MATERIALS RESEARCH SOCIETY

ANNUAL MEETING
Nov. 29-Dec. 1, 1978
Boston, Mass.

2nd Call for Papers

MATERIALS RESEARCH SOCIETY 1978 ANNUAL MEETING

Name

Organization Telephone No.

Street Address

City State Zip

I am interested in receiving more information - final program, registration instructions, etc. Note: Please do not check this item if you previously notified the MRS Secretariat of your interest; your name is already on the mailing list.

I intend to present a paper in Symposium (Circle)

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tentatively titled

MAIL TO: MRS Secretariat
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University Park, PA 16802

Second Announcement and Call for Papers

MATERIALS RESEARCH SOCIETY
1978 ANNUAL MEETING

November 29 - December 1, 1978

Boston-Sheraton Hotel, Boston, Massachusetts

General Information: R. J. H. Voorhoeve, Program Chairman, Bell Laboratories, Murray Hill, N.J. 07974 Phone (201) 582-3047

Submissions: To Symposium Chairpeople

Deadlines are: Title - June 30, 1978
Abstract - September 15, 1978

ROLE OF THE MATERIALS RESEARCH SOCIETY IN FACILITATING INTERDISCIPLINARY, GOAL-ORIENTED RESEARCH IN MATERIALS

The role of man's control over materials in the development of civilization is evident throughout the sweep of history. Today, the uses of materials are diverse, complex and sophisticated. There are groups of experts for various classes and even subclasses of materials. Their expertise must be called upon for the construction of any advanced or complex system, since the materials properties usually limit the performance of the system. The problems addressed by materials researchers are of ever-expanding complexity and diversity. They are often the focus of multidisciplinary efforts in industrial laboratories and in some universities.

A researcher in the materials field regularly attends meetings within his own discipline, be this physics, chemistry, metallurgy, or any of their subdivisions. The meetings are hence those of the Physical Society, or the Chemical Society, or the Metallurgical Society, or the Ceramic Society, or the Electrochemical Society, etc. In addition, an increasing number of topical symposia are organized, some on a continuing basis, some ad hoc. While each of these meetings has value, and interactions of materials researchers with colleagues in their own discipline are to be encouraged, the situation has limited truly interdisciplinary interactions in many areas. It has not been conducive to the development of a professional identify in materials research.

From its formation, the goal of The Materials Research Society has been to remedy this situation. It organizes meetings at which several interdisciplinary topical symposia are held concurrently. In principle, this permits scientists to participate

working in the same field as his own, for more intense discussions, while it also becomes possible to attend at least some talks at topical symposia in areas of overlapping interest. More importantly, the focus of each symposium is on the efforts of several disciplines to achieve a specific common goal in new materials, new characterization methods or new process technology. Such meetings should promote and stimulate multidisciplinary materials research. Attendance of graduate students is strongly encouraged, with a special registration rate. (Faculty should contact local committee for special arrangements.)

The symposia are organized with two guiding principles:

(1) Each symposium is to provide an important forum for the exchange of ideas at the forefront of research by those actively involved 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.

This format resulted in successful conferences in 1976 and 1977. It is providing a long overdue interdisciplinary forum in the materials area focussed on goal-oriented research.

SYMPOSIUM A

SCIENCE UNDERLYING RADIOACTIVE WASTE MANAGEMENT

Chairman: Gregory J. McCarthy, (814) 865-1542, Materials Research Laboratory, The Pennsylvania State University University Park, Pa. 16802

The purpose of this symposium is to bring together the entire range of sciences bearing on the processing, solidification, storage, and isolation of radioactive wastes. Up to the present a comprehensive treatment of the scientific foundation underlying the technologies proposed for waste handling has been neglected. Either isolated areas of the topic have been considered in small symposia of monodisciplinary societies, or the scientific aspects of the topic have been relegated to short times in international gatherings, chiefly concerned with systems management. The Materials Research Society is therefore gathering an interdisciplinary group of scientists to present scientific research relevant to the many aspects of radioactive waste management. Symposium topics will include

- Composition and structure of various solids incorporating waste nuclides.
- Properties of solid waste forms.

