

**Friday, December 1, 1978**

9:00 a.m. \*FF1 Keynote: *Mechanical Behavior of High Temperature Composites*, **N. S. STOLOFF**, RPI, Troy, NY

9:45 a.m. FF2 *"Further Assessment and Improvement of High Strength  $\gamma/\gamma'$ -NbC Composites for Advanced Turbine Blades,"* **T. KHAN**, Office National d'Etudes et de Recherches Aeronautiques (ONERA), Chantillon, France

10:10 a.m. FF3 *"The Ni-Al-Ta-Mo ( $\gamma'+\alpha$ ) Pseudo-Binary Eutectic,"* **D. D. PEARSON**, United Technologies Research Center, East Hartford, CT

10:35 a.m. COFFEE

10:50 a.m. FF4 *"Shear Rupture Strength of a Directionally Solidified Gamma/Gamma Prime-Alpha (Mo) Eutectic Alloy,"* **F. H. HART**, NASA Lewis Research Center, Cleveland, OH

11:15 a.m. FF5 *"Thermal Cyclic Fatigue of Directionally Solidified Ni-Al-Mo Eutectics,"* **P. R. BHOWAL** and **A. J. McEVILY**, Inst. of Materials Science, Univ. of Connecticut, Storrs, CT and **D. D. PEARSON**, United Technologies Research Center, East Hartford, CT

11:40 a.m. FF6 *"Thermal Fatigue Evaluation of Superalloy Eutectics,"* **D. A. WOODFORD**, General Electric Research Center, Schenectady, NY

12:05 p.m. LUNCH

SESSION G  
High Temperature  
Eutectics — II

Presiding

**HARRISON**  
G.E. Aircraft  
Engine Div.

**N. S. STOLOFF**  
RPI

Friday p.m.

- 2:00 p.m. FG1 "Mechanical and Physical Properties of Modified Co,Cr-(Cr,Co)<sub>2</sub>C<sub>3</sub> Alloys," **F. D. LEMKEY** and **E. R. THOMPSON**, United Technologies Research Center, East Hartford, CT
- 2:25 p.m. FG2 "Effects of Alloying Additions and High Rate Solidification on the Properties of the  $\gamma$ - $\gamma'$ -Cr<sub>3</sub>C<sub>2</sub> System," **E. BULLOCK**, Euratom, Petten, The Netherlands and **P. N. QUESTED** and **M. McLEAN**, National Physical Laboratory, Teddington, Middlesex, England
- 2:50 p.m. FG3 "Solidification and Properties of Ni-Cr-Mo and Ni-Cr-W Monovariant Eutectics," **E. GRUNDY**, INCO, European Res. & Dev. Center, Birmingham, UK
- 3:15 p.m. COFFEE
- 3:35 p.m. FG4 "Prediction and Assessment of New Eutectic Alloys in the Co-Cr-(Zr,Nb or Ta) Systems," **T. G. CHART** and **F. H. PUTLAND**, Division of Chemistry Standards and **M. McLEAN**, National Physical Laboratory, Teddington, Middlesex, England
- 4:00 p.m. FG5 "Solidification and Strength Characteristics of New Eutectics Based on Cobalt, Iron and Nickel," **M. K. THOMAS**, Naval Air Development Center, Warminster, PA
- 4:25 p.m. FG6 "M-M<sub>3</sub>AlC<sub>x</sub> Directionally Solidified Eutectic Composites," **K. FRITSCHER**, DFVLR, Cologne, West Germany
- 4:50 p.m. End of Conference on In Situ Composites — III

SYMPOSIUM G\*  
EPITAXIAL CRYSTALLIZATION  
OF POLYMERS AND  
ORIENTED POLYMERIZATION

SYMPOSIUM CHAIRMEN: **ERIC BAER** AND **J. B. LANDO**  
Case Western Reserve University,  
Cleveland, Ohio

SESSION A  
Oriented Polymerization

Presiding

**E. BAER**  
Case Western Reserve University

Wednesday, November 29, 1978

- 9:00 a.m. GA1 "Overview Discussion of Oriented Polymerization," **JEROME B. LANDO**, Case Western Reserve University
- 9:30 a.m. Discussion
- 9:40 a.m. GA2 "Topochemical Synthesis of Conductive Polymers," **RAY H. BAUGHMAN**, Allied Chemical Company
- 10:05 a.m. Discussion
- 10:15 a.m. GA3 "Solid State Polymerization of Organometallic Coordination Complexes," **BRUCE M. FOXMAN**, Brandeis University
- 10:40 a.m. Discussion
- 10:50 a.m. GA4 "Polymerization of Ordered Monomer Multilayers," **ASIS BANERJIE**, Armstrong Cork Company
- 11:15 a.m. Discussion
- 11:25 a.m. GA5 "Polymerization of Diacetylene Monomer Monolayers at the Gas-Water Interface," **DAVID DAY**, Case Western Reserve University
- 11:50 a.m. Discussion
- 12:00 p.m. LUNCH

