



CALL FOR PAPERS

195th Meeting of The Electrochemical Society



Seattle, Washington

May 2-7, 1999

Sheraton Seattle Hotel & Towers/
Washington State Convention and Trade Center

The Electrochemical Society, Inc.

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Since 1902, Society Meetings have provided individuals with an opportunity and a forum to exchange information on the latest scientific and technical developments in the fields of electrochemical and solid-state science and technology. The 195th Meeting continues this tradition and serves as a major conference for the discussion of interdisciplinary research from around the world through a variety of formats, such as oral presentations, poster sessions, exhibits, panel discussions, and tutorial sessions.

HOTEL & MEETING REGISTRATION

The 1999 Spring Society Meeting will be held at the Sheraton Seattle Hotel and Towers (1400 Sixth Avenue, Seattle, WA 98101 USA) and the Washington State Convention and Trade Center, which is located just steps away from the Sheraton (100 steps to be exact). The Sheraton Seattle Hotel and Towers is located in one of the most beautiful natural settings in the country and within walking distance of shopping, theater, restaurants and many cultural attractions. This hotel is an ideal Headquarters Hotel for the Society's 195th Meeting.

Since the Sheraton Seattle Hotel and Towers is the Headquarters Hotel, the Society has special rates for our attendees. Please note that May is a very busy month in Seattle and space is limited, so we encourage you to make your reservations early. To obtain these special convention rates, you must mention that you are planning to attend The Electrochemical Society Meeting. The deadline for reservations is April 2, 1999. In addition, a limited number of government rate rooms are available (please contact the ECS Headquarters Office for details).

\$147 for Single Occupancy

\$162 for Double Occupancy

The Sheraton Seattle Hotel and Towers reservations telephone number is (206) 621-9000, toll free (800) 325-3535, or fax (206) 447-5525.

Beginning Saturday, May 1st, additional rooms have also been reserved at the Seattle Hilton and Towers (Sixth and University, Seattle, WA 98111 USA) one block away from the Sheraton. The Seattle Hilton reservations telephone number is (206) 624-0500 or toll free (800) hiltons.

Meeting registration and additional hotel reservation information will be sent to all members, authors of papers, and Technical Session Chairmen and Vice-Chairmen in February of 1999.

TECHNICAL EXHIBITION

The 195th Meeting will also include a Technical Exhibition, featuring presentations and displays by over 50 manufacturers of instruments, materials, systems, publications, and software of interest to meeting attendees. Parties interested in exhibiting should contact The Electrochemical Society Headquarters Office for more information.

ABSTRACT SUBMISSION

Submit one original, **one-page**, properly formatted, Meeting Abstract either electronically or on paper by **January 2, 1999** to the Society Headquarters Office, with a copy to the appropriate Symposium Organizer(s). Meeting Abstracts should explicitly state objectives, new results, and conclusions or significance of the work.

Programming for this Meeting will occur in January of 1999, with some papers scheduled for poster presentation. All presenting authors will receive a letter from the Society Headquarters Office notifying them of the date and time of their presentation. Check the ECS Home Page for further program details.

MANUSCRIPT PUBLICATION

All Meeting Abstracts will be published in the Meeting Abstracts Volume copyrighted by The Electrochemical Society, Inc. and become the property of the Society upon presentation. To publish in the Journal of The Electrochemical Society or Electrochemical and Solid-State Letters, a full manuscript must be submitted within six months of the symposium date. "Instructions to Authors" are available from the Society Headquarters Office, the Journal or Letters, or the ECS Home Page. If publication elsewhere is desired after presentation, written permission from the Society Headquarters Office is required.

SEATTLE SYMPOSIA — MAY 2-7, 1999

A1 - GENERAL SOCIETY STUDENT POSTER SESSION



(All Divisions and Groups)

This Poster Session provides a forum for graduate and undergraduate students to present research results of general interest to the Society. The purpose of this session is to foster and promote work in both electrochemical and solid-state science and technology, and to stimulate active student interest and participation in the Society. A competition for the two best posters will be part of the session. A cash prize of \$250 and a scroll will be awarded to the winning student authors. In the case of coauthors, a maximum award of \$750 per winning poster will be divided equally between student coauthors. The awards will be made without regard to sex, citizenship, race, or financial need.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **D. Misra**, Department of Electrical & Computer Engineering, New Jersey Institute of Technology, Newark, NJ 07102 USA, Phone: (973) 596-5739, Fax: (973) 596-5680, E-mail: dmisra@megahertz.njit.edu; and **P. S. Fedkiw**, Department of Chemical Engineering, North Carolina State University, 113 Riddick Laboratories, Box 7905, Raleigh, NC 27695-7905 USA, Phone: (919) 515-3572, Fax: (919) 515-3465, E-mail: peter_fedkiw@ncsu.edu.

B1 - BATTERY/ENERGY TECHNOLOGY JOINT GENERAL SESSION



(Battery Division/Energy Technology Division)

Papers are solicited on the fundamental and applied aspects of energy conversion, storage, and transmission not covered by other symposia at this Meeting. Of particular interest are unconventional conversion methods and applications, new materials for batteries and fuel cells, and novel methods for energy storage and transmission. In the case of batteries, examples are: 1. Zinc-manganese dioxide; 2. Lead-acid; 3. Nickel-cadmium; and 4. Nickel-zinc batteries; and 5. Lithium batteries.

Papers on theoretical models and the economics of energy systems are also welcome.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **M. A. Ryan**, Mail Stop 303-308, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109 USA, Phone: (818) 354-8028, Fax: (818) 393-4272, E-mail: mryan@jpl.nasa.gov; and **R. Surampudi**, Mail Stop 277-212, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109 USA, Phone: (818) 354-0352, Fax: (818) 393-6951, E-mail: subbarao.surampudi@jpl.nasa.gov.

C1 - CORROSION AND PREVENTION IN AIR AND SPACECRAFT



*(Corrosion Division/Physical Electrochemistry Division/
Energy Technology Division)*

The demand for improved performance and increased life from air and spacecraft systems has prompted examination of all aspects of corrosion and corrosion control for aerospace materials. This symposium will provide a forum for presentation and discussion on a range of issues in corrosion prevention in aircraft and spacecraft materials exposed to atmospheric and earth orbit environments. Papers are solicited on topics including, but not limited to novel corrosion protection, corrosion behavior and corrosion control for advanced aerospace materials, and test techniques and methodologies for life prediction when corrosion is life-limiting. The goal of this symposium is to capture the latest advances in one of the most active, dynamic, and challenging fields in corrosion science.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. G. Buchheit**, Fontana Corrosion Center, The Ohio State University, 477 Watts Hall, 2041 College Road, Columbus, OH 43210-1124 USA, Phone: (614) 292-6085, Fax: (614) 292-1537, E-mail: buchheit.8@osu.edu; and **K. Sugimoto**, Department of Metallurgy, Graduate School of Engineering, Tohoku University, Sendai 980-77, Japan, Phone: 81-022-217-7297, Fax 81-022-217-7297, E-mail: sugik@material.tohoku.ac.jp.

C2 - CORROSION GENERAL SESSION



(Corrosion Division)

Papers concerning all aspects of corrosion and associated phenomena in liquid and gaseous phases not covered by topic areas of other specialized Corrosion Division symposia at this Meeting are welcome. Theoretical analyses, experimental techniques for the study of corrosion processes, and corrosion products are also of interest. Contributed papers will be ordered depending on the titles and content of the Meeting Abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizer: **C. R. Clayton**, State University of New York at Stony Brook, Department of Materials Science and Engineering, Stony Brook, NY 11794 USA, Phone: (516) 632-8381, Fax: (516) 632-8381, E-mail: cclayton@cmail.sunysb.edu.

D1 - FIFTH INTERNATIONAL SYMPOSIUM ON SILICON NITRIDE AND SILICON DIOXIDE THIN INSULATING FILMS



*(Dielectric Science and Technology Division/Electronics Division/
High Temperature Materials Division)*

This symposium will provide a forum for the presentation and discussion of topics concerning all aspects of silicon nitride and silicon dioxide thin film technology. The objective is to link material studies and technological applications to allow for clearer design and design processing considerations for the fabrication of devices and integrated circuits (VLSI/ULSI) which incorporate these thin insulating films. The symposium will include both invited and contributed papers. Topics will cover film preparation, characterization, passivations, modeling, processing, device physics, present applications, and future requirements of the insulators in developing ULSI and VHSIC technologies.

Both experimental and theoretical contributed papers are solicited from the following general areas: 1. Film preparation (CVD, LPCVD, plasma, ion implantation, sputtering, thermal nitridation, thermal oxidation, etc.) and characterization; 2. Film and film/substrate interface analysis by RBS, AES, XPS, SIMS, and other new and novel analysis techniques; 3. Passivation, charge transport and trapping, characteristics of traps, interface states, tunneling phenomena and dielectric breakdown; 4. Defects and impurities and their effects on electronic and optical processes; 5. Electrical, chemical, physical and optical properties; 6. Multi-layer dielectric stacks and interfaces, nitridation/oxidation methodologies for thin gate dielectrics; 7. Silicon dioxide and/or silicon nitride films for nonvolatile semiconductor memories; 8. Insulators for multi-layer interconnect processes; 9. Insulating films on compound semiconductors (passivation studies, interfaces, electrical and optical properties of devices); 10. Plasma science and plasma processing technology for silicon nitride and silicon dioxide films; 11. Quality verification, environmental effects, reliability, new applications and new devices; 12. Rapid thermal oxidation and nitridation, doped oxides and nitrides; 13. Novel isolation techniques including PBL, SEG, single wafer hipox, doped glasses; and 14. Radiation effects, hot carrier effects, etc.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **K. B. Sun-**

daram, Department of Electrical Engineering, University of Central Florida, Orlando, FL 32816 USA, Phone: (407) 823-5326, Fax: (407) 823-5835, E-mail: kbs@ece.engr.ucf.edu; **M. J. Deen**, Department of Engineering Science, Simon Fraser University, Burnaby, B.C., Canada, V5A 1S6, Phone: (604) 291-3248, Fax: (604) 291-4951, E-mail: jamal@cs.sfu.ca; **W.D. Brown**, Department of Electrical Engineering, University of Arkansas, Fayetteville, AR 72701 USA, Phone: (501) 575-6045, Fax: (501) 575-7967; **R.E. Sah**, Fraunhofer Institute, Freiburg, Germany, Phone: 49-761-5159-175, Fax: 49-761-5159-219, E-mail: sah@iaf.fhg.de; **E. Poindexter**, Army Research Laboratory, AMSRL-SE, 2800 Powder Mill Road, Adelphi, MD 20783 USA, Phone: (301) 394-1287, Fax: (301) 394-1318; **D. Misra**, Department of Electrical & Computer Engineering, New Jersey Institute of Technology, Newark, NJ 07102 USA, Phone: (973) 596-5739, Fax: (973) 596-5680, E-mail: dmisra@megahertz.njit.edu; **M. D. Allendorf**, Sandia National Laboratories, MS 9052, PO Box 969, Livermore, CA 94551-0969, Phone: (925) 294-2895, Fax: (925) 294-1004; E-mail: mdallen@sandia.gov; and **S. I. Raider**, IBM T. J. Watson Research Center, P.O. Box 218, Yorktown Heights, NY 10598-0218 USA, Phone: (914) 945-3822, Fax: (914) 945-2018, E-mail: raider@watson.ibm.com.

E1 - FOURTH INTERNATIONAL SYMPOSIUM ON LOW AND HIGH DIELECTRIC CONSTANT MATERIALS: MATERIALS SCIENCE, PROCESSING, AND RELIABILITY ISSUES



(Dielectric Science and Technology Division)

This symposium will emphasize all aspects of Low and High Dielectric Materials in Silicon and Compound Semiconductor Integrated Circuits, packaging of integrated circuits and microwave devices. In case of low dielectric constant materials, special emphasis will be placed on the issues related to the use of these materials in multilevel interconnections for ultra large scale integrated circuits. In case of high dielectric constant materials, special emphasis will be placed on the use of these materials for DRAM and as gate dielectric materials for sub 180 nm feature size integrated circuits. Papers are encouraged in all areas related to materials, processing, reliability, equipment, process integration, and manufacturing.