J. A. Stone [Savannah River Laboratory] "Studies of Concrete as a Host for Savannah River Plant Radioactive Waste"

J. A. Stottlemyer [Battelle Northwest] "Geologic Simulation of a Nuclear Waste Repository"

M. S. Tierney [Sandia Laboratories(Alburquerque)] and H. R. Shaw [US Geological Survey] "Analysis of the Geological Stability of a Radioactive Waste Disposal Site"

SYMPOSIUM B

MATERIALS CHARACTERIZATION IN ARCHAEOLOGY, HISTORIC PRESERVATION AND THE FINE ARTS

Chairman: Wendell S. Williams,(202) 632-7406,Head Metallurgy and Materials Section,Division of Materials Research National Science Foundation,1800 G Street, NW Washington D.C. 20550

The purpose of this symposium is to illustrate to a wide range of materials scientists the variety, complexity and challenge of technical problems associated with materials characterization in the scholarly fields of archaeology and art history and the practical field of historic preservation. New techniques for microchemical surface analysis becoming prominent in the fields of metallurgy, ceramics, and surface chemistry might be of considerable value in such problems, and advanced methods of physical analysis are already being applied.

Conversely, through engagement in fields beyond the usual domains of materials-oriented scientists, new methods or insights might be generated which would benefit the materials community.

The speakers at the symposium will be asked to address, in various proportions the following four questions: (1) What are the types of scholarly problems (dating, authentication, etc.) that require materials characterization in the fields of: a) archaeology, b) art history, c) historic preservation? (2) What are the means for characterization presently used in these fields by university departments and museum laboratories? (3) Would the application of new techniques for surface micro-chemical analysis, depth profiling, defect identification, micro-structural visualization, etc., significantly advance the state of knowledge in these fields? (4) Would such investigations significantly advance the state of materials research through refinements in techniques, interpretation of early practices in processing or treating materials, identification of early materials with significantly different properties, evaluation of long-term corrosion rates or assessment of changing environmental chemistry on structural materials?

Prelinary Program

Session I: Materials Characterization in Archeology

A. D. Franklin, National Bureau of Standards: Session Chairman

W. Lanford, Yale University: NMR of hydrated glass

H. Gove, Rochester University: C^{14} dating with accelerators

Session II: Materials Characterization in Archeology (Continued)

R. Organ, Smithsonian Institution: materials problems in archeology

R. Maddin, University of Pennsylvania: ancient metallurgy

P. Leavy, Brookhaven National Laboratory: Thermoluminesence dating of ceramics

C. Maurer and W. S. Williams: ESR dating of ceramics

Session III: Materials Characterization in the Fine Arts

Peter Meyers, Metropolitan Museum of Art, N. Y.

CATALYTIC MATERIALS

Three consecutive symposia are planned on the subject of catalytic materials:

SYMPOSIUM C

CHARACTERIZATION OF SMALL METAL CLUSTERS INTERACTING WITH SIMPLE MOLECULES

Chairman: Pedro A. Montano, (304) 293-3422, Department of Physics - West Virginia University - Morgantown, West Virginia 26506

This symposium will focus on the preparation and subsequent study of small metal particles by matrix isolation techniques; on the characterization of the particles by optical spectroscopy, ESR, Mossbauer spectroscopy and EXAFS; on the interaction of the metal particles with simple molecules (i.e. CO, N_2, O_2, etc.); and on the theoretical modeling of these particles and their interactions by advanced molecular orbital techniques.

Invited Speakers:

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G. A. Ozin, (University of Toronto) "Selective Photo-aggregation of Metal Atoms to small Metallic and Bimetallic Clusters of known Size"

P. H. Barrett, (University of California Santa Barbara) "Interactions of Iron Monomers and Dimers with Simples Molecules in a Low Temperature Matrix"

William A. Goddard (California Institute of Technology) "Free Radicals Studies of the Binding of Molecules to Metal Clusters".

Paul Kasai (Union Carbide Corporation) "Generation and ESR Studies of Intermetallic Molecules", Tarrytown, N. Y.