\*Invited papers only

SESSION B  
**Epitaxial Crystallization  
of Polymers**

Presiding

**J. B. LANDO**  
Case Western Reserve University

**Wednesday, p.m.**

- 2:00 p.m. GB1 "Overview Discussion of Epitaxial Crystallization of Polymers," **ERIC BAER**, Case Western Reserve University
- 2:30 p.m. Discussion
- 2:45 p.m. GB2 "The Epitaxial Crystallization of Low Molecular Weight Polymers on Organic Substrates," **JEAN CLAUDE WITTMAN**, Centre de Recherche Macromolecules, Strassbourg, France
- 3:15 p.m. Discussion
- 3:30 p.m. GB3 "Control of Polymorphism and Morphology by Epitaxial Crystallization," **SCOTT E. RICKERT**, Case Western Reserve University
- 4:00 p.m. Discussion
- 4:15 p.m. GB4 "Theoretical Calculations of the Mechanism of Epitaxial Crystallization of Polymers," **KENNETH MAURITZ**, Diamond Shamrock Corporation
- 4:45 p.m. Discussion
- 5:00 p.m. END OF SYMPOSIUM (Wine and Cheese Party 6:00-7:30 p.m.)

SYMPOSIUM H  
**LASER-SOLID INTERACTIONS  
AND LASER PROCESSING**

SYMPOSIUM CHAIRMEN: **H. J. LEAMY AND J. M. POATE**  
Bell Laboratories  
Murray Hill, N.J.

**SESSION A**

Presiding

**W. L. BROWN**  
Bell Laboratories  
Murray Hill, N.J.

**Tuesday, November 28, 1978**

- 8:25 a.m. Welcome and Opening Remarks, **H. J. LEAMY**, Bell Laboratories
- 8:30 a.m. \*HA1 "Laser Annealing of Ion-Implanted Semiconductors," **A. V. DVURECHENSKY** and **G. A. KACHURIN**, Institute of Semiconductor Physics, Novosibirsk, USSR
- 9:10 a.m. \*HA2 "Laser Annealing of Ion-Implanted Si and GaAs Semiconductors," **E. RIMINI**, Instituto di Struttura della Materia, Catania, Italy
- 9:50 a.m. HA3 "Extent of Annealed Regions as a Function of the Energy of Pulsed Irradiation," **J. NARAYAN** and **C. W. WHITE**, Oak Ridge National Laboratory, Oak Ridge, TN
- 10:05 a.m. HA4 "Pulsed Laser Annealing of Ion Implanted Silicon," **J. H. STEPHEN**, **B. J. SMITH**, and **N.G. BLAMIRE**s, Atomic Energy Research Establishment, Harwell, England
- 10:20 a.m. HA5 "Laser Annealing of Ion-Implanted Semiconductors," **K. GAMO**, Osaka University, Toyonaka, Osaka, Japan
- 10:35 a.m. BREAK
- 10:45 a.m. HA6 "Solid Phase Epitaxy of Implanted Silicon by CW Ar Ion Laser Irradiation," **J. S. WILLIAMS**, **W. L. BROWN**, **H. J. LEAMY**, **J. M. POATE**, **J. W. RODGERS**, **D. ROUSSEAU**, **G. A. ROZGONYI**, **J. A. SHELNUTT**, and **T. T. SHENG**, Bell Laboratories, Murray Hill, NJ
- 11:00 a.m. HA7 "Crystallization of Implanted Amorphous Silicon on Single Crystal Silicon by a Free Running Ruby Laser," **T. W. SIGMON**, **J. REGOLINI**, and **J. F. GIBBONS**, Stanford Electronics Labs., and **T. J. MAGEE**, ARACOR, Sunnyvale, CA
- 11:15 a.m. HA8 "Pulsed Electron Beam Annealing of Ion-Implanted Layers," **E. F. KENNEDY**, **S. S. LAU**, **J. W. MAYER**, and **W. TSENG**, California Institute of Technology, Pasadena, CA, and **J. A. MINNUCCI** and **A. R. KIRKPATRICK**, Spire Corporation, Bedford, MA
- 11:30 a.m. HA9 "Comparison of Laser and Electron Beam Annealing," **S. S. LAU**, **W. TSENG**, **I. GOLECKI**, **E. F. KENNEDY**, and **J. W. MAYER**, California Institute of Technology, Pasadena, CA

11:45 a.m. HA10 "Processing of Semiconductor Materials by Pulsed Electron Beams," **A. R. KIRKPATRICK, A. C. GREENWALD,** and **J. A. MINNUCCI,** Spire Corporation, Bedford, MA

12:00 p.m. LUNCH

## SESSION B

Presiding

**J. F. GIBBONS**  
Stanford University

Tuesday p.m.