Areas of interest include: 1. Fundamental issues in the synthesis and processing of low and high dielectric constant material systems; 2. Materials, processing and reliability issues related to low k dielectric materials with dielectric constant K , 3.84; 3. Materials, processing, and reliability issues related to Al and Cu multilevel interconnect (use of low K dielectric as the interlevel dielectric layer) systems; 4. Materials, processing and reliability issues related to high K dielectric (Ta_2O_5 , BaSrTiO_3 , Pb LaZrTiO_3 etc.) materials in DRAM; 5. Materials, processing and reliability issues related to high K dielectrics as gate dielectric materials for sub 180 nm feature size Si integrated circuits; 6. Issues related to the integration of low K materials in multilevel chip modules and other packaging systems; 7. Issues related to the integration of high K dielectric materials in microwave devices; 8. All aspects of equipment issues related to processing of low and K dielectric materials; and 9. All aspects of process integration issues of low and high K dielectrics.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. Singh**, Department of Electrical and Computer Engineering, Clemson University, 102 Riggs Hall, Box 340975, Clemson, SC 29634-0915 USA, Phone: (864) 656-0919, Fax: (864) 656-5910, E-mail: raj.singh@ces.clemson.edu; **H. S. Rathore**, IBM, Department 57A, Zip AR1, East Fishkill Facility, Hopewell Junction, NY 12533 USA, Phone: (914) 892-2905, Fax: (914) 892-3039, E-mail: rathore@fshumrici.unet.ibm.com; **R. P. S. Thakur**, AG Associates, 4425 Fortran Drive, San Jose, CA 95134 USA, Phone: (408) 935-2010, Fax: (408) 935-2775, E-mail: randir.thakur@agai.com; **C. C. Schuckert**, DuPont Co., 1201 Hopeton Road, Wilmington, DE 19807 USA, Phone: (302) 658-4836, Fax: (302) 658-3330, E-mail: schuckert@91.esuax.uncm.dupont.com; and **S. C. Sun**, Taiwan Semiconductor Manufacturing Co., No. 9 Creation Road 1, Science Based Industrial Park, Hsinchu, Taiwan 300, Phone: 519-933-3184, Fax: 519-933-5497, E-mail: scsun@tsmc.com.tw.

E2 - SECOND INTERNATIONAL SYMPOSIUM ON ENVIRONMENTAL ISSUES WITH MATERIALS AND PROCESSES FOR THE ELECTRONICS AND SEMICONDUCTOR INDUSTRIES



(Dielectric Science and Technology Division/Electronics Division)

Recent increases in environmental awareness on issues such as global warming, greenhouse gases, ozone depletion, and toxic pollutants will have a profound effect on the process technologies used for electronic component manufacture. This symposium will focus on these issues with emphasis on the waste treatment and abatement of the materials causing such detrimental effects. Topics will focus on these issues with emphasis on the waste stream treatment and recovery, gas stream abatement, and possible alternative chemistries. Both invited and contributed papers will be represented from industry, academia, and government.

The following environmental areas of concern are suggested: 1. CVD and PVD metallization for semiconductor and electronics processing; 2. CMP processes, slurry chemistries; 3. Wet and Dry etch chemistries; 4. Heavy metal contaminants from plating and solder processes; 5. New and current dielectric processing and materials; 6. Photoresist solvents and materials; 7. Implant gases and abatement issues; 8. Passivation and barrier layers; 9. Encapsulation materials; and 10. III-V semiconductor materials and processes.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **L. Mendicino**, Motorola Corporation, M/S K-10, 3501 Ed Bluestein Boulevard, Austin, TX 78721 USA, Phone: (512) 933-3938, Fax: (512) 933-6962, E-mail: laura_mendicino@email.sps.mot.com; and **L. Simpson**, Applied Materials, Inc., 9050 Capital of Texas Highway, Suite 320, Austin, TX 78759 USA, Phone: (512) 272-7606, Fax: (512) 272-7600, E-mail: logan_simpson@amat.com.

E3 - SECOND INTERNATIONAL SYMPOSIUM ON THIN FILM MATERIALS FOR ADVANCED PACKAGING TECHNOLOGIES



(Dielectric Science and Technology Division/Electronics Division)

As the speed and information capacity of semiconductor devices continue to improve, greater attention is placed on the limitations imposed by current packaging technologies. The purpose of this symposium is to provide a forum for the presentation of topics concerned with all aspects of thin film materials and processes used in advanced interconnection and packaging technologies for semiconductor devices. This rapidly growing area includes multichip modules (MCMs), flip chips, chip-on-board, 3-D designs, and many other high lead count packaging technologies. The objective is to link new thin film materials, process integration and new packaging strategies to further develop these applications, providing clearer design and processing considerations necessary for realizing the ultimate performance attainable with modern electronics designs. This symposium will include both invited and contributed papers. Topics will cover packaging related aspects of new thin film materials, characterization, modeling, processes, material physics, present application and future requirements placed on thin film materials in the packaging of advanced integrated circuits.

Both experimental and theoretical contributed papers are solicited in the following general areas: 1. Back-end-of-the-line (BEOL) thin film processes for high speed I/O; 2. New thin film materials (metals, inorganic and organic dielectrics); 3. Thin film processes (CVD, PECVD, sputtering, electrochemical deposition); 4. Applications of low- K and high- K dielectrics in packaging; 5. New passivation systems; 6. Diffusion barrier technology; 7. Advanced packaging for compound semiconductor devices; 8. Electrical, mechanical and thermal characterization; 9. Electrical and environmental reliability characterization; 10. Process integration; 11. Plasma etching for packaging and interconnect structures; and 12. Applications of advanced packaging in electro-optics.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **S. S. Ang**, The University of Arkansas, 3217 Bell Engineering Center, Fayetteville, AR 72701 USA, Phone: (501) 575-5683, Fax: (501) 575-7967, E-mail: ssa@engr.uark.edu; **M. J. Loboda**, Dow Corning Corporation, MS C041A1, Midland, MI 48686-0994, Phone: (517) 496-6249, Fax: (517) 496-5121, E-mail: usdccc5vp@ibmmail.com; and **R. K. Ulrich**, The University of Arkansas, 3203 Bell Engineering Center, Fayetteville, AR 72701 USA, Phone: (501) 575-5645, Fax: (501) 575-7926, E-mail: rku@engr.uark.edu.

F1 - PROCESS CONTROL, DIAGNOSTICS, AND MODELING IN SEMICONDUCTOR DEVICE MANUFACTURING III



*(Dielectric Science and Technology Division/
Electronics Division/High Temperature Materials Division)*

This Symposium is aimed at bringing together the technical community involved in various aspects of process control, diagnostics, and modeling in semiconductor manufacturing. Processes of interest include, but are not limited to: CVD, PVD, PECVD, etching, RTP, cleaning, and lithography. Topics relating to automation, i.e., computer controlled feedback and/or feedforward of information for controlling a single process, or a series of processes, are also of interest.

Suggested topics include control methodologies, in situ measurement techniques, and modeling approaches. Papers focusing on the use of fundamental equipment/process models and real-time sensors to generate control strategies and controller designs are of particular interest. Other appropriate themes are the relationship between modeling and control, calibration techniques, and automation issues. Papers focusing on application to commercial tools are also welcome. The Symposium will consist of invited and contributed papers. Sessions will be organized around coherent subjects in order to facilitate discussion and focus on appropriate solutions to problems.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **M. Meyyappan**, NASA Ames Research Center, Mail Stop 229-3, Moffett Field, CA 94035 USA, Phone: (650) 604-2616, Fax: (650) 604-5244, E-mail: meyya@orbit.arc.nasa.gov; **D. J. Economou**, Department of Chemical Engineering, University of Houston, Houston, TX 77204-4792 USA, Phone: (713) 743-4320, Fax: (713) 743-4323, E-mail: economou@uh.edu; S.W. Butler, Texas Instruments, Inc., P.O. Box 655012, Dallas, TX 75265, Phone: (972) 995-4241, Fax: (972) 995-4241, E-mail: butler@spdc.ti.co; **M. D. Allendorf**, Sandia National Laboratories, MS 9052, PO Box 969, Livermore, CA 94551-0969, Phone: (925) 294-2895, Fax: (925) 294-1004, E-mail: mdallen@sandia.gov; and **L. Simpson**, Applied Materials, Inc., 9050 Capital of Texas Highway, Suite 320, Austin, TX 78759 USA, Phone: (512) 272-7606, Fax: (512) 272-7600, E-mail: logan_simpson@amat.com.

G1 - ELECTROCHEMICAL PROCESSING IN ULSI FABRICATION AND SEMICONDUCTOR/METAL DEPOSITION II



*(Electrodeposition Division/Electronics Division/
Dielectric Science and Technology Division)*

Electrochemical processes are receiving much attention in microelectronic applications. The most prominent example at present is the electrochemical deposition of copper for interconnect wiring on silicon wafers. Another technology of high commercial impact is solder deposition for flip-chip interconnects. Many other electrochemical processes and techniques, at various stages of emergence and development, hold promise for the electronics industry and beyond; these include chemical-bath deposition of semiconductors and compounds, formation of heterojunctions and metal-semiconductor contacts, deposition of magnetic multilayers and nanowires, wet etching, chemical-mechanical polishing, electrolytic and electroless deposition of patterned structures, and scanning-probe patterning.

This symposium is intended to be a balanced forum for discussion of both the practical and fundamental aspects of electrochemical processes. Practical aspects of interest include: design and modeling of

plating and etching equipment; thickness uniformity; patterning techniques; shape evolution and filling of high-aspect-ratio cavities; bath-composition control; integration of the electrochemical process with other process steps to make devices; device performance; electromigration, failure modes, and device reliability. Consideration is given to the multi-disciplinary technological challenges involved in implementing an electrochemical process in semiconductor manufacturing. Fundamental aspects of interest include: the initial stages of nucleation and growth as revealed by in-situ and ex-situ means such as SPM, X-ray techniques, and TEM; the influence of surface pretreatment; the action of additive molecules at electrode surfaces; structural and electrical characterization of interfaces (e.g., Schottky diode, ohmic contacts, heterojunctions). Much emphasis will be given to process-structure-property relationships, since process dynamics determine material and interfacial structure, which in turn determine numerous properties and ultimately device characteristics.

Contributions are solicited in the following areas: electroless and electrolytic plating of copper and copper alloys for chip wiring; integration aspects of chip metallization based on copper; failure and reliability of copper metallization especially as they relate to deposit properties and methods of deposition; influence of organic additives on shape evolution and deposit properties; processes for electrochemical deposition, removal, and patterning of lead-containing and lead-free solders for flip-chip interconnection; design and modeling of plating and etching tools; porous silicon formation and characterization; device isolation processing; anisotropic electrochemical processes for high levels of integration; electrochemical aspects of chemical-mechanical polishing (CMP) technology including mechanisms, slurry composition and performance, and process characterization and control; novel applications of electrochemical processes in ULSI fabrication; electrochemical deposition of magnetic thin films, multilayers and wires on semiconductor substrates; nanocontact formation and characterization; patterning using scanning-probe microscopy (SPM) for nanoelectronics applications; electrochemical deposition of microelectromechanical devices including LIGA; electrodeposition of compound semiconductors; deposition phenomena related to impurities and to wafer cleaning.

Publication of a proceedings volume is planned. Authors are obligated to submit a camera-ready manuscript by the meeting date.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and the Symposium organizers: **P. C. Andricacos**, IBM T. J. Watson Research Center, P.O. Box 218, Yorktown Heights, NY 10598-0218 USA, Phone: (914) 945-2683, Fax: (914) 945-4520, E-mail: andricac@us.ibm.com; **P. C. Searson**, Department of Materials Science and Engineering, The Johns Hopkins University, 102 Maryland Hall, Baltimore, MD 21218 USA, Phone: (410) 516-8774, Fax: (410) 516-5293 E-mail: searson@jhu.edu; **C. Reidsema Simpson**, Motorola, Materials Research and Strategic Technology, 3501 Ed Bluestein Boulevard MS K-10, Austin, TX 78721 USA, Phone: (512) 933-3184, Fax: (512) 933-5497, E-mail: ra1557@email.sps.mot.com; **P. Allongue**, Laboratoire de Physiques des Liquides et Electrochimie, CNRS-UPR15, ESPCI, BAT. H, 10 rue Vauquelin, 75005 Paris, France, Phone and Fax: 33-01-43-36-16-80, E-mail: pa@ccr.jussieu.fr; **J. L. Stickney**, Department of Chemistry, University of Georgia, Athens, GA 30602 USA, Phone (706) 542-1962, Fax: (706) 542-9454, E-mail: stickney@sunchem.chem.uga.edu; and **G. M. Oleszek**, Department of Electrical and Computer Engineering, University of Colorado, 1420 Austin Bluffs Parkway, P.O. Box 7150, Colorado Springs, CO 80933-7150 USA, Phone: (719) 593-3490, Fax: (719) 548-9404, E-mail: gmoleszek@eas.uccs.edu.

H1 - DEFECTS IN SILICON



(Electronics Division)

This international symposium, third in a series, will focus on the science and technology of grown-in and process-induced crystallographic defects in silicon crystals and polished, epitaxial, and SOI wafers. This symposium is particularly timely because in today's 200 mm diameter crystals and tomorrow's 300 mm and larger crystals, the effects of grown-in vacancies, interstitials, and crystal originated pits (COPs) are particularly significant. Other defects of interest include oxide and metallic precipitates, dislocations, stacking faults, and various "electrically-inactive" impurities such as interstitial oxygen, substitutional carbon, nitrogen, and hydrogen.

