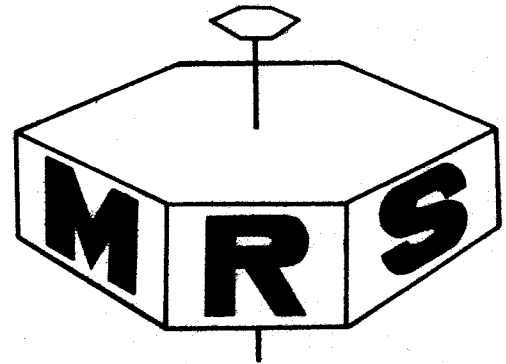


# MATERIALS RESEARCH SOCIETY

**ANNUAL MEETING**  
November 26-30, 1979  
Hyatt Regency Hotel  
Cambridge, Massachusetts

**CALL FOR PAPERS**



MATERIALS RESEARCH SOCIETY  
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## MATERIALS RESEARCH SOCIETY

### 1979 ANNUAL MEETING

November 26-30, 1979  
Hyatt Regency Hotel  
Cambridge, Massachusetts

For general information on the program, contact any of the program co-chairpersons:

B. C. Giessen	J. M. Poate	K. C. Taylor
Northeastern University	Bell Laboratories	General Motors Res. Labs.
Boston, MA 02115	Murray Hill, NJ 07974	Warren, MI 48090
617-437-2827	201-582-3462	313-575-3065

The Society's annual meeting is essentially a composite of a number of interdisciplinary topical symposia conducted concurrently. The focus of each symposium is on the effort of several disciplines to achieve a specific common goal in new materials development, new characterization methods, or new process technology. Two principles guide the organization of the symposia:

- (1) Each symposium is to provide an important forum for the exchange of ideas at the forefront of research by those active in the field. The "education" or instruction of non-specialists is not the primary purpose.
- (2) The topics are to be treated at a sophisticated level, from an interdisciplinary viewpoint, so that all possible physical, chemical, engineering insights may be presented and discussed.

For information on specific symposia, contact the respective chairpersons indicated for the symposium(a) of interest.

**DEADLINES:** Follow the directions specified for each symposium. In cases where no deadlines are stated, the following will apply: titles of papers — May 15; single page abstracts — June 15. This material is to be sent to the respective symposia chairpersons.

Symposia and Chairpersons		Days
A. Laser and Electron Beam Processing of Materials	C. W. White P. S. Peercy	3
B. Surface Modification of Materials by Ion Implantation	J. K. Hirvonen C. M. Preece	1
C. Advances in Defect Characterization in Semiconductor Materials and Devices	P. M. Petroff	2
D. Semiconductor Interfaces	K. N. Tu J. W. Mayer	2
E. Material Problems in Microstructure Fabrication	R. W. Keyes	2
F. Nondestructive Optical Techniques for Interface and Thin-Film Analysis	D. E. Aspnes	1
G. Adhesion to Polymer-Solid Interfaces	H. Schonhorn	2
H. Performance Predictions in Composites	D. Roylance K. L. DeVries	2
I. The Science of Nuclear Waste Management	C. J. Northrup	4
J. Coal: Materials Properties and Conversion	P. A. Montano G. W. Stewart P. Solomon	2
K. Coal Conversion Catalysis	T. P. Kobylinski M. A. Vannice	1
L. Catalyst Preparation Techniques and Maintenance of Catalyst Activity	D. J. C. Yates K. C. Taylor	1
M. Metallic Glasses and Rapidly Quenched Crystalline Metals	B. C. Giessen	3
N. Layered Synthetic Microstructures	T. R. Barbee	1
O. EXAFS in Materials Research: Past, Present and Future	B. K. Teo D. C. Joy	2

## SYMPOSIUM A

### LASER AND ELECTRON BEAM PROCESSING OF MATERIALS

The purpose of this symposium is to bring together scientists and engineers engaged in the use of directed energy sources such as lasers, electrons, and ions for materials processing. Materials of interest include semiconductors (elemental and compound), metals and alloys, insulators, thin films, etc.