1:30 p.m. \*HB1 "Laser Annealing of Ion-Implanted Silicon," **C. W. WHITE, R. T. YOUNG,** and **J. NARAYAN,** Oak Ridge National Laboratory, Oak Ridge, TN

2:10 p.m. HB2 "Annealing of Silicon with 1.06  $\mu\text{m}$  Laser Pulses," **M. VON ALLMEN, W. LUTHY, M. T. SIREGAR, K. AFFOLTER,** Univ. of Bern, Bern, Switzerland, and **H. A. NICOLET,** California Institute of Technology, Pasadena, CA

2:25 p.m. HB3 "Channeling Analysis of Laser Annealed Silicon," **W. K. CHU** and **B. J. MASTERS,** I.B.M., Hopewell Junction, NY

2:40 p.m. HB4 "Comparison of Laser Annealing (Pulsed and Continuous) and Furnace Annealing of Low-Solid Solubility, Pb-Implanted Si," **J. S. WILLIAMS,** Royal Melbourne Institute of Technology, Melbourne, Australia, **B. PAINE,** University of Melbourne, Parkville, Australia, and **G. K. CELLER,** Western Electric Engineering Research Center, Princeton, NJ

2:55 p.m. BREAK

3:05 p.m. HB5 "Annealing Behaviour of Phosphorus Implanted Silicon Irradiated by Several Lasers of Different Wavelengths," **M. MIYAO, H. TAMURA, K. OHYU,** and **T. TOKUYAMA,** Central Research Laboratory, Hitachi Ltd, Kokubunji, Tokyo, Japan

3:20 p.m. HB6 "Comparison of Laser and Furnace Annealing of P Type Dopants in Silicon," **A. G. CULLIS, D. V. McCAUGHAN, J. M. KEEN,** and **F. G. H. SMITH,** Royal Radar & Signals Establishment, Malvern, England

3:35 p.m. HB7 "Laser-Induced Regrowth of  $\langle 100 \rangle$  and  $\langle 111 \rangle$  Ge Implanted with  $^{11}\text{B}$  and  $^{31}\text{P}$  Ions: Damage and Impurity Location Study," **G. DELLA MEA, G. FOTI,** and **G. MAJINI,** Università di Padova, Padova, Italy

3:50 p.m. HB8 "Laser Recrystallization of Ion-Implanted Silicon by Frequency Doubled Nd:YAG Laser," **R. TSU, K. C. PARK, T. Y. TAN,** and **J. E. E. BAGLIN,** I.B.M. Thomas J. Watson Research Center, Yorktown Heights, NY

4:05 p.m. HB9 "CW Ar Laser Annealing of Ion-Implanted Silicon," **D. H. AUSTON, J. A. GOLOVCHENKO, P. R. SMITH, C. M. SURKO** and **T. N. C. VENKATESAN,** Bell Laboratories, Murray Hill, NJ

4:20 p.m. HB10 "Annealing of Ion-Implanted Silicon by  $\text{CO}_2$  Laser Irradiation," **G. K. CELLER** and **R. BORTA,** Western Electric Engineering Research Center, Princeton, N.J., and **W. L. BROWN, J. M. POATE, G. A. ROZGONYI** and **T. T. SHENG,** Bell Laboratories, Murray Hill, N.J.

4:35 p.m. DINNER

## SESSION C

Presiding

**J. W. MAYER**  
California Institute of Technology

Tuesday p.m.

7:30 p.m. HC1 "Epitaxial Laser Crystallization of Thin-Film Amorphous Silicon," **J. C. BEAN, H. J. LEAMY, J. M. POATE, G. A. ROZGONYI, T. T. SHENG** and **J. S. WILLIAMS,** Bell Laboratories, Murray Hill, NJ, and **G. K. CELLER,** Western Electric Engineering Research Center, Princeton, NJ

7:45 p.m. HC2 "Laser Annealing Behavior of Deposited and Implant-Produced Amorphous Silicon Layers on Silicon Substrates," **L. D. HESS, J. A. ROTH, C. L. ANDERSON, W. M. CLARK, JR.,** and **H. L. DUNLAP,** Hughes Research Laboratories, Malibu, CA

8:00 p.m. HC3 "Laser-Annealing of Amorphous Deposited Layers," **F. W. SARIS,** F. O. M. Institute, Amsterdam, The Netherlands

8:15 p.m. HC4 "Laser Annealing of H-Implanted Amorphous Silicon," **P. S. PEERCY** and **H. J. STEIN,** Sandia Laboratories, Albuquerque, NM

8:30 p.m. HC5 "Laser Annealing of Ion Implanted Polycrystalline Silicon Films," **C. P. WU** and **C. W. MAGEE,** R. C. A. Research Laboratories, Princeton, NJ