Topics appropriate for inclusion in the symposium include the origins of various defects; mechanical, chemical, and electrical effects of defects in the bulk, in epitaxial or SOI layers, or at wafer surfaces and interfaces; interactions between two or more defect species (agglomeration, gettering, diffusion, etc.); techniques, including rapid thermal processing, for defect modification or annihilation; and methods for characterizing defects. Both theoretical and experimental papers are solicited. It is expected that the papers will be grouped into cohesive sessions, each introduced by an invited state-of-the-art paper.

Authors must submit a 500-word abstract in English, double spaced, together with any necessary tables or figures, indicating title, author(s), affiliation, along with a cover letter giving the mail and e-mail addresses of the primary author, to the symposium organizers no later than August 1, 1998. The abstract should contain sections on objective, approach, results, and conclusions to assist the reviewers in evaluating the suitability of the paper for oral presentation at the symposium. Some papers may be grouped into one or more poster sessions. These abstracts will not be published, but they may subsequently be submitted to Society headquarters for inclusion in the meeting program.

Publication of a Proceedings Volume, to be available at the meeting, is planned. Authors will be advised by October 1, 1998, if their paper has been accepted for the symposium and detailed instructions for manuscript preparation will be supplied at that time. Manuscripts must be submitted in camera-ready format to one of the symposium organizers no later than December 1, 1998, one month prior to the deadline for submission of abstracts to Society headquarters. Papers for which manuscripts are not received in a timely fashion will not be scheduled in the symposium. Submission of a paper for review and subsequent acceptance is considered by the symposium organizers as an agreement that the work will not be published by the author prior to presentation at the symposium.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **W. M. Bullis**, SEMI, 805 East Middlefield Road, Mountain View, CA 94043 USA, Phone: (650) 940-7980, Fax: (650) 940-7943, E-mail: mbullis@semi.org; **W. Lin**, Lucent Technologies, 555 Union Boulevard, Mail Code 60M-2JBX, Allentown, PA 18103 USA, Phone: (610) 712-6663, Fax: (610) 712-4883, E-mail: wenlin@lucent.com; **P. Wagner**, Wacker Siltronic A.G., P.O. Box 1140, D-84479 Burghausen, Germany, Phone: 49 (8677)83-2430, Fax: 49 (8677)83-2640, E-mail: peter.wagner@wacker.de; **T. Abe**, Shin-Etsu Handotai Co., Ltd., 2-13-1 Isobe, Annaka-shi, Gunma-ken, 379-0196 Japan, Phone: 81-27-385-2511, Fax: 81-27-385-2774, E-mail: LDW00303@niftyserve.or.jp; and **S. Kobayashi**, Sumitomo Metal Industries, Ltd., 1-8 Fuso-Cho, Amagasaki, 660 Japan, Phone: 81-6-401-6201, Fax: 81-6-489-0056, E-mail: sk@knight.amaken.sumikin.co.jp.

H2 - FIFTH INTERNATIONAL SYMPOSIUM ON PROCESS PHYSICS AND MODELING IN SEMICONDUCTOR DEVICE MANUFACTURING



(Electronics Division)

This symposium is aimed at providing a forum for the presentation of research activities on modeling and simulation of processes in semiconductor technology. The primary emphasis is on the understanding of the relevant phenomena at various levels of sophistication: computational aspects of process and defect modeling which includes finite-elements/-differences, classical and ab initio atomistic approaches and hybrid/mesoscopic techniques and the experimental determination of microscopical mechanisms.

One of the primary objectives of this symposium series is to bring about synergistic interactions between the industry groups and those in basic science engaged in research in this field. Papers are solicited on topics such as transient enhanced diffusion, ion implantation, point and extended defects, diffusion in and formation of thin dielectrics, materials and processes in newer technologies such as silicon on insulator, Si/Ge devices, and stress induced effects. The symposium will include both invited and contributed papers.

Prospective authors should submit by October 15, 1998, the title, names of authors, and address and telephone numbers (Fax numbers and e-mail address), and a description of the work sufficient to provide a basis for paper selection. These abstracts will not be published and may be submitted by mail, fax or e-mail. If figures are desired to be included in an electronic submission, postscript format files can be used.

Submitting authors can expect to be notified early in November

regarding their submissions and must submit a camera-ready copy of their full manuscript to one of the Symposium organizers by December 15, 1998. This schedule will allow manuscript review and revision in time for the Proceedings Volume to be printed at the time of the meeting. In addition, all authors must send a meeting abstract in camera-ready form to The Electrochemical Society Headquarters by January 2, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. S. Murthy**, IBM East Fishkill, Zip AE1, Hopewell Junction, NY 12533 USA, Phone: (914) 892-4884, Fax: (914) 892-3039, E-mail: murthy@us.ibm.com; **G. R. Srinivasan**, IBM Corp., Department 62G, Building 300, Z/AE1, East Fishkill Facility, Hopewell, NY 12533 USA, Phone: (914) 892-4064, Fax: (914) 892-3039, E-mail: srinivas@fshvm1.vnet.ibm.com; and **S. T. Dunham**, Department of Electrical and Computer Engineering, Boston University, 8 St. Mary's Street, Boston, MA 02215 USA, Phone: (617) 353-9845, Fax: (617) 353-6440, E-mail: dunham@bu.edu.

H3 - NINTH INTERNATIONAL SYMPOSIUM ON SILICON-ON-INSULATOR TECHNOLOGY AND DEVICES



(Electronics Division)

This symposium covers recent and exciting advances in SOI technologies. It will be of interest to materials and device scientists, as well as to process and applications oriented engineers. Theoretical and experimental contributions are solicited. Specific topics will include, but are not limited to: 1. Substrate preparation: optimized synthesis of UNI-BOND, ITOX, SIMOX and BESOI, novel structures, advanced ZMR, ELO, SPE, FIPOS, SOS and heterostructures; 2. Materials evaluation: wafer screening and non-destructive techniques, basic electrical properties (lifetime, mobility, residual doping and impurities), defect identification, interface quality, properties of ultra thin oxides and films, tools for quality control; 3. SOI MOSFETs: characterization, modeling and simulation of floating body effects, coupling, transient and heating phenomena, advanced techniques for parameter extraction, reliability issues (including hot carriers, irradiation, ESD); 4. Devices and circuits: low power/low voltage circuits, high speed CMOS and bipolar, memories, microprocessors, power and high temperature devices, sensors, quantum and innovative devices, novel technologies, advanced design.

Each of the symposium sessions will be introduced by a keynote speaker.

Meeting Abstracts are due to the ECS Headquarters Office and the Symposium Organizers by October 31, 1998. Authors will be informed of paper acceptance or rejection in November of 1998.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **P. L. F. Hemment**, School of Electronic Engineering, Information Technology and Mathematics, University of Surrey, Guildford, Surrey, GU2 5XH UK, Phone: 44-0-1483-259144, Fax: 44-0-1483-534139, E-mail: p.hement@surrey.ac.uk; **S. Cristoloveanu**, LPCS-ENSERG, BP 257, 38016 Grenoble Cedex 1, France, Phone: 33-0-47-685-6040, Fax: 33-0-47-685-6070, E-mail: sorin@enserg.fr; **T. W. Houston**, Texas Instruments, Dallas, USA, Phone: (214) 995-9131, Fax: (214) 995-2770, E-mail: houston@spdc.ti.com; **K. Izumi**, Project Team 2, A4N-215N, NTT, 3-1, Morinosato Wakamiya, Atsugi 243-01, Japan, Phone: 81-462-40-2300, Fax: 81 462 404316, E-mail: izumi@aecl.ntt.co.jp; and **H. Hovel**, IBM T. J. Watson Research Center, PO Box 218, Yorktown Heights, NY 10598 USA, Phone: (914) 945-2226, Fax: (914) 945-4440, E-mail: hovel@watson.ibm.com.

H4 - STATE-OF-THE-ART PROGRAM ON COMPOUND SEMICONDUCTORS XXX



(Electronics Division)

The 30th State-of-the-Art Program on Compound Semiconductors (SOTAPOCS) will address the most recent advances in compound semiconductors. Original contributions are solicited on materials

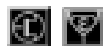
growth, characterization, processing, device fabrication, reliability, and other related topics. Papers on both practical issues and fundamental studies are solicited. Specific areas of interests include: 1. Novel devices and materials growth; 2. New advances of processing technologies, including wet and dry etching, selective oxidation, dielectric deposition, nano-structure fabrication, Schottky and ohmic contact formation, ion implantation, activation and isolation, passivation and annealing, microcleaving, bonding and packaging, and so on; 3. Characterization of materials, devices, and processes, including non-destructive evaluation and in situ and ex situ process characterization; 4. Wide bandgap material growth and processing; 5. Wafer-level testing and mapping; 6. Device degradation mechanisms; 7. Monolithic device integration; 8. High-speed III-V electronics technologies for wireless, automotive and microwave applications; and 9. Fundamental optical, electrical, and other physical properties.

The symposium will consist of both invited and contributed papers.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. R. Abernathy**, Department of Materials & Science Engineering, University of Florida, Gainesville, FL 32611 USA, Phone: (352) 846-1087, Fax: (352) 846-1182, E-mail: caber@quartz.mse.ufl.edu; **R. E. Sah**, Fraunhofer Institute for Applied Solid-State Physics, Tullastrasse 72, D-79108 Freiburg, Germany, Phone: 49 761 5159 175, Fax: 49 761 5159 400, E-mail: sah@iaf.fhg.de; **A. Baca**, Sandia National Laboratories, Albuquerque, NM 87185 USA, Phone: (505) 844-7127, Fax: (505) 844-8985, E-mail: agbaca@sandia.gov; **D. N. Buckley**, Department of Physics, University of Limerick, Limerick, Ireland, Phone: 383-61-202-902, Fax: 383-61-207-423, E-mail: noel.buckley@ul.ie; and **K. H. Chen**, Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan, Phone: 886-2-2366-8232, Fax: 886-2-2366-8232, E-mail: chenkh@po.iam.s.sinica.edu.tw.

11 - ELECTRONICS/DIELECTRIC SCIENCE AND TECHNOLOGY JOINT GENERAL SESSION



(Electronics Division/Dielectric Science and Technology Division)

Original papers are solicited on all aspects of electronic materials, devices, and processing technologies not covered by specialized topical symposia at this Meeting. The sessions will be organized depending on the content of the Meeting Abstracts. One or more of the sessions may be organized as a poster session. Contributors should specify their preference as to poster or oral presentation, and all efforts will be made to accommodate their requests.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **M. J. Deen**, School of Engineering, Simon Fraser University, Burnaby, B.C. Canada, V5A 1S6, Phone: (604) 291-3248, Fax: (604) 291-4951, E-mail: jamal@cs.sfu.ca; **W. D. Brown**, 3217 Bell Center, University of Arkansas, Fayetteville AR 72701 USA, Phone: (501) 575-6045, FAX: (501) 575-7965, E-mail: wdb@engr.uark.edu; **R. K. Ulrich**, 3202 Bell Center, University of Arkansas, Fayetteville, AR 72701 USA, Phone: (501) 575-5645, Fax: (501) 575-7926, E-mail: rku@engr.uark.edu; **K. B. Sundaram**, Department of Electrical and Computer Engineering, University of Central Florida, Orlando, FL 32816, Phone: (407) 823-5326, Fax: (407) 823-5835, E-mail: kbs@ece.engr.ucf.edu; and **R. B. Fair**, Duke University, Department of Electrical and Computer, Engineering, Durham, NC 27708, Phone: (919) 660-5277, Fax: (919) 660-5221, E-mail: rfair@ee.duke.edu.

J1 - ADVANCES IN RAPID THERMAL PROCESSING



*(Electronics Division/Dielectric Science and Technology Division/
High Temperature Materials Division)*

The objective of this symposium is to become an annual international forum for the discussion of all aspects of RTP. The program will address recent innovations in RTP equipment issues as well as RTP processes and their applications in the fabrication of advanced semiconductor and other devices. Papers are solicited in the following

areas: 1. Ultra-thin gate dielectrics and MOS gate stacks (thermal and RTCVD oxides, nitrides and novel higher dielectric constant materials for future generation integrated circuits, polysilicon deposition and doping, doping diffusion through gate dielectric, and novel gate electrode materials, novel silicide processes on polysilicon gate electrode); 2. Ultra-shallow junctions and contacts (formation of ultra-shallow junctions, low energy ion-implantation and short time annealing, in-situ doped or implanted solid diffusion sources, low resistivity contacts to ultra-shallow junctions: novel self-aligned silicide processes); 3. Epitaxial growth (epitaxial growth of Si, Si/Ge and compound semiconductors by RTCVD and their device applications); 4. Equipment issues (novel ultra-short time annealing techniques, temperature measurement and control, uniformity, equipment design and modeling, throughput, cluster tools, in situ cleaning, etc.); 5. New applications of RTP (applications of RTP in back-end processing of integrated circuits, flat panel displays, compound semiconductors, glass reflow, novel processing such as UV processing, magnetic thin films, etc.).

