MATERIALS RESEARCH SOCIETY ANNUAL MEETING

November 14-16, 1977
Sheraton Hotel,
Boston, Massachusetts

PRELIMINARY PROGRAM

Materials research encompasses diverse interests in a wide variety of materials, properties and processes. In recent years this diversity has led to a proliferation of topical conferences, attended only by specialists. The Materials Research Society, which is devoted to promoting interactions in this interdisciplinary and multidisciplinary field, has responded to this fragmentation by organizing a conference consisting of several topical symposia which will be held at the same time and place. The format of the conference preserves the basic advantages of the topical symposium in providing a forum for invaluable interactions between researchers in the same field while at the same time affording an opportunity for increased interactions between fields. The meeting will consist of three concurrent symposia, including both invited and contributed papers, on the following topics: 1) Catalysis and Catalytic Materials, which is an extension of the successful symposium last year on this topic. 2) Metallic Glasses, dealing with recent advances in the understanding of these novel materials, and 3) Materials Characterization Using Transmission Electron Microscopy, a symposium on the current state of the art in electron microscopy as applied to materials research. During the planning of these symposia, an important area of mutual interest emerged, namely the growing importance of extended fine structure studies, such as EXAFS. There will be a special session on this topic.

SYMPOSIUM TOPICS

CATALYSIS AND CATALYTIC MATERIALS
Chairman: J. T. Kummer

METALLIC GLASSES
Chairmen: H. S. Chen and L. A. Davis

MATERIALS CHARACTERIZATION USING TRANSMISSION ELECTRON MICROSCOPY
Chairman: D. M. Maher

DEADLINE FOR CONTRIBUTED PAPERS: To submit a paper, send a 200-word abstract before September 15 to: *K. A. Jackson, Bell Laboratories, 600 Mountain Avenue, Murray Hill, New Jersey 07974.*

CHEMISTRY ***ENGINEERING*** ***PHYSICS***

CATALYSIS AND CATALYTIC MATERIALS

Chairman: J. T. Kummer

The focus will be on the overlap or potential overlap between the two disciplines of catalysis and materials science. Each talk will provide insight into the extent of potential contribution to or use of "the other" discipline, while at the same time presenting state of the art work with a high appeal to colleagues of the same specialization.

ACTIVE CENTERS AND SURFACE REARRANGEMENTS

SURFACE MORPHOLOGY OF PLATINUM CATALYSTS: M. Flytzani-Stephanopoulos, S. Wong, and L. D. Schmidt (University of Minnesota)

THEORETICAL STUDIES OF THE ELECTRONIC STRUCTURE AND BONDING PROPERTIES OF STEPPED METAL SURFACES: G. S. Painter (Oak Ridge National Laboratories)

ACTIVE SITES FOR AMMONIA OXIDATION: John Gland (General Motors)

SPIN-ORBITAL ELECTRONEGATIVITY AND CATALYTIC ACTIVITY: Keith H. Johnson (M.I.T.)

CO AS A SURFACE STRUCTURE PROBE FOR Pt: D. W. Blakely (Chevron Research Company)

CHARACTERIZATION OF CATALYSTS BY MOSSBAUER AND OTHER SPECTROSCOPIC TECHNIQUES

THE CARBURIZATION OF IRON ON SILICA CATALYSTS DURING THE SYNTHESIS REACTION: J. A. Amelse, E. E. Unmuth, L. H. Schwartz and J. B. Butt (Northwestern University)

CHARACTERIZATION OF SURFACE-TO-BULK RATIOS IN BIMETALLIC CATALYSTS USING THE MOSSBAUER EFFECT: L. J. Swartzendruber and L. H. Bennett (NBS), R. E. Watson (Brookhaven), B. J. Evans (U. Michigan, Ann Arbor)

SURFACE REACTION PROBABILITIES MEASURED IN A RECYCLING MOLECULAR BEAM REACTOR: D. Loffler, J. B. Fenn and G. L. Haller (Yale University)