8:45 p.m. BREAK

9:00 p.m. HC6 "Metal-Silicide Formation by Laser Irradiation," **M. WITTMER,** Brown Boveri, Baden, Switzerland and **M. VON ALLMEN,** University of Bern, Bern, Switzerland

9:15 p.m. HC7 "Laser Induced Reactions of Platinum and Other Metal Films with Silicon," **J. M. POATE, H. J. LEAMY,** and **T. T. SHENG,** Bell Laboratories, Murray Hill, NJ, and **G. K. CELLER,** Western Electric Engineering Research Center, Princeton, NJ

9:45 p.m. HC8 "Silicide Formation by Energy Beam Annealing," **T. Y. TAN, P. S. HO,** and **K. N. TU,** IBM, T. J. Watson Research Center, Yorktown Heights, NY

10:00 p.m. HC9 "Detailed Characterization of Metal-Semiconductor Alloying Produced by Single Laser Pulses," **H. G. PARKS,** General Electric Research and Development Center, Schenectady, NY and **K. ROSE,** Rensselaer Polytechnic Institute, Troy, NY

10:15 p.m. REFRESHMENTS

## SESSION D

Presiding

**F. W. YOUNG**

Oak Ridge National Laboratory

**Wednesday, November 29, 1978**

- 8:30 a.m. \*HD1 "Fundamentals of Laser-Solid Interactions," **N. BLOEMBERGEN**, Harvard University, Cambridge, MA
- 9:10 a.m. \*HD2 "Interaction of Intense Light with Amorphous and Crystalline Semiconductors," **D. H. AUSTON, J. A. GOLOVCHENKO, R. E. SLUSHER, P. R. SMITH, C. M. SURKO,** and **T. N. C. VENKATESAN**, Bell Laboratories, Murray Hill, NJ
- 9:50 a.m. HD3 "Ruby Laser High Power Effects on Implanted Semiconductors," **G. VITALI** and **M. BERTOLOTTI**, Istituto di Fisica, P. le delle Scienze, Rome, Italy, and **G. FOTI** and **E. RIMINI**, Istituto di Struttura della Materia, Catania, Italy
- 10:05 a.m. HD4 "Laser-Molecular Solid Interaction Under Ultra High Vacuum at Low Temperatures," **J. HEIDBERG, A. NESTMANN,** and **H. STEIN**, Universitaet Erlangen-Nurnberg
- 10:20 a.m. HD5 "Radial Heat Flow and Microstructure in Small Diameter Energy Beam Annealed Amorphous Silicon," **P. S. HO, T. Y. TAN,** and **R. TSU**, IBM Thomas J. Watson Research Center, Yorktown Heights, NY
- 10:35 a.m. BREAK
- 10:45 a.m. HD6 "Dopant Profile Changes Induced by Laser Irradiation of Silicon — Comparison of Theory and Experiment," **J. C. WANG, R. F. WOOD, C. W. WHITE, B. R. APPLETON, P. P. PRONKO, S. R. WILSON,** and **W. H. CHRISTIE**, Oak Ridge National Laboratory, Oak Ridge, TN
- 11:00 a.m. HD7 "Spatial Distribution of Temperature Rise Induced by a Gaussian Laser Beam," **M. LAX**, City College of New York and Bell Laboratories, Murray Hill, NJ
- 11:15 a.m. HD8 "Influence of Implanted Arsenic Dose in Silicon on the Energy Density Required for Annealing with a Nd-Glass Laser," **T. K. McNAB, T. T. BARDIN,** and **D. KOHLER**, Lockheed Palo Alto Research Laboratories, Palo Alto, CA
- 11:30 a.m. HD9 "Redistribution of Very Thin Sb Layers in Si After Laser Annealing," **S. L. LIAU, B. Y. TSAUR, S. S. LAU, I. GOLECKI,** and **J. W. MAYER**, California Institute of Technology, Pasadena, CA
- 11:45 a.m. HD10 "Laser Kinetic Study of the Semiconducting to Metal Phase Transition in Vanadium-Dioxide," **R. M. WALSER** and **M. F. BECKER**, University of Texas, Austin, TX
- 12:00 p.m. HD11 "Laser Effects on Amorphous Silicon," **M. BERTOLOTTI** and **G. VITALI**, Istituto di Fisica, P. le delle Scienze, Rome, Italy
- 12:15 p.m. LUNCH