W. Schulze (Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin) "UV-VIS, Raman and IR-spectra of Silver Molecules $Ag_n (n<10)$"

T. Welker (Max-Planck-Institut für Festkorper-Forschung, Stuttgart) "Optical Absorption of Metal Crystals Containing from One to One Million Atoms"

Pedro A. Montano (West Virginia University) "Matrix Isolation Studies of Bimetallic Molecules and their Interactions with Simple Molecules"

SYMPOSIUM D

INVESTIGATION OF THE STRUCTURE OF CATALYSTS AND CHEMISORBED SPECIES BY THE EXAFS TECHNIQUE

Chairman: Farrell W. Lytle,(206) 655-5574,The Boeing Company P. O. Box 3707 Seattle, Washington 98124

The rapid development of the Extended X-ray Absorption Fine Structure (EXAFS) technique as a means of determining the atomic arrangement in materials has struck a responsive chord among those interested in catalyst structure. Finally, here is an element specific atomic probe ideally suited to the investigation of many of the structural questions of catalysts: atomic environment at the catalytic site i.e., bond distance and coordination number, size and shape of metallic clusters, catalyst-support interaction, and catalyst-reactant interaction to name a few. These topics lie at the very heart of catalyst understanding necessary for modeling reactions or designing improved catalysts. The ease of in situ studies on real catalysts is also an advantage compared with some other structural techniques.

This symposium will assemble nearly complete representation of those catalyst scientists and physicists now working on related surface physics problems who are using the EXAFS techniques.

Included subjects sample a broad spectrum of catalyst-related problems as well as differing schools of thought on EXAFS analysis. This symposium will provide a perfect forum for presenting and challenging new ideas. This critical mass should provoke an interesting and instructive exchange of information for all who attend.

Invited Speakers:

D. Blakely (Chevron) "Hydroprocessing Catalysts"

M. Boudart (Stanford) "Pt clusters on zeolite"

P. Citrin (Bell Labs) "Surface EXAFS"

R. Friedman (Monsanto) "Cu on Alumina Catalysts"

R. Greegor (Boeing) "Size and Shape of Metal Clusters"

J. Katzer (U. Delaware) "Supported Pt Catalysts"

M. Klein (U. California, Berkeley), "Biological Catalysts: Enzymes"

J. Sinfelt (Exxon) "Heterogeneous Catalysts"

E. Stern (U. Washington) "Br_2 on Graphoil"

J. Stöhr (Stanford Synchrotron Radiation Lab.) "EXAFS of Carbon and Oxygen on Surfaces"

SYMPOSIUM E
PATHWAYS TO NEW CATALYTIC MATERIALS

Chairman: William R. Moser, (617) 899-8400 ext. 2475, The Badger Company, Cambridge, Massachusetts 02142

This symposium will emphasize novel catalytic materials. The practice and theory of the preparation of new catalytic materials will be treated along with their characterization and catalytic reactivity. Topics selected for discussion will include some of the new types of zeolite catalysts, semiconductor powders as photocatalysts, cation substitution in inorganic oxides, catalyst-support interactions, and new preparative techniques. The catalytic reactions derived from these materials include desulfurization, carbon monoxide-hydrogen catalysis, methanol conversion, aromatics alkylation, energy conversion and electrosyntheses, and poly-propylene catalysis.

Invited Speakers:

Werner Haag (Mobil Research and Development Corporation) "Shape Selective Phenomenon in Zeolite Catalysis"

Transition Metal Compounds in Zeolites"

David G. Whitten (University of North Carolina, Chapel Hill) "Catalytic Properties of Porphyrins and Other Transition Metal Complexes on Glass Supports"

S. J. Tauster, S. C. Fund, R. L. Garten, and R. T. Baker (Exxon Research and Engineering Co., Linden, N.J.) "Strong Metal Support Interaction Catalysts"

Kamil Klier (Lehigh University, Bethlehem, Pennsylvania) "Methanol Synthesis - Promotion Effects in the Ternary Oxide Low Pressure Catalyst"