Topics for contributed papers include:

Annealing ion implant damage  
Annealing and recrystallization mechanisms  
Rapid solidification and crystal growth  
Segregation and precipitation  
Metastable or supersaturated solid solutions  
Thin films and contacts  
Electrical properties and defects  
Device applications  
Materials characterization  
Metastable surface structure

Invited speakers will include W. L. Brown, Bell Labs. (Solid and Liquid Phase Epitaxy); F. H. Eisen, Rockwell International Science Center (Compound Semiconductors); J. W. Cahn, S. R. Coriell and W. J. Boettinger, NBS (Rapid Solidification); J. W. Mayer, Cal Tech (topic to be announced); R. F. Wood, ORNL (Macroscopic Theory of Pulsed Annealing); M. von Allmen, Cal Tech (Coupling of Energy to Solids); J. M. Poate, Bell Labs., (Metastable Alloys); J. F. Gibbons, Stanford (Device Applications); and A. Bement, DARPA (Future Directions for Directed Energy Sources in Materials Processing).

Titles for contributed papers should be sent by *May 11, 1979* to:

C. W. White	or	P. S. Peercy
Solid State Division		Division 5112
Oak Ridge National		Sandia Laboratories
Laboratory		Albuquerque, New Mexico 87185
Oak Ridge, Tennessee 37830		505-264-7681
615-574-6295		

## SYMPOSIUM B

### SURFACE MODIFICATION OF MATERIALS BY ION IMPLANTATION

This symposium will bring together physicists, metallurgists and engineers working in the field of ion implanted metals and alloys to present their recent results on the structure and properties of these materials. The emphasis of the meeting will be on the understanding of the structure and stability of the surface alloys produced by ion implantation and the mechanisms by which these layers affect the surface-sensitive properties of the material. The latter include fatigue-, wear- and corrosion-resistance, superconductivity, optical and other nonelectronic properties. The practical implications and limitations of the observed improvements in surface-sensitive properties will also be considered.

Topics covered by the symposium and a partial list of speakers include:

Applications of ion implanted materials	G. Dearnaley Harwell, U.K.
High dose implantation phenomena	J. W. Mayer Caltech
Ion implantation metallurgy	S. M. Myers Sandia Laboratories
Ion implantation for corrosion resistance	R. P. M. Procter and V. Ashworth U.M.I.S.T., U.K.
The relationship between composition, structure and properties of ion implanted materials	R. Kant, N.R.L. C. Clayton, SUNY at Stony Brook C. M. Preece Bell Laboratories

Others interested in participating in this symposium are invited to contact either

Dr. J. K. Hirvonen	or	Dr. C. M. Preece
Naval Research Laboratory		Bell Laboratories
Washington, D.C. 20375		Murray Hill, N.J. 07974
202-767-4786		201-582-4176

## SYMPOSIUM C

### ADVANCES IN DEFECT CHARACTERIZATION IN SEMICONDUCTOR MATERIALS AND DEVICES

The aim of this two day symposium is to present new advances in defect characterization techniques in semiconductors. However, the symposium will stress the application of these techniques towards understanding the role and properties of defects in semiconductors.

Among the subjects chosen to discuss the utilization of these techniques are: grain boundaries properties in photovoltaic materials, laser annealing induced defects, oxygen in silicon, dislocations and point defects role in devices degradation, gettering, impurities in higher purity materials, amorphous silicon.

Among the characterization techniques to be presented are:

- Acoustic spectroscopy and related techniques (V. Narayanamurti — BTL)
- Deep level transient spectroscopy and EPR (G. Watkins — Lehigh University)
- Scanning and very high resolution transmission electromicroscopy (H. Föll — IBM)
- Electron loss spectroscopy
- Rutherford backscattering (T. Seidel — BTL)
- Ion channeling and scattering

Note: The half day on the laser annealing induced defects is organized commonly with the laser annealing symposium.