PRINCIPLES AND APPLICATIONS OF EXAFS: P. Eisenberger (Bell Laboratories)

INVESTIGATION OF CATALYST STRUCTURE BY EXAFS: CHEMISORPTION SITE SYMMETRY AND SUBSTRATE INTERACTION: F. W. Lytle and R.B. Greegov (Boeing Company), G. Parravano (University of Michigan), G. H. Via and J. H. Sinfelt (Exxon)

STRUCTURE STUDIES ON POLYMERBOUND CATALYSTS BY EXAFS: J. Reed, P. Eisenberger, B. K. Teo, B. Kincaid (Bell Laboratories)

EXAFS: Keith O. Hodgson (Stanford University)

SURFACE STRUCTURE OF SUPPORTED CATALYSTS

CHEMICAL REACTIVITY OF SUPPORTED GOLD IV. INFLUENCE OF SUPPORT AND GOLD PARTICLE SIZE ON CATALYTIC SELECTIVITY: S. Galvagno (Donegani Research Institute) and G. Parravano (University of Michigan)

QUASI-EQUILIBRIA BETWEEN TWO AND THREE- DIMENSIONAL PHASES OF OXIDE CATALYSTS ON OXIDE SUPPORTS: Max Bettman (Ford Research Laboratories)

REACTIVE SILICA: Manfred J. D. Low (New York University)

HYDRODESULPHURIZATION USING UNIQUE METAL OXIDE SURFACES: W. R. Moser (Badger Company) and John M. Blakeney (Exxon)

ELECTROCATALYSIS

RESEARCH ON NEW CATALYSTS FOR ADVANCED FUEL CELLS: Johann A. Joebstl (U. S. Army Mobility Equipment R&D Command)

O_2 ELECTROCATALYSIS: E. B. Yeager (Case Western Reserve)

PHOTOCHEMICAL CONVERSION OF SOLAR ENERGY USING ELECTROCHEMICAL CELLS: Norman N. Lichtin (Boston University)

PHOTOASSISTED HETEROGENEOUS CATALYSIS WITH OPTICAL FIBERS: David F. Ollis and R. Marinangeli (Princeton University)

THE EFFECT OF ELECTRODE STRUCTURE ON FUEL CELL PERFORMANCE: E. I. Kaufman (Englehard Industries)

PREDICTION OF SEMICONDUCTOR-LIQUID INTERFACE PROPERTIES FROM ATOMIC ELECTRONEGATIVES: M. Butler (Sandia)

ELECTROCHEMICAL OXIDATION AND SURFACE ANALYSIS CHARACTERIZATION OF TITANIUM AND TITANIUM HYDRIDE THIN FILM ELECTRODES: Rod K. Quinn (Sandia) and Neal R. Armstrong (Michigan State University)

THE ROLE OF SURFACE MORPHOLOGY ON THE ELECTROCATALYTIC PROPERTIES OF Pt: Philip N. Ross, Jr. (United Technologies Research Center)

METALLIC GLASSES

Chairmen: H. S. Chen and L. A. Davis

Metallic glasses, a novel class of materials, are at present the focus of considerable research effort, both to explore their technologically interesting properties, as well as to understand their basic characteristics and their stability. The first part of this symposium will focus on theoretical and experimental studies of structure and transport properties which contribute to the understanding of stability and properties of these materials. The second part of the symposium will be devoted to recent progress in the technologically important mechanical and magnetic behavior and properties of metallic glasses.