R. R. Chianelli and M. B. Dines (Exxon Research and Engineering Co., Linden, N.J.) "Low Temperature Precipitation of Layered Transition Metal Sulfides"

James Chien (University of Massachusetts, Amherst, Maryland) (Topic will be on the new high surface area polypropylene catalysts)

Allen J. Bard (University of Texas, Austin, Texas) "Heterogeneous Photocatalysis Over Semiconductor Powders"

SYMPOSIUM F

THIRD CONFERENCE ON IN SITU COMPOSITES – CISC-III

Chairmen: Professor Ben Oliver, (615) 974-5360, Department of Chemical and Metallurgical Engineering, University of Tennessee Knoxville, Tennessee 37916 and Herve Bibring, ONERA, 29 Avenue de la Division LeClerc, 923230 Chatillion Sous Bagneux, France

The intended scope of the composites sessions includes the still to be understood factors that control; structure synthesis, structure property relations, property environment interactions, directional solidification and its role in transformations, non-structural applications and general gradient effects upon transformations, encompassing metallic and non-metallic systems. Application of specific systems are also of interest.

The scope of the sessions should emphasize the understanding and development of composite materials systems.

Invited Speakers:

Mats Hillert (Royal Institute of Technology, Stockholm) "Fundamental Aspects of Aligned Growth"

Robert Brunetaud (SNECMA, Evry, France) "Particular Aspects of Eutectic Composites Application in Jet Engine Blades and Vanes"

SYMPOSIUM G

SYMPOSIUM ON EPITAXIAL CRYSTALLIZATION OF POLYMERS AND ORIENTED POLYMERIZATION

Chairmen: Eric Baer and J. D. Lando, (216) 368-2000, Case Western Reserve University, Department of Macromolecular Science, Cleveland, Ohio 44106

We intend that this symposium cover both the theoretical and experimental aspects of the field of oriented crystallization of polymers and oriented polymerization. There will be a strong emphasis on how the unique structures and morphologies produced by these methods can be utilized in applications.

For example in Session 1 on oriented polymerization possible users in membranes for separation processes, electrical conductivity, and the production of pyroelectric and piezoelectric materials will be covered.

In Session 2 on epitaxial crystallization of polymers the possible use of this technique to separate the high molecular weight tail in a polymer sample, in the "in situ" formation of composites, and in the control of structure and morphology will be discussed.

We think that this symposium will generate considerable interest from people with a broad range of technical interests.

Tentative Schedule

Session 1 Oriented Polymerization

Chairman: E. Baer

Invited Speakers:

Jerome B. Lando (Case Western Reserve University) "Overview Discussion of Oriented Polymerization"

Ray H. Baughman (Allied Chemical Company) "Topochemical Sythesis of Conductive Polymers"

Bruce M. Foxman (Brandeis University) "Solid State Polymerization of Organo-Metallic Coordination Complexes"

Asis Banerjie (Armstrong Cork Company) "Polymerization of Ordered Monomer Multilayers"

David Day (Case Western Reserve University) "Polymerization of Diacetylene Monomer Monolayers at the Gas-Water Interface"

Session 2 Expitaxial Crystallization of Polymers

Chairman: J. B. Lando

Invited Speakers:

Eric Baer (Case Western Reserve University) "Overview Discussion of Epitaxial Crystallization of Polymers"

Jean Claude Wittman (Centre de Recherche Macromolecules Strassbourg, France) "The Expitaxial Crystallization of Low Molecular Weight Polymers on Organic Substrates"

Scott E. Rickert (Case Western Reserve University) "Control of Polymorphism and Morphology by Epitaxial Crystallization"

Kenneth Mauritz (Diamond Shamrock Corporation) "Theoretical Calculations of the Mechanism of Epitaxial Crystallization of Polymers"

SYMPOSIUM H

LASER-SOLID INTERACTIONS AND LASER PROCESSING

Chairmen: H. J. Leamy (201) 582-2628, J. M. Poate, (201) 582-3462, Bell Laboratories, Murray Hill, N. J. 07974