Chairperson: P. M. Petroff  
Bell Laboratories  
Murray Hill, N.J. 07974  
201-582-6455

## SYMPOSIUM D

### SEMICONDUCTOR INTERFACES

#### Session A Interface Structure

1. High Resolution Electron Microscopic Study of Semiconductor Interfaces (O. Krivanek, Berkeley)
2. Backscattering — Channeling Studies of Si Interfaces (L. C. Feldman, Bell)
3. Grain Boundary Structure Studied by X-ray Diffraction (S. Sass, Cornell)
4. Structural Modeling of  $\alpha$ -Si/Si interfaces (F. Spaepen, Harvard)

#### Session B Interface Properties

1. Electronic Structure of Stacking Fault and Twin Boundary in Si (S. Louie, Penn.)
2. Chemical Bonds and Reactions at the Metal-Silicon Interfaces (G. Rubloff, IBM)
3. Contact Properties of Semiconductor Conductor-Interfaces (J. O. McCaldin, Caltech)
4. Metal Contacts to Semiconductors and the Influence of Absorbed Layers (R. Williams, Ulster and Xerox)

#### Section C Interface Reactions

1. Growth of Viscoelastic  $\text{SiO}_2$  on Si (W. Tiller, Stanford)
2. Regrowth of  $\alpha$ -Si on Si by Thermal and Laser Annealing (E. Rimini, Catana)
3. Microstructure and Schottky Barrier Height of Silicide Parallel Diodes (I. Ohdomari, Waseda)
4. Tracer Marker Studies on Silicide Formation and Oxidation (R. Pretorius, Southern Universities Nuclear Institute)

#### Section D Interface Analysis

1. Microanalysis by Scanning Transmission Electron Microscopy (P. Batson, IBM)
2. Effect of Sputtering on Interface Analysis (J. W. Mayer, Caltech)
3. Interface Analysis by Auger Electron Spectroscopy (P. Ho, IBM)
4. Interface Analysis by Secondary Ion Mass Spectroscopy (P. Williams, Illinois)

For further information, or for sending contributed paper titles (by May 15): contact Co-chairmen

K.N. Tu  
IBM Research Center  
Yorktown Heights, NY 10598  
914/945-1602

or J. W. Mayer  
Department of Electrical  
Engineering  
Caltech  
Pasadena, CA 91109  
213/795-6811

## SYMPOSIUM E

### MATERIAL PROBLEMS IN MICROSTRUCTURE FABRICATION

Microstructures, structures imposed on surfaces of thin films that have transverse dimensions ranging down to a micron and less, are the basic hardware of the vast information processing and computing industries. All of solid state electronics is based on the fabrication and interconnection of a large number of device microstructures on a single piece of silicon. Bubble memories and various image sensors and displays are also integrated microstructures. At a lower level of integration, the steadily increasing density of magnetic recording has forced the miniaturization of recording and reading heads, and miniaturization has made electronic catheters and implantable devices available to medicine. Finally, microstructures have invaded superconductivity, where small weak links and Josephson devices hold promise for several applications.

This symposium will focus on the need of continued miniaturization for a set of new technologies, including new lithographic materials (resists); techniques for registration of multi-layer structures too small to be seen sharply in an optical microscope; attainment of increased height-to-width ratios in metal lines to reduce electrical current densities; materials and techniques for making circuit masks to be used with radiation to which most materials are opaque; and metals for small, shallow, low-resistance electrical contacts.

*Chairperson*  
R. W. Keyes  
IBM Research Center,  
Yorktown Heights  
New York 10598  
914-945-2040

## SYMPOSIUM F

### NONDESTRUCTIVE OPTICAL TECHNIQUES FOR INTERFACE AND THIN-FILM ANALYSIS

The Symposium will consist of invited and contributed papers on the use of nondestructive optical techniques to characterize interfaces and thin films. The objective is to provide a forum for leading contributors to the field of nondestructive optical analysis for state-of-the-art discussions within the broader context of a materials science meeting. In-situ studies involving "hostile" environments, i.e. solid-solid, solid-liquid, solid-vapor, etc., interfaces that are inaccessible to electron spectroscopies, will be emphasized.

Invited speakers include:

- B. Cahan, Case Western Reserve: Combined spectroscopic ellipsometric/reflectance studies of solid-liquid interfaces;
- J. D. E. McIntyre, Bell Laboratories: Specular reflection spectroscopy;
- E. Palik, Naval Research Laboratory: Reflection/luminescence investigation of solid-solid interfaces and thin films;
- G. Schwartz, Bell Laboratories: Semiconductor-oxide interface analysis with Raman scattering;
- E. Taft, General Electric: Use of ellipsometry to investigate locked-in layers and thin films.