STRUCTURE

THEORETICAL ASPECTS OF STRUCTURE AND PROPERTIES OF RANDOM DENSE PACK HARD SPHERES: J. D. Weeks (Bell Labs)

STRUCTURE OF LIQUID METALS AND METALLIC GLASSES (EXPERIMENTAL): Y. Waseda (University of Toronto)

EXTENDED X-RAY ABSORPTION FINE STRUCTURE, APPLIED TO CRYSTALLINE AND AMORPHOUS A_3B COMPOUNDS: G. S. Brown (Stanford Synchrotron Radiation Project)

INVESTIGATION OF STRUCTURAL INHOMOGENEITY IN AMORPHOUS SOLIDS USING SMALL ANGLE X-RAY SCATTERING: B. G. Bagley (Bell Labs)

KINETICS OF STRUCTURAL RELAXATION IN METALLIC GLASSES: T. Egami (University of Pennsylvania)

TRANSPORT PROPERTIES

DIFFUSION AND VISCOSITY IN METALLIC GLASSES: H. S. Chen (Bell Labs)

LOW TEMPERATURE ANOMALIES IN SUPERCONDUCTING METALLIC GLASSES: J. E. Graebner (Bell Labs)

ELECTRONIC PROPERTIES: S. Hasegawa (Allied Chemical)

MECHANICAL BEHAVIOR

STRENGTH AND FRACTURE IN METALLIC GLASSES: L. A. Davis (Allied Chemical)

MECHANICAL PROPERTIES OF AMORPHOUS METALS: T. Masumoto (Tohoku University)

MECHANICAL STABILITY OF METALLIC GLASSES: To be announced

MAGNETIC BEHAVIOR

NEUTRON SCATTERING, MAGNETIZATION AND MOSSBAUER STUDIES OF METALLIC GLASS FERROMAGNETS: To be announced

MAGNETIC BEHAVIOR IN METALLIC GLASSES: C. D. Graham, Jr. (University of Pennsylvania)

PAIR ORDERING IN METALLIC GLASSES: J. J. Becker (General Electric)

MAGNETOSTRICTION AND MAGNETIC ANISOTROPY: R. C. O'Hanley (Allied Chemical)

MICROSTRUCTURE AND MAGNETIC ANISOTROPY IN RARE EARTH- TRANSITION METAL AMORPHOUS THIN FILMS: H. J. Leamy (Bell Laboratories)

MATERIALS CHARACTERIZATION USING TRANSMISSION ELECTRON MICROSCOPY

Chairman: D. M. Maher

This will be a three day meeting on the use of electron optical systems in the study of *thin* films. An attempt will be made to examine the most recent advancements in electron optical instrumentation, experimental techniques, theory and applications. A workshop format will be employed whenever possible; invited speakers will be asked to present overviews; and a limited number of contributions of five minutes maximum will be accepted from participants. Those interested in making a contribution should communicate directly with the appropriate chairman or co-chairman as soon as possible.

ANALYTICAL ELECTRON MICROSCOPY

Chairman: David Joy (Bell Laboratories)

Co-chairman: Hamish Fraser (University of Illinois)

In August 1976 a workshop on Analytical Electron Microscopy was held at Cornell University, Ithaca, N. Y. under the sponsorship of the National Science Foundation. The report of this workshop contained detailed recommendations for areas where instrumentation and research efforts should be concentrated (for summary see Ultramicroscopy **2**, 89 (1976)). The first session of this meeting will be devoted to an examination of the progress that has been made since that time and to an assessment of the present "state-of-the art". This will be followed by two papers discussing our current knowledge of methods for quantitation of characteristic excitations from energy dispersive X-ray spectra and electron energy-loss spectra. Matters to be considered include methods for standardization and the reliability of absolute ionization cross-sections, as well as, a summary of the available mathematical routines for background subtraction, curve fitting, deconvolution etc.

ENERGY DISPERSIVE X-RAY ANALYSIS: Eric Lifshin (General Electric Corporate Research and Development)

ELECTRON ENERGY-LOSS ANALYSIS: To be announced

EXTENDED FINE STRUCTURE

Chairman: John Silcox (Cornell University)

Co-chairman: Pierre Petroff (Bell Laboratories)

This session will be devoted to an examination of the techniques for chemical and physical analysis when using extended fine structure from either X-ray absorption or electron energy-loss spectra. The relative merits of synchrotron and electron beam instrumentation will be considered.