## SESSION E

Presiding

**K. A. JACKSON**

Bell Laboratories

Murray Hill, New Jersey

**Wednesday p.m.**

- 1:30 p.m. \*HE1 "Formation of Metastable States by Rapid Quenching," **D. TURNBULL**, Harvard University, Cambridge, MA
- 2:10 p.m. \*HE2 "Comparison of Laser and Thermal Annealing of Implanted-Amorphous Silicon," **S. S. LAU, J. W. MAYER,** and **T. T. TSENG**, California Institute of Technology, Pasadena, CA
- 2:30 p.m. HE3 "New Materials Properties Achievable by Ion Implantation and Laser Processing," **B. R. APPLETON, C. W. WHITE, B. C. LARSON, J. NARAYAN, S. R. WILSON,** and **P. P. PRONKO**, Oak Ridge National Laboratory, Oak Ridge, TN
- 3:05 p.m. HE4 "A Calculation of the Thermodynamic First Order Amorphous Semiconductor to Metallic Liquid Transition Temperature," **B. G. BAGLEY** and **H. S. CHEN**, Bell Laboratories, Murray Hill, NJ
- 3:20 p.m. COFFEE
- 3:30 p.m. HE5 "Lattice Location of As and Sb Implanted in Silicon After Annealing with a Pulsed Ruby Laser," **S. R. WILSON, C. W. WHITE, P. P. PRONKO,** and **B. R. APPLETON**, Oak Ridge National Laboratory, Oak Ridge, TN
- 3:45 p.m. HE6 "Laser Annealing of Transition Metal Implants in Silicon," **A. G. CULLIS**, Royal Radar and Signals Establishment, Malvern, England, **J. M. POATE**, Bell Laboratories, Murray Hill, NJ, and **G. K. CELLER**, Western Electric Engineering Research Center, Princeton, NJ
- 4:00 p.m. HE7 "The Microstructure of Laser Annealed Silicon," **G. A. ROZGONYI, H. J. LEAMY,** and **T. T. SHENG**, Bell Laboratories, Murray Hill, NJ, and **G. K. CELLER**, Western Electric Engineering Research Center, Princeton, NJ
- 4:15 p.m. HE8 "Surface Morphology of Laser Annealed Ge, GaAs, and Si," **G. MAJNI** and **G. OTTAVIANI**, Istituto di Fisica dell'Universita Modena, Modena, Italy
- 4:30 p.m. HE9 "Optimum Laser Recrystallization," **R. TSU**, I. B. M. Thomas J. Watson Research Center, Yorktown Heights, NY
- 4:45 p.m. HE10 "Laser Annealing of Cadmium Selenide Thin Films," **R. M. FEENSTRA, R. R. PARSONS, F. R. SHEPHERD, W. D. WESTWOOD,** and **S. J. INGREY**, Bell Northern Research, Ottawa, Canada
- 5:00 p.m. HE11 "Laser Annealing of Radiation Damaged Alkali Halides," **J. C. KELLY** and **B. KING**, University New South Wales, Kensington, Australia
- 5:15 p.m. ADJOURN (Wine and Cheese Party 6:00-7:30 p.m.)

## SESSION F

Presiding

**MORRIS COHEN**  
M.I.T.

Thursday, November 30, 1978

- 8:30 a.m. \*HF1 "Rapid Melting and Solidification of Surface Layers," **R. MEHRABIAN**, University of Illinois, Urbana, IL
- 9:10 a.m. \*HF2 "Surface Characterization of Irradiated Materials by Auger Spectroscopy," **B. H. KEAR** and **E. M. BREINAN**, United Technologies Research Center, East Hartford, CT
- 9:50 a.m. HF3 "Topography of Laser Surface Melted Metals," **P. G. MOORE**, **L. S. WEINMAN**, and **C. KIM**, Naval Research Laboratory, Washington, D.C.
- 10:05 a.m. BREAK
- 10:20 a.m. \*HF4 "Laser Generated Stress Waves: Their Characteristics and Their Effects on Materials," **B. P. FAIRAND** and **A. H. CLAUER**, Battelle Columbus Laboratories, Columbus, OH
- 10:35 a.m. HF5 "Laser Coupling Efficiencies for Metals in the Solid and Liquid Phases," **J. T. SCHRIEMPF** and **J. A. MCKAY**, Naval Research Laboratory, Washington, D.C.
- 10:50 a.m. HF6 "Use of Sims to Characterize Implantation and Annealing Phenomenon," **C. A. EVANS, JR.**, University of Illinois, Urbana, IL
- 11:05 a.m. HF7 "Laser Annealing for Thin Film Reactions," **Z. L. LIAU**, **B. Y. TSAUR**, and **J. W. MAYER**, California Institute of Technology, Pasadena, CA
- 11:20 a.m. HF8 "Laser Annealed Gold on Sodium Chloride," **G. J. CLARK** and **C. S. NEWTON**, C.S.I.R.O., Mineral Research Laboratories, North Ryde, Australia
- 11:35 a.m. HF9 "Time Resolved Specular Reflectivity of Metals Subjected to 10.6  $\mu\text{m}$  Laser Pulses," **C. T. WALTERS** and **A. H. CLAUER**, Battelle Columbus, OH
- 11:50 a.m. LUNCH

## SESSION G

Presiding

**B. H. KEAR**  
United Technologies Research Center  
East Hartford, Connecticut

Thursday p.m.