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **F. Roozeboom**, Philips Research Laboratories (WA 14), Prof. Holstlaan 4, 5656 AA Eindhoven, The Netherlands, Phone: 31-40-2742767, Fax: 31-40-2743352, E-mail: roozeboo@natlab.research.philips.com; **J. Gelpey**, Steag-AST Elektronik, 4904 Heatherwood Lane, Peabody, MA 01960 USA, Phone: (978) 535-2260, Fax: (978) 535-1677, E-mail: jeffast@aol.com; **M. C. Ozturk**, North Carolina State University, Department of Electrical and Computer Engineering, PO Box 7911, Raleigh, NC 27695-7911 USA, Phone: (919) 515 5245, Fax (919) 515-3027, E-mail: mco@eos.ncsu.edu; **J. Nakos**, IBM Microelectronics, Department FJZ, 1000 River Road, Essex Junction, VT 05452-4299, USA, Phone (802)-769-8780, Fax (802)-769-9659, E-mail: jnakos@us.ibm.com; and **S. E. Mohnney**, The Pennsylvania State University, Department of Materials Science and Engineering, 221 Steidle Building, University Park, PA 16802-5006 USA, Phone: (814) 863-0744, Fax: (814) 865-2917, E-mail: sem2@psu.edu.

K1 - HYDROGEN ENERGY TECHNOLOGIES FOR THE 21ST CENTURY



(Energy Technology Division/Battery Division)

New environmental legislation such as the California initiative to considerably lower and to ultimately eliminate emissions of pollutants from automobiles and the growing awareness of dangerous progression in greenhouse gases as we approach the 21st century have rekindled interest in hydrogen energy technologies. Efforts to combat these environmental issues such as The USA Partnership for a New Generation of Vehicles Program, initiated in 1993 with an objective of tripling the efficiency for fuel consumption, have provided an impetus for the accelerated development for fuel cell/battery hybrid vehicles. This together with the need for cleaner energy sources with lower greenhouse emissions promise to provide an overall fillip to hydrogen energy technologies in the 21st century.

This symposium will focus on fundamental and technology development aspects in the following areas: 1. Hydrogen production from primary energy sources: such as natural gas, petroleum, coal, solar, wind, biomass, nuclear: for example, partial oxidation/steam reforming/shift conversion, water electrolysis etc.; 2. Hydrogen storage: high pressure compressed gasses, metal hydrides, liquid hydrogen, hydrogen adsorption in high surface area materials such as carbon powders, fibers and nanotubes; 3. Hydrogen transmission/distribution: chemical conversion routes, conventional transportation; 4. Chemical to electric energy conversion: fuel cells, gas turbines; 5. Hydrogen powered vehicles: fuel cell, fuel cell hybrid with battery or internal combustion engines; 6. Hydrogen batteries: nickel/hydrogen, nickel metal hydrides; 7. Safety; and 8. Technical and economic aspects of hydrogen energy technologies in the 21st century.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **S. Mukerjee**, Department of Applied Science, Brookhaven National Laboratory, Upton, NY 11973 USA, Phone: (516) 344-4973, Fax: (516) 344-4071, E-mail: muk-

erjee@bnl480.das.bnl.gov; **J. Ogden**, Center for Energy and Environmental Studies, Princeton University, Engineering Quadrangle, PO Box CN 5236, Princeton, NJ 08544-5236 USA, Phone: (609) 258-5470, Fax: (609) 258-3661, E-mail: ogden@phoenix.princeton.edu; **S. Srinivasan**, Center for Energy and Environmental Studies, Princeton University, Engineering Quadrangle, PO Box CN 5236, Princeton, NJ 08544 USA, Phone: (609) 258-5217, Fax: (609) 258-3661, E-mail: srini@princeton.edu; and **R. A. Bowman, Jr.**, Jet Propulsion Laboratory, MS 157-316, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, Phone: (818) 354-7941, Fax: (818) 393-4206, E-mail: robert.c.bowman-jr@jpl.nasa.gov.

K2 - NANOSCOPIC MATERIALS FOR ENERGY CONVERSION



(Energy Technology Division)

The preparation and characterization of materials and composites on a nanometer scale are becoming increasingly important in the field of energy conversion. Examples include catalysts for fuel cell applications and semiconductors for photovoltaic and photoelectrochemical solar energy conversion. This Symposium will focus on critical issues and latest advancements in the science and technology of nanostructured materials for energy conversion applications. Papers are solicited in all areas related to materials including metals, semiconductors, and organic compounds/polymers.

Areas of interest include: 1. Semiconductor and metal nanoparticles and metal/semiconductor nanocomposites; 2. Size quantization effects in semiconductor nanoparticles; 3. Surface modification and characterization including tunneling and force microscopies; 4. Photoinduced charge separation and interfacial charge transfer; 5. Dye-sensitization of semiconductors; 6. Photoelectrochemistry of nanostructured films; 7. Photocatalysis and environmental applications; 8. Nanostructured catalysts for fuel cells; 9. Metal/polymer nanocomposites and membranes; and 10. Nanostructured sensor surfaces.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **K. Rajeshwar**, Department of Chemistry and Biochemistry, The University of Texas at Arlington, Arlington, TX 76019-0065 USA, Phone: (817) 272-3810, Fax: (817) 272-3808, E-mail: rajeshwar@uta.edu; **P. V. Kamat**, Radiation Laboratory, University of Notre Dame, Notre Dame, IN 46556-0579 USA, Phone: (219) 631-5411, Fax: (219) 631-8068, E-mail: kamat.1@nd.edu; and **H. Arakawa**, Department of Physical Chemistry, National Institute of Materials and Chemical Research, 305 Higashi 1-1, Tsukuba, Ibaraki, Japan, Phone: 81-298-54-4410, Fax: 81-298-54-4524, E-mail: H. Arakawa@ccmail.nimc.go.jp.

K3 - PHOTOVOLTAICS FOR THE 21ST CENTURY



(Energy Technology Division/

National Renewable Energy Laboratory - NREL)

Recent scientific and technical developments made in the photovoltaic (PV) technology have helped lower the cost of PV modules and overall price of PV systems. Consequently, the PV technology is making entry into a variety of commercial markets and it is likely to make significant contributions, globally, to the power generation industry in the 21st century. To achieve this position, the PV technology has to compete economically with the conventional means of power generation from fossil and nuclear fuel. To secure this competitive status, the PV technology has to bring about substantial further cost reductions which may require adaptation of revolutionary concepts rather than slow evolutionary development of the current technologies. A variety of interdisciplinary scientific and technical developments that may be assimilated in the PV technology can help achieve this status. This symposium will focus on using advanced concepts that are not being used in the PV industry today but are likely to be used commonly in the 21st century. Contributed publications of both fundamental and applied nature leading to maximum utilization of solar energy for electric power generation are solicited. Some of the suggested general areas of interest are: 1. New devices and structures

including thin film silicon, organic solar cells and dye-sensitized photo-electrochemical cells; 2. Device modeling; 3. New PV materials including nanoparticle concepts; 4. Material synthesis, smart materials; 5. Thin films; 6. Optical designs including holographic concepts; 7. Interfacial studies; 8. Contacts and interconnects; 9. Recycling of materials; 10. Efficient and low-cost manufacturing techniques; 11. Process control; 12. Materials and device characterization; 13. Batteries for PV systems; 14. PV generated hydrogen; 15. Hybrid systems; and 16. Environmental issues and other related topics.

Publication of a Proceedings volume is planned. Acceptance of a paper for presentation will obligate the author(s) to submit a camera-ready manuscript at the meeting.

Abstracts, suggestions and inquiries should be sent to the ECS Headquarters and symposium organizers: **V. K. Kapur**, International Solar Electric Technology (ISET), 8635 Aviation Boulevard, Inglewood, CA 90301 USA, Phone: (310) 216-4427, Fax: (310) 216-2908, E-mail: vkkapur@earthlink.net; **R. D. McConnell**, National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, CO 80401 USA, Phone: (303) 384-6419, Fax: (303) 384-6481, E-mail: robert_mcconnell@nrel.gov; **D. Carlson**, Solarex, 826 Newtown-Yardley Road, Newtown, PA 18940 USA, Phone: (215) 860-0902, Fax: (215) 860-2986, E-mail: dcarlson@solarex.com; **G. P. Ceasar**, National Institute of Standards and Technology, A415 Administration Building, Gaithersburg, MD 20899 USA, Phone: (301) 975-5069, Fax: (301) 548-1087, E-mail: gerald.ceasar@nist.gov; and **A. Rohatgi**, Georgia Institute of Technology, School of Electrical and Computer Engineering, 777 Atlantic Drive, NW, Atlanta, GA 30332-0250, Phone: (404) 894-7692, Fax: (404) 894-5934, E-mail: ajeet.rohatgi@ece.gatech.edu.

L1 - ALTERNATIVE FUELS AND PROCESSES FOR ELECTROCHEMICAL ENERGY CONVERSION



(Energy Technology Division/

Industrial Electrolysis and Electrochemical Engineering Division)

This Symposium will provide an interdisciplinary forum to present and discuss issues related to the choice of fuels for use with low temperature fuel cells, especially in light duty transportation applications. Fourteen automobile manufacturers are investigating the Polymer Electrolyte Fuel Cell (PEFC) for powering electric vehicles (EVs). The choice of fuels for fuel cell powered EVs is under active debate. Some developers advocate using stored H₂ as the fuel, while other developers advocate on-board generation of H₂ produced by reforming liquid fuels.

Papers are solicited on a broad range of topics including (but not limited to): 1. Comparison of fuel options; 2. Description and modeling of small scale systems for producing H₂ from alcohol and/or hydrocarbon fuels (including steam reforming, partial oxidation reforming, water gas shift and CO cleanup processes, etc.); 3. Advances in catalysts for steam reforming, partial oxidation, water gas shift, and preferential oxidation; 4. Fuel impurity issues (such as CO and "sulfur" tolerance); 5. Novel H₂ storage approaches; 6. Comparison of H₂-fueled PEFCs vs. direct methanol fuel cells; and 7. Fuel infrastructure issues.

Keynote lectures will be presented by invited speakers.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. J. Bellows**, Exxon Research and Engineering, Route 22 East, Annandale, NJ 08801 USA, Phone: (908) 730-2713, Fax: (908) 730-3198, E-mail: rjbello@erenj.com; and **R. F. Savinell**, Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH 44106-7218 USA, Phone: (216) 368-2728, Fax: (216) 368-3016, E-mail: rfs2@po.cwru.edu.

M - FULLERENES: CHEMISTRY, PHYSICS AND NEW DIRECTIONS XII



(Fullerenes Group)

Papers are invited for the symposium in the areas listed below. Authors should clearly state the appropriate subsection, 1 through 10, on the Meeting Abstract. Some papers selected for inclusion in the program may be assigned to a poster session.

Publication of a Proceedings Volume is planned. Acceptance of a

paper for presentation will obligate the author(s) to submit a camera-ready manuscript at the meeting. The Proceedings Volume will include sections as the topics listed below. Specific details about the format for contributed papers for the Proceedings Volume can be obtained from the Session Organizers of each session.

Questions and information may be obtained from: **K. M. Kadish**, University of Houston, Department of Chemistry, Houston, TX 77204-5641 USA, Phone: (713) 743-2740; Fax: (713) 743-2745; E-mail: kkadish@uh.edu, or **P. V. Kamat**, Notre Dame Radiation Laboratory, Notre Dame, IN 46556-0579, Phone: (219) 631-5411, Fax: (219) 631-8068, E-mail: pkamat@nd.edu.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers of the appropriate section listed below:

M1. ELECTROCHEMISTRY AND ESR: **F. D'Souza**, Department of Chemistry, Wichita State University, 1845 Fairmont, Wichita, KS 67260-0051, USA Phone: (316) 978-3120, Fax: (316) 689-3431, E-mail: dsouza@wsuhub.uc.twsu.edu, and **L. Echegoyen**, University of Miami, Department of Chemistry, Coral Gables, FL 33124 USA, Phone: (305) 661-2847, Fax: (305) 284-4571, E-mail: lechegoyen@umiami.edu.

M2. PHOTOPHYSICS AND PHOTOCHEMISTRY (Energy and Electron Transfer, Excited State Properties): **D. M. Guldi**, Radiation Laboratory, University of Notre Dame, Notre Dame, IN 46556, USA Phone: (219) 631-7441, Fax: (219) 631-8068, E-mail: guldi@marconi.rad.nd.edu; **K. P. Dinse**, Phys. Chem. III, Tu Darmstadt, Petefrenstrasse 20, D-64287 Darmstadt, Germany, Phone: 49-6151-162607, Fax: 49-6151-164347, E-mail: dinse@pc07.pc.chemie.tu-darmstadt.de; and **R. V. Bensasson**, Laboratoire de Biophysique, Museum National d'Histoire Naturelle, CNRS UA 481, INSERM U201, 43 Rue Cuvier, 75231, Paris Cedex 05, France, Phone: 33-1-4079-3708, Fax: 33-1-4079-3705, E-mail: rvb@mnhn.fr.