Topics of interest for contributed papers include:

- Infrared spectroscopy (reflectance, internal reflectance)
- Raman scattering
- Visible-UV reflectance, ellipsometry, and polarimetry
- Luminescence
- Roughness characterization
- Semiconductor-oxide interfaces
- Solid-liquid interfaces
- Solid-plasma interfaces
- Real-time investigation of catalytic reactions, CVD or plasma film growth

Titles of contributed papers are due by May 15; the deadline for abstracts is June 15.

Requests for information should be sent to:

D. E. Aspnes  
Bell Laboratories  
Murray Hill, N. J. 07974  
201-582-2831

## SYMPOSIUM G

### ADHESION TO POLYMER-SOLID INTERFACES

Surface and interfaces play a principle role in many areas of current technology. In this symposium we hope to focus attention on the surface properties of metals, metal oxides and polymers with particular emphasis on adhesion, adhesive joint strength, surface treatments and mechanics. Of considerable interest is the use of modern analytical tools such as Auger spectroscopy, ESCA, etc., to elucidate the nature of the interface and the detailed chemistry and physics that occurs in the interfacial region. Although we shall be concerned mainly with the interface, we also consider bulk phenomena as related to the formation of the interface and the role of morphology in governing composite performances.

*Chairman*

Harold Schonhorn  
Bell Laboratories  
Murray Hill, New Jersey 07974  
201-582-6088

## SYMPOSIUM H

### PERFORMANCE PREDICTIONS IN COMPOSITES

Papers are invited for the purpose of discussing research dealing with structure-property relations for fiber reinforced polymer-matrix composite materials. Topics will include the effect on engineering performance of such structural and environmental variables as resin chemistry and cure cycle, void and fiber distribution, lamination sequence, microscopic and macroscopic stress distributions, and exposure to humidity and/or ultra-violet radiation. List of invited speakers will be released at a later date.

*Chairmen*

D. K. Roylance  
Department of Material Science and Engineering  
MIT, Room 6-202  
Cambridge, Massachusetts 02139  
617-253-2000

K. L. De Vries

Department of Mechanical and Industrial Engineering  
University of Utah  
Salt Lake City, Utah 84112  
801-581-6441

## SYMPOSIUM I

### THE SCIENCE OF NUCLEAR WASTE MANAGEMENT

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

Those wishing to submit papers should contact the program chairman. All papers will be reviewed for their scientific merit and relevance to radioactive waste management. Authors will be requested to provide an original and one copy of a "review summary" which, if accepted, will be used for publication. Review summaries must be received by the Program Chairman on or before May 1, 1979. They can be up to two pages in length, on 8½" x 11" heavy, white bond paper, and typed within a block 6½" x 9⅞", preferably using IBM Selectric Gothic Elite type with a carbon ribbon, single spaced. Summaries may include figures, tables and/or references. Type title in CAPS flush with left margin. Continue on same line with author(s), affiliations(s) and underline author to whom all communications

should be addressed. Drop down two spaces and start summary. Please indicate outside the block which of the six subject areas would be appropriate for your paper, and approximate length of time preferred (maximum 25 min.), or if the poster session is preferable. Authors will be notified of acceptance or rejection of papers by July 9, 1979.

C. J. Northrup, Program Chairman  
Chemical Technology Division — 5812  
Sandia Laboratories  
P. O. Box 5800  
Albuquerque, New Mexico 87185 USA  
505-264-5650

## SYMPOSIUM J

### COAL: MATERIAL PROPERTIES AND CONVERSION

The symposium is an interdisciplinary gathering of scientists with diverse backgrounds but common interest in coal and coal conversion. The role of trace elements, mineral matter and the organic structure of coal in different utilization processes will be discussed. In particular, the symposium will emphasize high temperature processes occurring in coal conversion streams. Specific emphasis will be placed on the identification of the reactive intermediates resulting from direct pyrolysis and/or vaporization.

#### Program:

Harold Gluskoter (no title available)  
(EXXON Research and Eng. Co.).

R. Finkelman (United States Geological Survey)  
"Trace Elements in Coal: Can We Get the Lead Out?"

Raymond T. Greer (Iowa State University)  
"Microstructural Chemical Characterization of Coal by Combined Scanning Electron Microscope and Wavelength and Energy Dispersive X-ray Analyses."