- 1:30 p.m. \*HG1 "Laser Transformation Hardening," **D. S. GNANAMUTHU**, **C. B. SHAW, JR.**, and **W. E. LAWRENCE**, Rockwell International Science Center, Thousand Oaks, CA
- 2:10 p.m. \*HG2 "Laser Melt Quenching and Alloying," **S. M. COPLEY**, **M. BASS**, **E. W. VAN STRYLAND**, **D. BECK**, and **O. ESQUIVEL**, University of Southern California, Los Angeles, CA

2:50 p.m. HG3 "Redistribution of Cu in Polycrystalline and Single Crystal Al After Laser Irradiation," **G. DELLA MEA** and **P. MAZZOLDI**, Universita di Padova, Padova, Italy

3:05 p.m. COFFEE

3:15 p.m. \*HG4 "Desensitization of Stainless Steel Surfaces by Scanned Laser Radiation," **T. R. ANTHONY** and **H. E. CLINE**, General Electric Research and Development Center, Schenectady, NY

4:00 p.m. Session Adjourned to 7:30 p.m.

7:30 p.m. HG5 "Residual Stresses Around Laser Beam Cuts," **J. G. SIEKMAN**, Fonteinberg 3, The Netherlands

7:45 p.m. HG6 "Laser Assisted Machining," **M. Bass** and **S. M. COPLEY**, University of Southern California, Los Angeles, CA

8:00 p.m. HG7 "Laser Welding of Mechanically Alloyed Metals," **T. J. KELLY**, International Nickel Company, Suffern, NY

8:15 p.m. HG8 "Metallographic and Microprobe Studies of Laser Surface Cladded and Alloyed Low Carbon Steel," **L. S. WEINMAN**, **P. G. MOORE**, and **C. KIM**, Naval Research Laboratory, Washington, D.C.

8:30 p.m. HG9 "Synthesis of Silicon Nitride Powders by Laser Heating of  $\text{SiH}_4$  and  $\text{NH}_3$ ," **S. DANFORTH**, **J. FLINT**, **W. R. CANNON**, and **J. S. HAGGERTY**, MIT, Cambridge, MA

8:45 p.m. HG10 "Growth of Thin Films Using CVD and Laser Substrate Heating," **K. LAKIN** and **C. P. CHRISTENSEN**, University of Southern California, Los Angeles, CA

9:00 p.m. Panel Discussion

## SESSION H

Presiding

**J. M. POATE**  
Bell Laboratories  
Murray Hill, New Jersey

Thursday, November 30, 1978

8:30 p.m.-10:00 p.m. Panel Discussion: "Scientific and Technological Implications"

10:00 p.m. REFRESHMENTS

## SESSION J

Presiding

**J. W. CORBETT**  
State University of New York  
Albany, N.Y.

Friday, December 1, 1978

8:30 a.m. \*HJ1 "Annealing of Ion-Implanted Single and Polycrystalline Silicon with a Scanning CW Laser," **J. F. GIBBONS**, Stanford Electronics Laboratories, Stanford, CA

- 9:10 a.m. HJ2 "Deep Levels in Ion Implanted, CW Laser Annealed Silicon," **N. M. JOHNSON**, Xerox Corporation, Palo Alto, CA, **A. GAT** and **J. F. GIBBONS**, Stanford Electronics Laboratories, Stanford, CA
- 9:25 a.m. HJ3 "The Electrical Properties of Laser Annealed Silicon," **J. L. BENTON**, **L. C. KIMERLING**, **G. L. MILLER**, and **D. A. H. ROBINSON**, Bell Laboratories, Murray Hill, NJ
- 9:40 a.m. HJ4 "Characterization of Laser Irradiated Silicon Using X-ray Topography," **W. A. PORTER**, **D. L. PARKER**, and **W. M. RICHARDSON**, Texas A&M University, College Station, TX
- 9:55 a.m. HJ5 "Electrical Characterization of Low Dose Ion Implanted Silicon Annealed with Microsecond Laser Pulses," **D. R. MYERS**, **P. ROITMAN**, and **S. MAYO**, National Bureau of Standards, Washington, D.C.
- 10:10 a.m. HJ6 "TEM and Electrical Properties Measurements of Laser Doped Silicon and GaAs," **R. T. YOUNG** and **J. NARAYAN**, Oak Ridge National Laboratory, Oak Ridge, TN
- 10:25 a.m. BREAK
- 10:35 a.m. HJ7 "Electronic Properties of Laser Annealed Silicon," **K. L. WANG**, **Y. LIU**, **C. KIRKPATRICK**, and **C. Y. WEI**, General Electric Research and Development Center, Schenectady, NY
- 10:50 a.m. HJ8 "Charge Collection Microscopy of Laser Annealed Silicon," **H. J. LEAMY**, **S. D. FERRIS**, **G. L. MILLER**, and **W. L. BROWN**, Bell Laboratories, Murray Hill, NJ, and **G. K. CELLER**, Western Electric Engineering Research Center, Princeton, NJ
- 11:05 a.m. HJ9 "Prevention of Misfit Dislocations in Thermally Annealed, High-Dose, P-Implanted Si by Laser Annealing," **C. A. GOODWIN**, Bell Laboratories, Reading, PA
- 11:20 a.m. HJ10 "Boundary Effects in Laser Annealing Silicon Device Structures," **C. HILL**, Plessey Research (Caswell) Ltd., Allen Clark Research Centre, Caswell, Towchester, Northants, England
- 11:35 a.m. HJ11 "Aluminum-Silicon Laser Alloying with Implications for Mass Storage," **H. G. PARKS** and **C. G. KIRKPATRICK**, General Electric Research and Development Center, Schenectady, NY
- 11:50 a.m. HJ12 "Infrared and Raman Spectra of Boron Implanted Laser Annealed Silicon," **H. ENGSTROM**, **J. B. BATES**, **R. T. YOUNG**, **J. R. NOONAN**, and **C. W. WHITE**, Oak Ridge National Laboratory, Oak Ridge, TN
- 12:05 p.m. LUNCH