M3. FULLERENE FUNCTIONALIZATION (Organic Functionalization and Organometallics): **M. Maggini**, Centro Meccanismi CNR, Department of Organic Chemistry, University of Padova, Via Marzolo, 1, 35131 Padova, Italy, Phone: 39-49-827-5662, Fax: 39-49-827-5239, E-mail: maggini@chor02.chor.unipd.it; and **S. R. Wilson**, Department of Chemistry, New York University, 100 Washington Square East, New York, NY 10003-6688 USA, Phone: (212) 998-8461, Fax: (212) 260-7905, E-mail: spherebio@aol.com.

M4. BIOCHEMICAL/PHARMACEUTICAL (Pharmaceutical, Biological, Biotechnology, and Medical Applications): **S. R. Wilson**, Department of Chemistry, New York University, 100 Washington Square East, New York, NY 10003-6688 USA, Phone: (212) 998-8461, Fax: (212) 260-7905, E-mail: spherebio@aol.com; and **L. Y. Chiang**, Center for Condensed Matter Sciences, National Taiwan University, 1, Roosevelt Road, Section 4, Taipei, Taiwan, Phone: 886-2-2362-5507, Fax: 886-2-2365-5404, E-mail: lychiang@ccms.ntu.edu.tw.

M5. THEORY (Quantum Chemistry, Topology, Statistical Mechanics, and Molecular Dynamics of Fullerenes): **E. Osawa**, Knowledge-Based Information Engineering, Toyohashi University of Technology, Tempaku-cho, Toyohashi 441, Japan, Phone: 81-532-47-0111 ext. 853, Fax: 81-532-48-5588, E-mail: osawa@cochem.tutkie.tut.ac.jp; and **Z. Slanina**, Knowledge-Based Information Engineering, Toyohashi University of Technology, Tempaku-cho, Toyohashi 441, Japan, Phone: 81-532-44-6880, Fax: 81-532-48-5588, E-mail: slanina@cochem2.tutkie.tut.ac.jp.

M6. ENDOFULLERENES: **T. Akasaka**, Graduate School of Science and Technology, Niigata University, Niigata 950-2181, Japan, Phone: 81-25-262-7390, Fax: 81-25-262-7390, E-mail: akasaka@gs.niigata-u.ac.jp.

M7. NANOTUBES AND NANOCARBONS: **S. Subramoney**, E. I. DuPont de Nemours & Company, DuPont Experimental Station, Building 228, Room 114, Route 141 and Rising Sun, Henry Clay, Wilmington, DE 19880-0228 USA, Phone: (302) 695-2992, Fax: (302) 695-1351, E-mail: subrams@esvax.dnet.dupont.com.

M8. SOLID-STATE PHYSICS (Structures, New Compounds, Superconductivity, Surfaces, Thin Films, Diffraction Studies, Thermal Properties and Electronic Properties, etc.): **K. Prassides**, School of Chemistry and Molecular Science, University of Sussex, Brighton, BN1 9QJ, UK, Phone: 44-273-677-7196, Fax: 44-273-677-7196, E-mail: k.prassides@sussex.ac.uk; **V. Buntar**, Atomic Institute of the Austrian Universities, Stadionallee 2, A-1020 Vienna, Austria, Phone: 43-1-72-701-296, Fax: 43-1-72-89-220, E-mail: buntar@ati.ac.at; and **K. Tanigaki**, Fundamental Research Laboratories, NEC Corporation, 34-Miyukigaoka, Tsukuba 305, Japan, Phone: 81-298-50-1138, Fax: 81-298-56-6136, E-mail: kat@ep.cl.nec.co.jp.

M9. Thermodynamics and Mass Spectroscopy (Solubility and

Solution Studies, Gas Phase Energetics and Formation Enthalpies): **O. V. Boltalina**, Chemistry Department, Moscow State University, 119899, Moscow, Russia, Phone: 095-939-53-73, Fax: 095-939-12-40, E-mail: ovb@capital.ru; and **A. L. Smith**, Chemistry Department, Drexel University, 32nd and Chestnut Streets, Philadelphia, PA 19104, USA, Phone: (215) 895-1861, Fax: (215) 895-1265, E-mail: allan.smith@drexel.edu.

M10. OPTICAL PROPERTIES OF FULLERENES (cosponsored by the Luminescence and Display Materials Division): **K. Hoffman**, Whitman College, Department of Physics, Walla Walla, WA 99362 USA, Phone: (509) 527-5273, Fax: (509) 527-5904, E-mail: hoffman@whitman.edu; and **W. M. Yen**, University of Georgia, Department of Physics and Astronomy, Athens, GA 30602 USA, Phone: (706) 542-2491, Fax: (706) 542-2492, E-mail: wyen@hal.physast.uga.edu.

N1 - SOLID-STATE IONIC DEVICES



(High Temperature Materials Division/
Sensor Division/Battery Division)

Solid-state electrochemical devices are becoming pervasive in our technologically driven lifestyles, and will become even more so as we enter the 21st century. A fundamental understanding of ionic transport and interfacial phenomena in ceramics is imperative to a wide variety of these devices, from solid oxide fuel cells and ceramic membranes to solid-state sensors and battery electrodes. The intent of this symposium is to provide a forum for current advances in ion conducting ceramics and the design, fabrication, and performance of devices that utilize them.

Papers are solicited in modeling and characterization of defect equilibria, ionic and electronic transport, stability, interfacial and electrocatalytic properties of ion conducting ceramics as well as design, fabrication, and evaluation of ionic devices. Specific topical areas of interest include: novel synthesis and processing of thin films, membranes, and nanostructured materials or devices; the effect of nanostructures on ionic transport and catalytic activity; recent advances in ionic and mixed electronic-ionic conducting materials; theoretical treatments of mixed conduction; and electrode kinetics, interfacial phenomena, and electrode microstructure pertaining to fuel cells, gas separation membranes and reactors, solid-state battery and microbattery electrodes, and chemical sensors.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **E. D. Wachsman**, Department of Materials Science and Engineering, University of Florida, Gainesville, FL 32611-6400 USA, Phone: (352) 846-2991, Fax: (352) 392-7219, E-mail: ewach@mse.ufl.edu; **M.-L. Liu**, School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0245 USA, Phone: (404) 894-6114, Fax: (404) 894-9140, E-mail: meilin.liu@mse.gatech.edu; **J. R. Akridge**, Eveready Battery Company, Inc., P.O. Box 450777, Westlake, OH 44145-0616 USA, Phone: (440) 835-7754, Fax: (440) 835-8685, E-mail: jamesr.akridge@energizer.com; and **N. Yamazoe**, Department of Molecular and Material Science, Graduate School of Engineering Science, Kyushu University, Kasuga-shi, Fukuoka 816-8580, Japan, Phone: 81-92-583-7537, Fax: 81-92-575-2318, E-mail: noborigz@mbox.nc.kyushu-u.ac.jp.

O1 - TUTORIALS IN ELECTROCHEMICAL ENGINEERING- MATHEMATICAL MODELING



(Industrial Electrolysis and Electrochemical Engineering
Division/Energy Technology Division/Battery Divisions)

Modeling and simulation are important tools for developing an understanding of electrochemical processes and phenomena. The uses of these techniques often accelerate optimization and implementation of technology as well as reduce developing costs. In this symposium tutorial papers will be presented on mathematical techniques, solution algorithms, and approaches in simulating electrochemical phenomena and

processes. All scales are to be addressed including molecular, microscopic, macroscopic, and system levels.

The papers may address issues related to interfacial process, transport processes, coupled and complex phenomena. Advanced problem formulations that enhance solution efficiency will be relevant. Also of interest will be papers that demonstrate the use of commercially available simulation packages. Application papers that demonstrate techniques, validity, interpretation, parameter estimation, and model limitations are sought. Fields of applications will include batteries, fuel cells, electrodeposition and corrosion, electrosynthesis, and a generalization to all fields of electrochemical applications. The papers will be tutorial in nature to advance the education of scientists and engineers.

The symposium will consist of both invited and contributed papers.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript and list of key words by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. F. Savinell**, Department of Chemical Engineering, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106 USA, Phone: (216) 368-2728, Fax: (216) 368-3016, E-mail: rfs2@po.cwru.edu; **A. C. West**, Department of Chemical Engineering, Columbia University, New York, NY 10027 USA, Phone: (212) 854-4452, Fax (212) 854-3054, E-mail: acw17@columbia.edu; **J. M. Fenton**, University of Connecticut, Department of Chemical Engineering, U-222, Room 208, Storrs, CT 06269-3222 USA, Phone: (860) 486-2490, Fax: (860) 486-2959, E-mail: jmfent@eng2.uconn.edu; and **J. Weidner**, Department of Chemical Engineering, Swearingen Engineering Center, University of South Carolina, Columbia, SC 29208 USA, Phone: (803) 777-3207, Fax: (803) 777-8265, E-mail: weidner@engr.sc.edu.

O2 - INDUSTRIAL ELECTROLYSIS AND ELECTROCHEMICAL ENGINEERING GENERAL SESSION



(Industrial Electrolysis and Electrochemical Engineering Division)

Papers are solicited in areas of industrial electrochemical engineering that are not covered by other symposia at this Meeting. Of particular interest are papers concerning: design, operation, testing, and/or modeling of industrial electrochemical systems; electrochemical waste treatment technologies; methods for electrosynthesis; electrode and membrane technologies; development of microelectrochemical systems; electrolytic recovery of process materials; and electrocatalysts. Contributed papers will be programmed in some related order, depending on the titles and content of the abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizer: **G. Pillay**, Los Alamos National Laboratory, TSA-10, M/S K-575, Los Alamos, NM 875-45 USA, Phone: 505-667-4134, Fax: 505-665-7429, E-mail: gpillay@lanl.gov.

P1 - ELECTRODE AND CELL DESIGN ADVANCES IN MOLTEN SALT SYSTEMS: ELECTROLYSIS, BATTERIES, AND FUEL CELLS



*(Industrial Electrolysis and Electrochemical Engineering Division/
Energy Technology Division/Battery Division)*

This symposium will provide a forum to review recent progress in new electrochemical technology using molten salt electrolytes. Topics will include new electrode designs and materials, and novel cell design and operation. Papers are solicited from all areas and industries, including electrolysis, electrodeposition, batteries, fuel cells, and environmental applications. Presentations on such industrially significant processes as fluorine production, manufacture of aluminum, magnesium, titanium, lithium and other metals, and electrorefining are welcome. Also included are papers on the use of electrochemically-regenerated molten salt electrolytes in chemical synthesis or destruction, or other novel applications.

Papers are encouraged in fundamental laboratory studies, mod-

eling and recent industrial applications of advanced technologies and technological improvements in cell design, operations, equipment, and components. Presentations dealing with the business and economic aspects of new electrode technology or implementation of new cell designs are also encouraged. Other papers that relate to the symposium title will be considered.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. W. Walton**, FMC Corporation, Chemical R&D Center, US Highway 1 at Plainsboro Road, P.O. Box 8, Princeton, NJ 08543-0008 USA, Phone (609) 951-3189, Fax: (609) 951-3668, E-mail: clifford_walton@fmc.com; **R. Keller**, EMEC Consultants, 4221 Roundtop Road, Export, PA 15632-1834 USA, Phone: (724) 325-3260, Fax: (724) 335-8402, E-mail: emec@westol.com; or **J. R. Selman**, Illinois Institute of Technology, Center for Electrochemical Science and Engineering, 10 West 33rd Street, Chicago, IL 60616-3730 USA, Phone: (312) 567-3970, Fax: (312) 567-6914, E-mail: selman@charlie.cns.iit.edu.

O1 - MECHANISTIC ASPECTS OF BIOLOGICAL ELECTRON TRANSFER



(Organic and Biological Electrochemistry Division)

Electron-transfer (ET) reactions are key steps in a diverse array of biological transformations ranging from photosynthesis to aerobic respiration. The unique simplicity of ET reactions has fostered the development of highly successful theoretical models that describe rates in terms of a small number of experimentally accessible parameters. A vital synergy between theory and experiment provides the foundation for efforts to explain how biological ET reactions can proceed rapidly over quite long distances, at low driving forces, with remarkable selectivities. This symposium will focus on important current issues in biological electron transfer. Both electrochemical and non-electrochemical approaches for investigating these reactions are of interest. Contributions are solicited in the following areas: ET in proteins and protein-protein complexes; ET of proteins at electrode interfaces; conformational control in biological ET reactions; the role of ET reactions in enzyme function and electrocatalysis; ET in nucleic acids; and theory of biological ET reactions.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **E. F. Bowden**, Department of Chemistry, North Carolina State University, Raleigh, NC 27695-8204 USA, Phone: (919) 515-7069, Fax: (919) 515-5079, E-mail: bowden@chemdept.chem.ncsu.edu; **K. Niki**, Department of Chemistry, Iowa State University, Ames, IA 50011-3111 USA, Phone: (515) 294-3955, Fax: (515) 294-0105, E-mail: kniki@iastate.edu; **F. A. Schultz**, Department of Chemistry, Indiana University - Purdue University Indianapolis, Indianapolis, IN 46202-3274 USA, Phone: (317) 278-2027, Fax: (317) 274-4701, E-mail: schultz@chem.iupui.edu; and **J. R. Winkler**, Beckman Institute, Mail Code 139-74, California Institute of Technology, Pasadena, CA 91125 USA, Phone: (626) 395-2834, Fax: (626) 449-4159, E-mail: winklerj@cco.caltech.edu.