Barbara L. Loranoff (Sandia)  
"Mineral Effects in Coal Liquefaction."

Peter Givens (Penn State University)  
(not confirmed)

F. Brown (Pittsburgh Energy Technology Center, Department of Energy)  
(not confirmed)

Allan Davis (Penn State University)  
"Rank versus Physical and Chemical Properties."

John Larson (University of Tennessee)  
"Plastic Properties and Organic Structure"

Peter Solomon (United Technologies)  
"Functional Group Analysis From Infrared Measurements."

B. Gerstein (Iowa State)  
"Functional Group Analyses From NMR Measurements."

J. Howard (MIT)  
"Thermal Decomposition of Coal."

D. Whitehurst (Mobil) "Liquefaction of Coal."  
(Tentative)

D. Blair (EXXON Govt. Research Lab)  
"Pyrolysis Stage of Coal Particles Combustion."

J. Hastie (National Bureau of Standards)

A. Sarafin (MIT)

J. Gole (Georgia Tech.) "The Characterization of High Temperature Compounds of Importance to Energy Technologies."

C. Kolb (Aerodyne Research Inc.)

"Thermochemical and Kinetic Data Requirements for Computer Modeling of Coal Conversion Streams."

#### Organizing Committee:

Pedro A. Montano, Dept. of Physics (304-293-3422)  
West Virginia University, Morgantown, WV 26506

Gerald W. Stewart (304-599-7505)  
Morgantown Energy Technology Center  
Department of Energy  
Morgantown, WV 26505

Peter Solomon (203-727-7577)  
United Technologies  
Hartford, Conn.

## SYMPOSIUM K

### COAL CONVERSION CATALYSIS

This symposium will focus in general on the new developments in catalysis related to the conversion of coal to liquid and gaseous fuels. Subjects covered will include the direct conversion of coal as well as the catalysis in the synthesis gas and low B.T.U. gas conversion.

#### CHAIRMEN

Thaddeus P. Kobylinski Research Director Gulf Research and Development Company P.O. Drawer 2038 Pittsburgh, Pennsylvania 15230	Professor M. A. Vannice Dept. of Chemical Engineering Pennsylvania State University 113 Fenske Laboratory University Park, Pennsylvania 16802
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## SYMPOSIUM L

### CATALYST PREPARATION TECHNIQUES AND MAINTENANCE OF CATALYST ACTIVITY

This symposium will focus on catalyst material research with emphasis on catalyst preparation, modification, and maintenance. The symposium will be composed of both invited and submitted papers, which describe original research.

The symposium organizers welcome papers on such topics as: theory and practice of catalyst preparation, novel catalyst preparation techniques, chemical processes involved in catalyst preparations, promotion and stabilization of catalyst activity, regeneration and maintenance of catalyst activity.

#### Co-Chairmen:

D. J. C. Yates, 201-474-0100  
Exxon Research and  
Engineering  
P. O. Box 45  
Linden, New Jersey 07036

K. C. Taylor, 313-575-3085  
General Motors Research  
Laboratories  
Physical Chemistry Department  
Warren, Michigan 48090

## SYMPOSIUM M

### METALLIC GLASSES AND RAPIDLY QUENCHED CRYSTALLINE METALS

Metastable materials are of particular interest both as topics for basic research — metallic glasses represent a major current frontier in materials science — and for their potential for technological applications. The present conference falls halfway between the third and fourth triannual International Conferences on Rapidly Quenched Metals; advances made in the preceding eighteen months in this rapidly developing field will be presented.

Five sessions will explore the following aspects of metallic glasses: formation and electronic properties; thermal stability and mechanical properties; magnetic properties; corrosion and electrochemical properties; and technology. A sixth session will cover properties of rapidly quenched crystalline metals and alloys.