SYNCHROTRON RADIATION: Peter Eisenberger (Bell Laboratories)

ELECTRON RADIATION - A COMPARISON: Mike Isaacson (University of Chicago)

PANEL DISCUSSION: (Pierre Petroff, leader)

G. S. Brown (Stanford Synchrotron Radiation Project); Peter Eisenberger (Bell Laboratories); Mike Isaacson (University of Chiago); F. W. Lytle (Boeing Company); Steve Sass (Cornell University); Steve Schnatterly (Princeton University); John Silcox (Cornell University); G. Via (Exxon Research and Eng. Co.)

DYNAMICAL THEORY OF ELECTRON DIFFRACTION

Chairman: John Spence (Arizona State University)

Co-chairman: Bob Villagrana (General Atomic Company)

In this session the dynamical theory of electron diffraction from imperfect crystals will be examined from the point of view of the basis equations, validity and limits of the approximations, reduction of the equations for numerical analysis, numerical techniques and comparison of calculations to experiment.

BASIC FORMULATION: Alan Lewis (University of California)

APPLIED DIFFRACTION THEORY: Bob Villagrana (General Atomic Company)

INELASTIC SCATTERING -

IMAGE CONTRAST: Arne Melander (Royal Institute of Technology)

HIGH RESOLUTION LATTICE IMAGING

Chairman: Steve Sass (Cornell University)

Co-chairman: Ondrej Krivanek (Bell Laboratories)

In this session the theoretical and experimental factors which are relevent to the utilization of lattice images in materials science will be examined and past applications surveyed. The discussion will focus on assessing problems where lattice imaging can lead to important advances in the characterization of defect structures and in our understanding of related physical, electrical, chemical etc. phenomena.

AN INTRODUCTION: Dick Parsons (Chalk River Nuclear Laboratories)

LINE DEFECTS: John Spence (Arizona State University)

PLANAR DEFECTS: Ondrej Krivanek (Bell Laboratories)

SUPER LATTICES: Sumio Iijima (Arizona State University)

APPLICATIONS IN MATERIALS SCIENCE: Ron Gronsky (University of California)

DEDICATED HIGH-RESOLUTION STEM

Chairman: Dennis Maher (Bell Laboratories)

Co-chairman: Mike Isaacson (University of Chicago)

There are now three institutions in the United States where research based on dedicated high-resolution STEMs is being pursued. Three commercially built STEM systems will be installed at universities in this country before the end of this year. In this session the performance and scientific accomplishments derived or anticipated from a system of this type will be surveyed. The practical limitations in achieving an atomic or near atomic characterization of materials which are of interest in materials science and physics will be discussed.

THE COMPLETE ANALYTICAL SYSTEM! : Mike Isaacson (University of Chicago)

WHAT CAN BE EXPECTED?: John Vander Sande (Massachusetts Institute of Technology), Hamish Fraser (University of Illinois), John Spence (Arizona State University)

MATERIALS CHARACTERIZATION

Chairman: John Vander Sande (Massachusetts Institute of Technology)

Co-chairman: Subhash Mahajan (Bell Laboratories)

The important "problems" associated with the characterization of certain materials will be surveyed in this session. Emphasis will be placed on those aspects of the characterization which are special to each class of material with particular attention paid to limiting factors such as electron optics, stage design, specimen preparation, imaging modes, theoretical models etc.

METALS AND THEIR ALLOYS: Subhash Mahajan (Bell Laboratories)

SEMICONDUCTORS: Pierre Petroff (Bell Laboratories)

CERAMICS: Terry Mitchell (Case Western)

MINERALS: Scott Lally (U. S. Steel Corp.)

METALLIC GLASSES: Shoehei Nakahara (Bell Laboratories)

Special Conference Accommodations have been arranged for those attending the Annual Meeting of the Materials Research Society at the Sheraton Boston Hotel.

Main House		South Tower	
Single	$ 28-33	Single	$ 38
Double	$ 43	Double	$ 47

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102 MATERIAL RESEARCH LABORATORY
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PENNSYLVANIA 16802