O2 - ORGANIC ELECTROCHEMISTRY: 2000 AND BEYOND



(Organic and Biological Electrochemistry Division)

This symposium is intended to highlight areas where organic electrochemistry might be expected to witness new advances and developments in the 21st century such as Smart Electrodes (electrodes modified to respond selectively to specific components of a solution); Design of New Electrolysis Media; Asymmetric Electroorganic Synthesis; Design of New Electroactive Functional Groups; New Strategies for Electron Transfer Control; Visualization of the Structures of Intermediates on Electrodes by scanning electrode potential microscopy; Atomic force microscopy, and other techniques capable of nanometer-scale resolution; and Sensors. The preceding topics may be considered as representative examples; they are not meant to be restrictive. In general, we hope to showcase a variety of new directions that organic electrochemistry may take in the future, as well as newer develop-

ments in more well-established areas of the science. Both invited and contributed papers are planned. Contributions are solicited in the above areas and related topics.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **J. Lessard**, Department of Chemistry, University of Sherbrooke, Sherbrooke, Quebec, Canada J1K 2R1, Phone: (819) 821-7091, Fax: (819)821-8017, E-mail: jlessard@courrier.usherb.ca; **A. J. Fry**, Department of Chemistry, Wesleyan University, Middleton, CN 06459 USA, Phone: (203) 685-2622; Fax: (203) 685-2211; E-mail: afry@wesleyan.edu; and **H. Tanaka**, Department of Applied Chemistry, Faculty of Engineering, Okayama University, Okayama 700-8530, Japan, Phone: 81-86-251-8074, Fax: 81-86-255-3424, E-mail: tanaka95@cc.okayama-u.ac.jp.

Q3 - ORGANIC AND BIOLOGICAL ELECTROCHEMISTRY GENERAL SESSION



(Organic and Biological Electrochemistry Division)

Papers concerning any aspect of organic and biological electrochemistry not covered by topic areas of other specialized symposia at this Meeting are welcome. Contributed papers will be programmed in some related order depending on the titles and contents of the Meeting Abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizer: **F. A. Schultz**, Department of Chemistry, Indiana University Purdue University Indianapolis (IUPUI), 402 North Blackford Street, Indianapolis, IN 46202-3272, USA, Phone: (317) 278-2027, Fax: (317) 274-4701, E-mail: schultz@chem.iupui.edu.

R1 - MODELING OF PROCESSES AT ELECTROCHEMICAL INTERFACES AND IN ELECTROCHEMICAL SYSTEMS



(Physical Electrochemistry Division)

Papers are solicited for the Physical Electrochemistry Division Symposium on Modeling of Processes at Electrochemical Interfaces and in Electrochemical Systems. Subjects can range from microelectrodes to industrial cells and batteries, but the emphasis should be on the elucidation of physical phenomena, including, possibly, complex chemistries and complex geometries. Papers of a general or philosophical nature dealing with the directions of computational architectures are also welcome.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **S. W. Feldberg**, Brookhaven National Laboratory, Building 815, Upton, NY 11973-5000 USA, Phone: (516) 344-4480, Fax: (516) 344-3137, E-mail: feldberg@bnl.gov; and **J. Newman**, University of California at Berkeley, Department of Chemical Engineering, 201 Gilman Hall #1462, Berkeley, CA 94720-1400 USA, Phone: (510) 642-4063, Fax: (510) 642-4778, E-mail: newman@cchem.berkeley.edu.

S1 - SPECTROSCOPIC TOOLS FOR ANALYSIS OF ELECTROCHEMICAL SYSTEMS



(Physical Electrochemistry Division/Electrodeposition Division)

This symposium will provide an interdisciplinary forum on the application of spectroscopic methods for study of electrochemical interfacial phenomena. Topics of interest include in situ spectroscopies and scanning probe microscopies, e.g. FTIR, Raman, ellipsometry, AFM, STM, NMR, and synchrotron-based techniques, such as surface diffraction and x-ray absorption fine structure (EXAFS), and ex situ electron-based spectroscopies such as Auger electron, X-ray photo electron, and electron (ion) scattering. Of particular interest are illustrations of the use of these methods to the study of well-ordered systems, e.g. adsorbates and deposits on single crystal surfaces, nanostructures, intermetallics, self-organizing systems, islands and defects. Also to be included are some theoretical aspects of interfacial systems.

Publication of a Proceedings Volume is planned. Acceptance of a

paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **F. Argoul**, Centre de Recherche Paul Pascal, Avenue Schweitzer 33600 PESSAC, France, Phone: (33) 55 684 5665, Fax: (33) 55 684 5600, E-mail: argoul@crpp.u-bordeaux.fr; **J. McBrean**, Department of Applied Science, Building 815, P.O. Box 5000, Brookhaven National Laboratory, Upton, NY 11973-5000 USA, Phone: (516) 344-4513, Fax: (516) 344-4071, E-mail: mcbreen@bnlarm.bnl.gov; **D. A. Scherson**, Department of Chemistry, Case Western Reserve University, Cleveland, OH 44106 USA, Phone: (216) 368-5186, Fax: (216) 368-3006, E-mail: dxs16@po.cwru.edu; and **A. Wieckowski**, Department of Chemistry, Box 56-5, University of Illinois, 600 South Mathews, Urbana, IL 61801 USA, Phone: (217) 333-7943, Fax: (217) 244-8068, E-mail: andrzej@aries.scs.uiuc.edu.

T1 - PHYSICAL ELECTROCHEMISTRY/FULLERENES JOINT GENERAL SESSION



(Physical Electrochemistry Division/Fullerenes Group)

Papers concerning any aspect of physical electrochemistry or fullerenes not covered by topic areas of other specialized symposia at this Meeting are welcome. Contributed papers will be programmed in some related order, depending on the titles and content of the Meeting Abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **A. Wieckowski**, Department of Chemistry, RAL 58B, Box-56-5, University of Illinois, 600 South Mathews Avenue, Urbana, IL 61801-3602 USA, Phone: (217) 333-7943, Fax: (217) 244-8068, E-mail: andrzej@aries.scs.uiuc.edu; and **R. S. Ruoff**, Novel Carbon Materials Laboratory, Department of Physics, Washington University, CB 1105, One Brookings Drive, St. Louis, MO 63130-4899 USA, Phone: (314) 935-8746, Fax: (314) 935-5258, E-mail: ruoff@wuphys.wustl.edu.

U1 - NEW DIRECTIONS IN ELECTROANALYTICAL CHEMISTRY



*(Physical Electrochemistry Division/Sensor Division/
Organic and Biological Electrochemistry Division)*

This symposium will be a forum to present the newest methods and technologies of electroanalytical chemistry. Instruments, methods, unusual media, materials and environments, spectroscopy, microscopy, separations, detection, data processing, and modeling, all fall within the purview of this symposium. Nonstandard electrode materials, solvents, electrolytes, and media as well as reference electrodes for these systems are appropriate topics. Protocols for measurements in situ, in vivo, and in systems with only adventitious electrolyte are apropos, as is electrode assembly and miniaturization. Improved electroanalytical selectivity, especially in biological matrices, is of interest. Sensor topics include devices based on any chemical and physical transduction mechanism derived from or applied to electrochemistry. New spectroelectrochemical and in situ spectroscopic techniques, as well as separation methods (e.g., CZE), are appurtenant. Electrochemical detection coupled to other analytical methods, and new microscopy methods, including improvements in SECM, SEM, voltage perturbations for voltammetry, and models for microelectrodes of unusual geometry and in low electrolyte media are of interest.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by December 1, 1998 to the editor J. Leddy. In the event of a large number of papers, some papers may be presented in a poster session.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **J. Leddy**, University of Iowa, Department of Chemistry, Iowa City, IA 52242 USA, Phone: (319) 335-1720, Fax: (319) 335-1270, E-mail: jleddy@blue.weeg.uiowa.edu; **M. D. Porter**, Iowa State University, Department of Chemistry, Ames, IA 50011 USA, Phone: (515) 294-6433, Fax: (515) 294-3254, E-mail: mporter@porter1.ameslab.gov; and **P. Vanysek**, Northern Illinois University, Department of Chemistry and

U2 - SINGLE CRYSTAL AND NANOSTRUCTURED ELECTRODES



(Physical Electrochemistry Division/Sensor Division/
Organic and Biological Electrochemistry Division)

This symposium provides forum for presentation of new results on electrochemistry on single-crystal and nanostructured electrodes in the context of the recent developments in surface science and nanotechnology. It provides an opportunity for interdisciplinary exchange between researchers in electrochemistry, surface science and materials science. Specific areas of interest (session topics) include: 1. Surface crystallography; 2. Characterization of adsorbates and metal deposits; 3. Electrode kinetics and catalysis at single crystal and nanostructured electrodes; 4. Double layer structure and supramolecules at solid electrodes; and 5. Electrochemical nanotechnology.

While the main emphasis in the symposium is on results obtained with single- and multi-component single crystal or nanostructured materials, papers which describe procedures, formalisms and methods useful in characterization of single-crystal and nanostructured electrodes will be accepted.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. Adzic**, Chemical Sciences Division, Department of Applied Sciences, Brookhaven National Laboratory, Upton, NY 11973 USA, Phone: (516) 344-4522, Fax: (516) 344-3137, E-mail: adzic@solids.phy.bnl.gov; **G. Brisard**, Departement de Chimie, 2500 Boul. Universitaire, Université de Sherbrooke, Sherbrooke, QC, Canada J1K 2R1, Phone: (819) 821-7093, Fax: (819) 821-8017, E-mail: gessie.brisard@courrier.usherb.ca; **J. Lipkowski**, Department of Chemistry and Biochemistry, University of Guelph, Guelph, Ontario, Canada N1G 2W1, Phone: (519) 824-4120, ext. 8543, Fax: (519) 766-1499, E-mail: lipkowski@chembio.uoguelph.ca; and **E. Stuve**, Department of Chemical Engineering, Box 351750, University of Washington, Seattle, WA 98195-1750 USA, Phone: (206) 543-1056, Fax: (206) 543-3778, E-mail: stuve@u.washington.edu.

V1 - TRANSPORTATION SENSORS



(Sensor Division)

Modern automobiles, trucks, aircraft, watercraft, and rail vehicles employ an ever increasing number of sensors to monitor critical system functions. The information from these sensors is used for component and system diagnostics and for feedback control to improve performance and fuel efficiency, to decrease emissions and wastes, to increase personnel safety, and to reduce maintenance down-time and costs. In order to operate properly in highly demanding environments, many of the present on-vehicle sensors have required significant advances in materials and device design. Additional government mandates and customer demands create further need for improvements in sensor technology. Research and development programs now involve multidisciplinary teams of scientists and engineers from industry, government, and universities.

This symposium will focus on recent developments in transportation sensor technologies and is intended to act as a forum for the large and diverse technical community involved in this area of research. Contributions are solicited on a broad range of sensor topics. These include the fundamental sensor sciences as well as the applications engineering, and the traditional device developments along with the emerging technologies. Suggested presentation areas are: lean burn

oxygen sensors, selective gas constituent sensors, new semiconductor and ceramic sensor materials, photonic physical and chemical sensors, fluid level and fluid quality sensors, fuel composition sensors, combustion sensors, pressure and temperature transducers, accelerometers, position/displacement/rotation sensors, hall effect sensors, air and fluid flow sensors, acoustic sensors and vibration damping control, corrosion and integrity sensors, smart sensor systems (for engine, powertrain or total vehicle control), health-based maintenance sensor systems, sensors for cabin air quality, navigation and guidance sensors, sensors for intelligent highway systems, collision avoidance sensors, sensors for extreme environments, electronic subsystems for sensors, algorithms or data processing strategies for use with advanced sensors, and reliability of sensors. Contributions in other transportation sensor areas not mentioned above are also welcomed.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. W. Cernosek**, Microsensor R&D Department, Sandia National Laboratories, P.O. Box 5800, M/S 1425, Albuquerque, NM 87185-1425 USA, Phone: (505) 845-8818, Fax: (505) 844-1198, E-mail: rwcerno@sandia.gov; **R. E. Soltis**, Ford Research Laboratories, MD 3028/SRL, 20,000 Rotunda Drive, Dearborn, MI 48121-2053 USA, Phone: (313) 323-1708, Fax: (313) 322-7044, E-mail: rsoltis@ford.com; and **E. N. Balko**, Auto Emissions Systems R&D, Engelhard Corporation, 101 Wood Avenue, Iselin, NJ 08830-0770 USA, Phone: (732) 205-5288, Fax: (732) 205-5300, E-mail: ed.balko@engelhard.com.