A partial list of invited speakers and their topics includes:

D. Turnbull	Harvard University	Formation of Metallic Glasses
S. Nagel	University of Chicago	Electronic Structure and Transport Properties of Metallic Glasses
B.C. Giessen	Northeastern University	Glass Transition, Relaxation and Crystallization Temperatures of Metallic Glasses
F. Spaepen	Harvard University	Elastic and Inelastic Properties of Metallic Glasses
L. Johnson	G.E. Research Laboratories	Magnetic Applications of Metallic Glasses
R. Latanision	Massachusetts Institute of Technology	Corrosion Research on Metallic Glasses
R. B. Diegle	Battelle Memorial Institute	Localized Corrosion on Glassy Metal Surfaces
R. Maringer	Battelle Memorial Institute	Technologically Useful Rapid Quenching Methods
C. Chiriac	Lawrence Livermore Laboratories	Applications for Glassy Metal Alloys

Others interested in participating in this symposium are invited to contact:

Prof. B.C. Giessen  
Materials Science Division, Institute of Chemical Analysis, Applications and Forensic Science  
Northeastern University, Boston, Massachusetts 02115  
617-437-2827

## SYMPOSIUM N

### LAYERED SYNTHETIC MICROSTRUCTURES [LSM]

Techniques allowing sequential deposition of layers having thicknesses varying from the monolayer level to many hundreds of lattice spacings have been developed. These allow synthesis of layered synthetic microstructures [LSM] exhibiting unique structures and properties. These processes are analogous to Molecular Beam Epitaxy. A much wider range of elements and alloys can be deposited with these technologies than by MBE greatly extending the breadth of materials that can be explored by LSM. The scope of this symposium covers:

- 1) Synthesis techniques including physical vapor deposition using both thermal and sputter deposition sources;
- 2) The LSM structure-synthesis processes relationship;
- 3) The LSM structure property relationship.

Particular emphasis will be placed on synthesis techniques and techniques for structure characterization. In addition, relationships to naturally occurring structures such as observed in spinodally decomposed alloys will be considered. Particular emphasis will be placed on the implications of this correlation with respect to the stability of LSM.

Chairman  
Troy R. Barbee  
Rm 119 McCullough Bldg.  
Materials Research Center  
Stanford University, Stanford, CA 94305

## SYMPOSIUM O

### EXAFS IN MATERIALS RESEARCH: PAST, PRESENT, AND FUTURE

This symposium will focus on the historical, present, and future developments of Extended X-ray Absorption Fine Structure (EXAFS) spectroscopy. There will be a critical review on the current status of the theory and the instrumentation of EXAFS, followed by overviews and discussions on the capability of synchrotron radiation sources at SSRL, Cornell, BNL, Wisconsin, and NBS and a comparison of these with electron beam instruments as means of generating EXAFS information. The applications of EXAFS in catalysis and materials research include structural investigations of supported and homogeneous catalysts, impurities and dilute systems, metallic glasses, amorphous semiconductors, superionic conductors, halogenated polysulfonitriles and polyacetylenes, liquids and solutions at ordinary as well as high temperatures.

Invited Speakers For Each Session

(1) EXAFS:

- E. Stern (Washington)
  - F. Lu (Bell Labs)
  - G. Brown (SSRL)
- EELS:
- B. Kincaid (Bell Labs)
  - R. Leapman (Cornell)
  - D. Johnson (Washington)

(II) Radiation Sources for Materials Research

- A. Bienenstock (SSRL)
- B. Batterman (Cornell)
- C. Frazer (BNL)
- E. Rowe (Wisconsin)
- B. Madden (NBS)
- M. Isaacson (Chicago)

(III) Catalysis

- F. Lytle (Boeing)
- J. Sinfelt (Exxon)
- J. Katzer (Delaware)
- B. Stults (Monsanto)

(IV) Materials:

- P. Eisenberger (Bell Labs)
- J. Hastings (BNL)
- J. Wong (GE)
- T. Hayes (Xerox)

(V) Materials:

- D. Sayers (N. Carolina)
- S. Hunter (IBM)
- D. Crozier (Simon Fraser)
- D. Sandstrom (Washington S.)

Chairmen: Boon K. Teo (201-582-6593) and David C. Joy (201-582-7216) Bell Laboratories, Murray Hill, N.J. 07974.

toot

**MATERIALS RESEARCH SOCIETY**

INFORMATION REQUEST FORM

Name \_\_\_\_\_ Position \_\_\_\_\_  
Organization \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please place my name on your mailing list to receive additional information about the annual meeting and the Materials Research Society.

Return to: M.R.S. Secretariat  
102C Materials Research Laboratory  
University Park, PA 16802