## SESSION K

Presiding

**F. H. EISEN**

Rockwell International Science Center  
Thousand Oaks, CA

Friday p.m.

- 1:30 p.m. HK1 "Laser Annealing of Ion Implanted GaAs," **B. J. SEALY**, **M. H. BADAWI**, **S. S. KULAR**, and **D. G. STEPHENS**, University of Surrey, Guildford, Surrey, England
- 1:45 p.m. HK2 "Laser Annealed Si and Se Implants for GaAs Microwave Devices," **C. L. ANDERSON**, **W. M. CLARK, JR.**, **H. L. DUNLAP**, **L. D. HESS**, and **K. V. VAIDYANATHAN**, Hughes Research Laboratories, Malibu, CA
- 2:00 p.m. HK3 "Highly Doped Implanted Donor Layers in Laser Annealed GaAs," **J. WOODCOCK**, Philips Research Laboratories, Redhill, Surrey, England
- 2:15 p.m. HK4 "Annealing of Ion-Implanted GaAs with a Nd-Glass Laser," **S. G. LIU** and **C. P. WU**, R.C.A. Research Laboratories, Princeton, NJ
- 2:30 p.m. HK5 "Laser Annealing of Ion Implanted GaAs," **Y. S. PARK**, Air Force Avionics Laboratory, Wright-Patterson AFB, OH
- 2:45 p.m. HK6 "Laser Recrystallization of Ion-Implanted GaAs By Frequency Doubled Nd:YAG Laser," **R. TSU**, **J. E. E. BAGLIN**, **J. C. TSANG**, and **G. J. LASHER**, I.B.M. Thomas J. Watson Research Center, Yorktown Heights, NY
- 3:00 p.m. HK7 "Laser Alloying of Au-Ge OHMIC Contacts on GaAs," **R. B. GOLD**, **R. A. POWELL**, and **J. F. GIBBONS**, Stanford Electronics Laboratories, Stanford, CA
- 3:15 p.m. HK8 "OHMIC Contacts Produced by Laser-Annealing of Te-Implanted GaAs," **P. A. BARNES**, **H. J. LEAMY**, **J. M. POATE**, **J. S. WILLIAMS**, and **S. D. FERRIS**, Bell Laboratories, Murray Hill, NJ
- 3:30 p.m. HK9 "Laser Annealed OHMIC Contacts for GaAs Microwave Devices," **C. L. ANDERSON**, **M. D. CLARK**, **W. M. CLARK, JR.**, **L. D. HESS**, and **C. F. KRUMM**, Hughes Research Laboratories, Malibu, CA
- 3:45 p.m. END OF SYMPOSIUM

**SYMPOSIUM J\***  
**SURFACES AND INTERFACES:**  
**ASPECTS RELATED TO**  
**MATERIALS JOINING**

**CHAIRMEN: R. F. SEKERKA**  
*Department of Metallurgy and  
Materials Science, Carnegie Mellon  
University, Schenley Park, Pittsburgh, PA*

**K. A. JACKSON**  
*Materials Physics Research Department  
Bell Telephone Laboratories, Inc.  
Murray Hill, NJ*

**SESSION A**  
**Surface Theory**

Presiding

**T. N. RHODIN**  
*Cornell University, Ithaca, NY*

**Wednesday, November 29, 1978**

9:00 a.m. JA1 "Studies of Equilibrium Configurations and Segregation at Surfaces by Computer Simulation," **G. H. GILMER**, Bell Telephone Laboratories, Murray Hill, NJ