W1 - SECOND INTERNATIONAL SYMPOSIUM ON GOVERNMENT, ACADEMIC, AND INDUSTRIAL INTERACTIONS IN THE NEW GLOBAL ECONOMIC ENVIRONMENT



(New Technology Subcommittee/Electronics Division/
Dielectric Science and Technology Division)

The object of this symposium is to provide a window for members of the Electrochemical Society on the changing research and development environment. An international group of contributed and invited speakers, representing industry, government, and academia, would address these important issues.

These issues will include but are not restricted to: the impact of the new global economic perspective on research and development; current policy perspectives on long term research and development; the amount of basic research performed in industrial labs; the relationships between research groups across national borders; the interrelationship of industry, academia, and government labs around the globe; expanded expectations of the scientist and engineer in today's environment; changing skills for scientists and engineers; the changes in the university science and engineering curricula; technical management; preparation for tomorrow's challenges.

After a full day session on these topics, an evening rump session will take place where you are encouraged to bring your concerns and questions on these important issues to our community.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **V. R. McCrary**, National Institute of Standards and Technology, Room B256/225, Gaithersburg, MD 20899 USA, 301-975-4321, E-mail: victor.mccrary@nist.gov; **R. L. Opila**, Lucent Bell Laboratories, Room 1D-352, 600 Mountain Avenue, Murray Hill, NJ 07974-0636 USA, Phone: (908) 582-3390, Fax: (908) 582-3957, E-mail: opila@lucent.com; **B. Schwartz**, Consultant, 321 Orenda Circle, Westfield, NJ 07090 USA, Phone: (908) 233-6444; **T. Sugano**, Tokyo University, 5-28-20 Hakusan, Bunkyo-ku, Tokyo, Japan, Phone: 81-33 94 57 241, E-mail: sugano@hakusan.tokyo.ac.jp; **J. P. Dismukes**, College of Engineering, 1016 Nitschke Hall, University of Toledo, Toledo, OH 43606-3390 USA, Phone: (419) 530-8060, Fax: (419) 530-8065, E-mail: jdismuke@eng.utoledo.edu; and **D. N. Buckley**, Department of Physics, University of Limerick, Limerick, Ireland, Phone: 383-61-202-902, Fax: 383-61-207-423, E-mail: noel.buckley@ul.ie.

Abstract Preparation Instructions

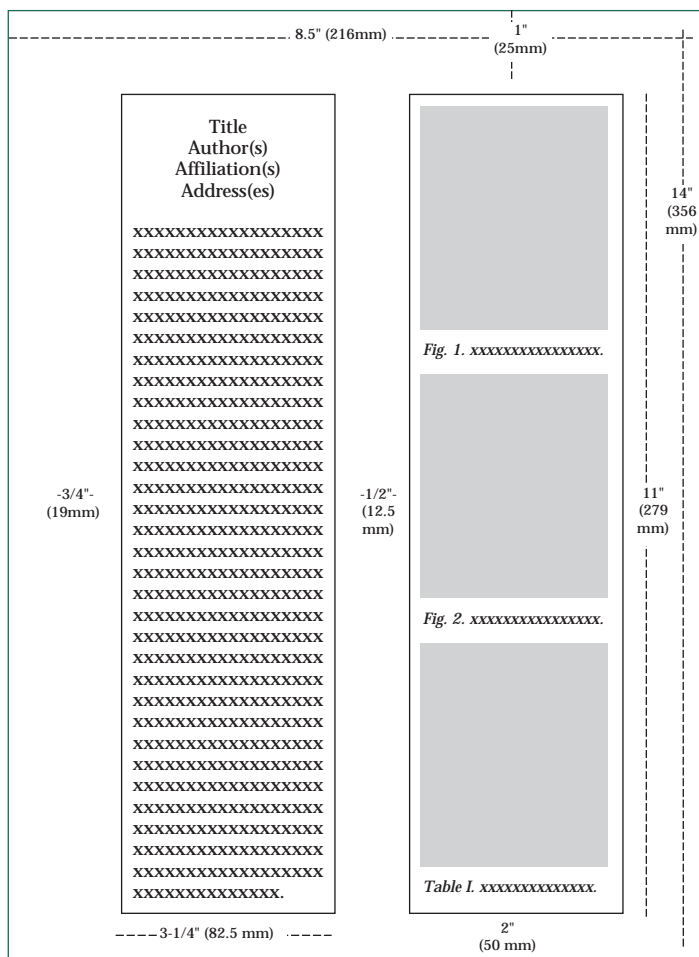
Abstract Format—Abstracts are required to be no more than one page in length consisting of two columns 3.25 x 11 in. (82.5 x 279 mm), approximately 800 words total or 400 words per column. A recommended format is one column of text and references and an additional column of tables, graphs, or figures. You may use any white bond paper 8.5 x 14 in. (216 x 356 mm). For international standards, white bond A3 paper (297 x 420 mm) may also be used, but the right side should be trimmed so that the total trimmed width is 216 mm and trim the length so that the total trimmed length is 356 mm. Type the body of the abstract **single-spaced** using black ink. The preferred font for laser printers is 10-point Times. Type author(s), affiliation(s), and address(es) at the top as shown above. Failure to follow these guidelines will result in the rejection of the paper. Abstracts may be submitted either electronically or on paper.

Preparing Abstracts Electronically—All authors are encouraged to submit their meeting abstracts electronically. For those authors with access to the World Wide Web, you may read information about preparing your meeting abstract electronically from "http://www.electrochem.org/abstracts.html". Processing of the electronic submissions is accomplished by the ECS Tool for Abstract Submission via the Internet (ECSTASI). To use the ECSTASI Web interface, go to "http://www.electrochem.org/ecstasi". These instructions, and much more information about the ECS electronic meeting abstracts, are available from the ECS World Wide Web Home Page at "http://www.electrochem.org".

Preparing Abstracts on Paper—Camera-ready typing mats may be obtained from the Society Headquarters Office. Follow the instructions carefully. If you are using a laser printer which cannot accommodate legal size paper, make each column 3.25 x 11 in. (82.5 x 279 mm) and securely paste the column onto the camera-ready typing mats or a legal size sheet within the proper margins. Published abstracts are photo-offset from the copy that you prepare. We will not retype your abstract and it will appear the way you prepare it. Abstracts will NOT be accepted via FAX or ordinary E-mail.

Publication—All scheduled papers will be published in the Meeting Abstracts Volume, copyrighted by The Electrochemical Society, Inc. The volume is published photo-offset directly from copy submitted by the author. The volume size is 7 X 10 in. (178 x 254 mm); therefore, it is mandatory that the typing be clear and all lettering should be the size of ordinary type or at least 1/16 in. (1.6 mm) high so that it will be legible after reduction.

Sample Abstract Diagram



ABSTRACT SUBMISSION FORM

Seattle, Washington
May 2-7, 1999

Abs. No. _____
(Assigned by the Society)

Submit to: The Electrochemical Society
10 South Main Street, Pennington, NJ 08534-2896 USA
With a copy to the Symposium Organizer(s)—by January 2, 1999

PLEASE TYPE

Symposium Code and Title: _____

Sponsoring Division(s)/Group(s) _____

Title of Paper: _____

Author(s), with complete mailing address(es) - (List presenting author FIRST and include contact author's telephone and fax numbers and e-mail address. Please group authors at the same address when possible).

1 _____

2 _____

3 _____

4 _____

5 _____

Do you plan to present more than one paper at this Meeting?

☐ No

☐ Yes; If so, indicate Symposia _____

Do you require any audio-visual equipment?

☐ 35mm (2x2") slide projector

☐ Overhead projector

☐ Please indicate other equipment at author's expense and subject to availability.

☐ Check here to receive information about membership in The Electrochemical

Society, Inc. Information will be sent to author(s) # _____ listed above

Deadline for Submission of Abstracts: January 2, 1999

Abstracts received after January 2, 1999 will be rejected.
All abstracts and oral presentations must be in English and are required to be no more than one page in length.

Topics appropriate for inclusion in the symposium include the origins of various defects; mechanical, chemical, and electrical effects of defects in the bulk, in epitaxial or SOI layers, or at wafer surfaces and interfaces; interactions between two or more defect species (agglomeration, gettering, diffusion, etc.); techniques, including rapid thermal processing, for defect modification or annihilation; and methods for characterizing defects. Both theoretical and experimental papers are solicited. It is expected that the papers will be grouped into cohesive sessions, each introduced by an invited state-of-the-art paper.

Authors must submit a 500-word abstract in English, double spaced, together with any necessary tables or figures, indicating title, author(s), affiliation, along with a cover letter giving the mail and e-mail addresses of the primary author, to the symposium organizers no later than August 1, 1998. The abstract should contain sections on objective, approach, results, and conclusions to assist the reviewers in evaluating the suitability of the paper for oral presentation at the symposium. Some papers may be grouped into one or more poster sessions. These abstracts will not be published, but they may subsequently be submitted to Society headquarters for inclusion in the meeting program.

Publication of a Proceedings Volume, to be available at the meeting, is planned. Authors will be advised by October 1, 1998, if their paper has been accepted for the symposium and detailed instructions for manuscript preparation will be supplied at that time. Manuscripts must be submitted in camera-ready format to one of the symposium organizers no later than December 1, 1998, one month prior to the deadline for submission of abstracts to Society headquarters. Papers for which manuscripts are not received in a timely fashion will not be scheduled in the symposium. Submission of a paper for review and subsequent acceptance is considered by the symposium organizers as an agreement that the work will not be published by the author prior to presentation at the symposium.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **W. M. Bullis**, SEMI, 805 East Middlefield Road, Mountain View, CA 94043 USA, Phone: (650) 940-7980, Fax: (650) 940-7943, E-mail: mbullis@semi.org; **W. Lin**, Lucent Technologies, 555 Union Boulevard, Mail Code 60M-2JBX, Allentown, PA 18103 USA, Phone: (610) 712-6663, Fax: (610) 712-4883, E-mail: wenlin@lucent.com; **P. Wagner**, Wacker Siltronic A.G., P.O. Box 1140, D-84479 Burghausen, Germany, Phone: 49 (8677)83-2430, Fax: 49 (8677)83-2640, E-mail: peter.wagner@wacker.de; **T. Abe**, Shin-Etsu Handotai Co., Ltd., 2-13-1 Isobe, Annaka-shi, Gunma-ken, 379-0196 Japan, Phone: 81-27-385-2511, Fax: 81-27-385-2774, E-mail: LDW00303@niftyserve.or.jp; and **S. Kobayashi**, Sumitomo Metal Industries, Ltd., 1-8 Fuso-Cho, Amagasaki, 660 Japan, Phone: 81-6-401-6201, Fax: 81-6-489-0056, E-mail: sk@knight.amaken.sumikin.co.jp.

H2 - FIFTH INTERNATIONAL SYMPOSIUM ON PROCESS PHYSICS AND MODELING IN SEMICONDUCTOR DEVICE MANUFACTURING



(Electronics Division)

This symposium is aimed at providing a forum for the presentation of research activities on modeling and simulation of processes in semiconductor technology. The primary emphasis is on the understanding of the relevant phenomena at various levels of sophistication: computational aspects of process and defect modeling which includes finite-elements/-differences, classical and ab initio atomistic approaches and hybrid/mesoscopic techniques and the experimental determination of microscopical mechanisms.

One of the primary objectives of this symposium series is to bring about synergistic interactions between the industry groups and those in basic science engaged in research in this field. Papers are solicited on topics such as transient enhanced diffusion, ion implantation, point and extended defects, diffusion in and formation of thin dielectrics, materials and processes in newer technologies such as silicon on insulator, Si/Ge devices, and stress induced effects. The symposium will include both invited and contributed papers.

Prospective authors should submit by October 15, 1998, the title, names of authors, and address and telephone numbers (Fax numbers and e-mail address), and a description of the work sufficient to provide a basis for paper selection. These abstracts will not be published and may be submitted by mail, fax or e-mail. If figures are desired to be included in an electronic submission, postscript format files can be used.

Submitting authors can expect to be notified early in November

regarding their submissions and must submit a camera-ready copy of their full manuscript to one of the Symposium organizers by December 15, 1998. This schedule will allow manuscript review and revision in time for the Proceedings Volume to be printed at the time of the meeting. In addition, all authors must send a meeting abstract in camera-ready form to The Electrochemical Society Headquarters by January 2, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. S. Murthy**, IBM East Fishkill, Zip AE1, Hopewell Junction, NY 12533 USA, Phone: (914) 892-4884, Fax: (914) 892-3039, E-mail: murthy@us.ibm.com; **G. R. Srinivasan**, IBM Corp., Department 62G, Building 300, Z/AE1, East Fishkill Facility, Hopewell, NY 12533 USA, Phone: (914) 892-4064, Fax: (914) 892-3039, E-mail: srinivas@fshvm1.vnet.ibm.com; and **S. T. Dunham**, Department of Electrical and Computer Engineering, Boston University, 8 St. Mary's Street, Boston, MA 02215 USA, Phone: (617) 353-9845, Fax: (617) 353-6440, E-mail: dunham@bu.edu.