The aim of this symposium is to bring together scientists and engineers engaged in the study of the effects of laser radiation on materials. The symposium will feature presentations of work devoted to the study of the fundamental processes that accompany laser irradiation of solids as well as papers in which the application of these processes to the production of novel or improved material properties is described. Invited presentations in the following topic areas have been scheduled:

Laser-Solid Interaction Fundamentals

Laser Annealing of Ion-Implanted Semiconductors

Surface Characterization of Irradiated Materials

Laser Hardening and Transformations in Iron Base Alloys

Laser Damage Thresholds and Mechanisms

Invited Speakers:

N. Bloembergen (Harvard University, Cambridge, Mass.)

D. Auston (Bell Labs, Murray Hill, N.J.)

S. S. Lau, J. W. Mayer and W. F. Tseng (California Institute of Technology, Pasadena, California)

C. W. White, R. T. Young and J. Narayan (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee)

J. F. Gibbons (Stanford University, California)

S. Copley, M. Bass, E. W. Van Stryland, D. Beck and O. Osquivel (University of Southern California, Los Angeles)

B. H. Kear & E. M. Breinan (United Technologies Research Center, East Hartford, Connecticut)

R. Mehrabian (University of Illinois, Urbana, Illinois)

T. R. Anthony & H. E. Cline (GE R&D, Schenectady)

A. V. Dvurechensky & G. A. Kachurin (Institute of Semiconductor Physics, Siberian Branch of Academy of Science, Novosibirsk U.S.S.R.)

E. Rimini (Institute for Structure of Materials, Catania, Italy).

SYMPOSIUM I
OPTICAL WAVEGUIDE – GLASS SCIENCE INTERACTIONS

Chairman: C. R. Kurkjian, (201) 582-2378, Bell Laboratories, Murray Hill, New Jersey 07974

The purpose of the symposium is to stimulate interactions between workers involved in the study and production of "classical" optical and fiber glasses on the one hand, and the newer high-transmission, high-purity glass fibers, on the other hand. Coverage of both fields from a consideration of composition and properties to production and measurement techniques, is envisaged.

Invited Speakers:

E. Deeg (American Optical Co.) "Optical Glasses and Glassmaking"

J. B. MacChesney (BTL) "Processes for the Production of Optical Waveguide Glasses"

P. B. Macedo, J. H. Simmons and R. K. Mohr (Catholic Univ. of America) "Molecular Stuffing Techniques"

P. K. Gupta (Owens-Corning Fiberglass) "Strenghtening of Fibers by Means of Surface Compression"

L. L. Blyler (BTL) "Coatings for Optical Fibers"

SYMPOSIUM J

SURFACES AND INTERFACES: ASPECTS RELATED TO MATERIALS JOINING

Chairman: R. F. Sekerka, (412) 578-2700, Department of Metallurgy and Materials Science, Carnegie-Mellon University, Schenley Park, Pittsburgh, PA 15213

Topics:

Surface Theory: Equilibrium studies; Segregation; Surface density of states; Surface transport; Surface thermodynamics.

Application of Surface and Interface Techniques: Acoustic microscopy; Segregation studied with ESCA; Si/SiO_2 interface defects; Adsorption studied with LEED, AUGER, UPS.

Interface Structure: Structure of grain boundaries; Coherency, Lattice mismatch, Stresses; Tailored boundaries in NaCl; Disclinations.

Electronic Devices: Contacts, Shottkey barriers; Metals on insulators; Multilayer technology theory; Metallization schemes.

Joining Techniques: SiC composites; "Real Surfaces"; Metal plating on polymers; Superglues.

Invited Speakers:

G. H. Gilmer, Bell Laboratories
J. W. Cahn, National Bureau of Standards
C. S. Tsai, Carnegie Mellon University
R. W. Balluffi, Massachusetts Institute of Technology
C. L. Bauer, Carnegie Mellon University
K-N. Tu, IBM
J. A. Rayne, Carnegie Mellon University
D. R. Hamann, Bell Laboratories
G. H. Olsen, RCA
M. S. Abrahams, RCA