9:45 a.m. JA2 "The Electronic Structure of Semiconductor Surfaces," **D. R. HAMANN**, Bell Telephone Laboratories, Murray Hill, NJ

10:30 a.m. BREAK

10:45 a.m. JA3 "Adsorption, Segregation and Their Effect on Surface Structure," **J. M. BLAKELY**, Department of Materials Science and Engineering, Cornell University, Ithaca, NY

11:30 a.m. JA4 "Surface Thermodynamic Problems in Joining Technology," **J. W. CAHN**, National Bureau of Standards, Washington, D.C. and Department of Materials Science and Engineering, MIT, Cambridge, MA

12:15 p.m. LUNCH

\*Invited papers only

**SESSION B**  
**Surface and**  
**Interface Studies**

Presiding

**J. W. CAHN**  
*National Bureau of Standards  
and  
Massachusetts Institute of Technology*

**Wednesday p.m.**

2:00 p.m. JB1 "Acoustic Microscopy for Study of Interfaces," **C. S. TSAI**, Department of Electrical Engineering, Carnegie-Mellon University, Pittsburgh, PA

2:45 p.m. JB2 "Surface Segregation in Alloys, Especially Au-Ni, Studied by Low-Energy Ion Scattering," **T. M. BUCK**, Bell Telephone Laboratories, Murray Hill, NJ

3:30 p.m. BREAK

3:45 p.m. JB3 "Structural Observations at the Si on Sapphire Interface," **M. S. ABRAHAMS**, R. C. A. Laboratories, Princeton, NJ

4:30 p.m. JB4 "Structure and Adsorption on Surfaces and Interfaces," **T. N. RHODIN**, Department of Applied and Engineering Physics, Cornell University, Ithaca, NY

5:15 p.m. ADJOURN (Wine and Cheese Party 6:00-7:30 p.m.)

**SESSION C**  
**Interface Structure**

Presiding

**K. TU**  
*I.B.M. Research Laboratories  
Yorktown Heights, NY*

**Thursday, November 30, 1978**

8:45 a.m. JC1 "Structure of Grain Boundaries," **R. W. BALLUFFI**, Department of Materials Science and Engineering, MIT, Cambridge, MA

9:30 a.m. JC2 "Coherency and Lattice Mismatch at Interfaces," **G. OLSEN**, R.C.A. Laboratories, Princeton, NJ

10:15 a.m. COFFEE

10:30 a.m. JC3 "Characterization of Grain Boundary Structure in Bicrystalline Thin Films," **C. L. BAUER**, Department of Metallurgy and Materials Science, Carnegie-Mellon University, Pittsburgh, PA

11:15 a.m. JC4 "Transport Properties in Thin Films," **J. A. RAYNE**, Department of Physics, Carnegie-Mellon University, Pittsburgh, PA

12:00 p.m. LUNCH

SESSION D  
**Electronic Devices**

Presiding

**R. W. BALLUFFI**  
Massachusetts Institute of Technology  
Cambridge, MA

**Thursday p.m.**

2:00 p.m. JD1 "*Ohmic and Schottky Contacts in Semiconductor Devices*," **A. K. SINHA**, Bell Telephone Laboratories, Murray Hill, NJ

2:45 p.m. JD2 "*Thin Electrodes and Tunneling Contacts: Devices Based on Current Transport Through Thin Interfacial Layers*," **J SHEWCHUN**, Department of Engineering Physics, McMaster University, Hamilton, Ontario, Canada

3:30 p.m. COFFEE

3:45 p.m. JD3 "*Interfacial Reactions in Multilayer Thin Film Technology*," **K. TU**, I.B.M. Research Laboratories, Yorktown Heights, NY

4:30 p.m. JD4 "*Diffusion Studies During the Interconnection of Electronic Devices*," **N. T. PANOUSIS**, Bell Telephone Laboratories, Allentown, PA

5:15 p.m. END OF SYMPOSIUM

NOTES

# NOTES

# Materials Research Society Annual Meeting, 1978

## PRE-REGISTRATION FORM

Name \_\_\_\_\_

Position \_\_\_\_\_

Affiliation \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

### SYMPOSIUM(A) INTEREST

Please indicate the Symposium(a) in which you are primarily interested. IMPORTANT FOR PLANNING.

- A    B    C    D    E  
 F    G    H    J

### FEES

Totals

#### Registration

- \$65 Member  
 75 Non Member  
 25 Student \$ \_\_\_\_\_

#### Membership

- \$15 1978  
 15 1979  
 25 both years  
 5 Student (Show evidence of University registration) \$ \_\_\_\_\_

#### Proceedings

- \$20 Symposium A  
 35 Symposium F \$ \_\_\_\_\_

#### Award Luncheon

- \$12 \$ \_\_\_\_\_

TOTAL \$ \_\_\_\_\_

### Payment

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