H3 - NINTH INTERNATIONAL SYMPOSIUM ON SILICON-ON-INSULATOR TECHNOLOGY AND DEVICES



(Electronics Division)

This symposium covers recent and exciting advances in SOI technologies. It will be of interest to materials and device scientists, as well as to process and applications oriented engineers. Theoretical and experimental contributions are solicited. Specific topics will include, but are not limited to: 1. Substrate preparation: optimized synthesis of UNI-BOND, ITOX, SIMOX and BESOI, novel structures, advanced ZMR, ELO, SPE, FIPOS, SOS and heterostructures; 2. Materials evaluation: wafer screening and non-destructive techniques, basic electrical properties (lifetime, mobility, residual doping and impurities), defect identification, interface quality, properties of ultra thin oxides and films, tools for quality control; 3. SOI MOSFETs: characterization, modeling and simulation of floating body effects, coupling, transient and heating phenomena, advanced techniques for parameter extraction, reliability issues (including hot carriers, irradiation, ESD); 4. Devices and circuits: low power/low voltage circuits, high speed CMOS and bipolar, memories, microprocessors, power and high temperature devices, sensors, quantum and innovative devices, novel technologies, advanced design.

Each of the symposium sessions will be introduced by a keynote speaker.

Meeting Abstracts are due to the ECS Headquarters Office and the Symposium Organizers by October 31, 1998. Authors will be informed of paper acceptance or rejection in November of 1998.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **P. L. F. Hemment**, School of Electronic Engineering, Information Technology and Mathematics, University of Surrey, Guildford, Surrey, GU2 5XH UK, Phone: 44-0-1483-259144, Fax: 44-0-1483-534139, E-mail: p.hement@surrey.ac.uk; **S. Cristoloveanu**, LPCS-ENSERG, BP 257, 38016 Grenoble Cedex 1, France, Phone: 33-0-47-685-6040, Fax: 33-0-47-685-6070, E-mail: sorin@enserg.fr; **T. W. Houston**, Texas Instruments, Dallas, USA, Phone: (214) 995-9131, Fax: (214) 995-2770, E-mail: houston@spdc.ti.com; **K. Izumi**, Project Team 2, A4N-215N, NTT, 3-1, Morinosato Wakamiya, Atsugi 243-01, Japan, Phone: 81-462-40-2300, Fax: 81 462 404316, E-mail: izumi@aecl.ntt.co.jp; and **H. Hovel**, IBM T. J. Watson Research Center, PO Box 218, Yorktown Heights, NY 10598 USA, Phone: (914) 945-2226, Fax: (914) 945-4440, E-mail: hovel@watson.ibm.com.

H4 - STATE-OF-THE-ART PROGRAM ON COMPOUND SEMICONDUCTORS XXX



(Electronics Division)

The 30th State-of-the-Art Program on Compound Semiconductors (SOTAPOCS) will address the most recent advances in compound semiconductors. Original contributions are solicited on materials

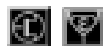
growth, characterization, processing, device fabrication, reliability, and other related topics. Papers on both practical issues and fundamental studies are solicited. Specific areas of interests include: 1. Novel devices and materials growth; 2. New advances of processing technologies, including wet and dry etching, selective oxidation, dielectric deposition, nano-structure fabrication, Schottky and ohmic contact formation, ion implantation, activation and isolation, passivation and annealing, microcleaving, bonding and packaging, and so on; 3. Characterization of materials, devices, and processes, including non-destructive evaluation and in situ and ex situ process characterization; 4. Wide bandgap material growth and processing; 5. Wafer-level testing and mapping; 6. Device degradation mechanisms; 7. Monolithic device integration; 8. High-speed III-V electronics technologies for wireless, automotive and microwave applications; and 9. Fundamental optical, electrical, and other physical properties.

The symposium will consist of both invited and contributed papers.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. R. Abernathy**, Department of Materials & Science Engineering, University of Florida, Gainesville, FL 32611 USA, Phone: (352) 846-1087, Fax: (352) 846-1182, E-mail: caber@quartz.mse.ufl.edu; **R. E. Sah**, Fraunhofer Institute for Applied Solid-State Physics, Tullastrasse 72, D-79108 Freiburg, Germany, Phone: 49 761 5159 175, Fax: 49 761 5159 400, E-mail: sah@iaf.fhg.de; **A. Baca**, Sandia National Laboratories, Albuquerque, NM 87185 USA, Phone: (505) 844-7127, Fax: (505) 844-8985, E-mail: agbaca@sandia.gov; **D. N. Buckley**, Department of Physics, University of Limerick, Limerick, Ireland, Phone: 383-61-202-902, Fax: 383-61-207-423, E-mail: noel.buckley@ul.ie; and **K. H. Chen**, Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan, Phone: 886-2-2366-8232, Fax: 886-2-2366-8232, E-mail: chenkh@po.iam.s.sinica.edu.tw.

11 - ELECTRONICS/DIELECTRIC SCIENCE AND TECHNOLOGY JOINT GENERAL SESSION



(Electronics Division/Dielectric Science and Technology Division)

Original papers are solicited on all aspects of electronic materials, devices, and processing technologies not covered by specialized topical symposia at this Meeting. The sessions will be organized depending on the content of the Meeting Abstracts. One or more of the sessions may be organized as a poster session. Contributors should specify their preference as to poster or oral presentation, and all efforts will be made to accommodate their requests.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **M. J. Deen**, School of Engineering, Simon Fraser University, Burnaby, B.C. Canada, V5A 1S6, Phone: (604) 291-3248, Fax: (604) 291-4951, E-mail: jamal@cs.sfu.ca; **W. D. Brown**, 3217 Bell Center, University of Arkansas, Fayetteville AR 72701 USA, Phone: (501) 575-6045, FAX: (501) 575-7965, E-mail: wdb@engr.uark.edu; **R. K. Ulrich**, 3202 Bell Center, University of Arkansas, Fayetteville, AR 72701 USA, Phone: (501) 575-5645, Fax: (501) 575-7926, E-mail: rku@engr.uark.edu; **K. B. Sundaram**, Department of Electrical and Computer Engineering, University of Central Florida, Orlando, FL 32816, Phone: (407) 823-5326, Fax: (407) 823-5835, E-mail: kbs@ece.engr.ucf.edu; and **R. B. Fair**, Duke University, Department of Electrical and Computer, Engineering, Durham, NC 27708, Phone: (919) 660-5277, Fax: (919) 660-5221, E-mail: rfair@ee.duke.edu.

J1 - ADVANCES IN RAPID THERMAL PROCESSING



*(Electronics Division/Dielectric Science and Technology Division/
High Temperature Materials Division)*

The objective of this symposium is to become an annual international forum for the discussion of all aspects of RTP. The program will address recent innovations in RTP equipment issues as well as RTP processes and their applications in the fabrication of advanced semiconductor and other devices. Papers are solicited in the following

areas: 1. Ultra-thin gate dielectrics and MOS gate stacks (thermal and RTCVD oxides, nitrides and novel higher dielectric constant materials for future generation integrated circuits, polysilicon deposition and doping, doping diffusion through gate dielectric, and novel gate electrode materials, novel silicide processes on polysilicon gate electrode); 2. Ultra-shallow junctions and contacts (formation of ultra-shallow junctions, low energy ion-implantation and short time annealing, in-situ doped or implanted solid diffusion sources, low resistivity contacts to ultra-shallow junctions: novel self-aligned silicide processes); 3. Epitaxial growth (epitaxial growth of Si, Si/Ge and compound semiconductors by RTCVD and their device applications); 4. Equipment issues (novel ultra-short time annealing techniques, temperature measurement and control, uniformity, equipment design and modeling, throughput, cluster tools, in situ cleaning, etc.); 5. New applications of RTP (applications of RTP in back-end processing of integrated circuits, flat panel displays, compound semiconductors, glass reflow, novel processing such as UV processing, magnetic thin films, etc.).

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **F. Roozeboom**, Philips Research Laboratories (WA 14), Prof. Holstlaan 4, 5656 AA Eindhoven, The Netherlands, Phone: 31-40-2742767, Fax: 31-40-2743352, E-mail: roozeboo@natlab.research.philips.com; **J. Gelpey**, Steag-AST Elektronik, 4904 Heatherwood Lane, Peabody, MA 01960 USA, Phone: (978) 535-2260, Fax: (978) 535-1677, E-mail: jeffast@aol.com; **M. C. Ozturk**, North Carolina State University, Department of Electrical and Computer Engineering, PO Box 7911, Raleigh, NC 27695-7911 USA, Phone: (919) 515 5245, Fax (919) 515-3027, E-mail: mco@eos.ncsu.edu; **J. Nakos**, IBM Microelectronics, Department FJZ, 1000 River Road, Essex Junction, VT 05452-4299, USA, Phone (802)-769-8780, Fax (802)-769-9659, E-mail: jnakos@us.ibm.com; and **S. E. Mohny**, The Pennsylvania State University, Department of Materials Science and Engineering, 221 Steidle Building, University Park, PA 16802-5006 USA, Phone: (814) 863-0744, Fax: (814) 865-2917, E-mail: sem2@psu.edu.

K1 - HYDROGEN ENERGY TECHNOLOGIES FOR THE 21ST CENTURY



(Energy Technology Division/Battery Division)

New environmental legislation such as the California initiative to considerably lower and to ultimately eliminate emissions of pollutants from automobiles and the growing awareness of dangerous progression in greenhouse gases as we approach the 21st century have rekindled interest in hydrogen energy technologies. Efforts to combat these environmental issues such as The USA Partnership for a New Generation of Vehicles Program, initiated in 1993 with an objective of tripling the efficiency for fuel consumption, have provided an impetus for the accelerated development for fuel cell/battery hybrid vehicles. This together with the need for cleaner energy sources with lower greenhouse emissions promise to provide an overall fillip to hydrogen energy technologies in the 21st century.

This symposium will focus on fundamental and technology development aspects in the following areas: 1. Hydrogen production from primary energy sources: such as natural gas, petroleum, coal, solar, wind, biomass, nuclear: for example, partial oxidation/steam reforming/shift conversion, water electrolysis etc.; 2. Hydrogen storage: high pressure compressed gasses, metal hydrides, liquid hydrogen, hydrogen adsorption in high surface area materials such as carbon powders, fibers and nanotubes; 3. Hydrogen transmission/distribution: chemical conversion routes, conventional transportation; 4. Chemical to electric energy conversion: fuel cells, gas turbines; 5. Hydrogen powered vehicles: fuel cell, fuel cell hybrid with battery or internal combustion engines; 6. Hydrogen batteries: nickel/hydrogen, nickel metal hydrides; 7. Safety; and 8. Technical and economic aspects of hydrogen energy technologies in the 21st century.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **S. Mukerjee**, Department of Applied Science, Brookhaven National Laboratory, Upton, NY 11973 USA, Phone: (516) 344-4973, Fax: (516) 344-4071, E-mail: muk-

erjee@bnl480.das.bnl.gov; **J. Ogden**, Center for Energy and Environmental Studies, Princeton University, Engineering Quadrangle, PO Box CN 5236, Princeton, NJ 08544-5236 USA, Phone: (609) 258-5470, Fax: (609) 258-3661, E-mail: ogden@phoenix.princeton.edu; **S. Srinivasan**, Center for Energy and Environmental Studies, Princeton University, Engineering Quadrangle, PO Box CN 5236, Princeton, NJ 08544 USA, Phone: (609) 258-5217, Fax: (609) 258-3661, E-mail: srini@princeton.edu; and **R. A. Bowman, Jr.**, Jet Propulsion Laboratory, MS 157-316, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, Phone: (818) 354-7941, Fax: (818) 393-4206, E-mail: robert.c.bowman-jr@jpl.nasa.gov.

K2 - NANOSCOPIC MATERIALS FOR ENERGY CONVERSION



(Energy Technology Division)

The preparation and characterization of materials and composites on a nanometer scale are becoming increasingly important in the field of energy conversion. Examples include catalysts for fuel cell applications and semiconductors for photovoltaic and photoelectrochemical solar energy conversion. This Symposium will focus on critical issues and latest advancements in the science and technology of nanostructured materials for energy conversion applications. Papers are solicited in all areas related to materials including metals, semiconductors, and organic compounds/polymers.

Areas of interest include: 1. Semiconductor and metal nanoparticles and metal/semiconductor nanocomposites; 2. Size quantization effects in semiconductor nanoparticles; 3. Surface modification and characterization including tunneling and force microscopies; 4. Photoinduced charge separation and interfacial charge transfer; 5. Dye-sensitization of semiconductors; 6. Photoelectrochemistry of nanostructured films; 7. Photocatalysis and environmental applications; 8. Nanostructured catalysts for fuel cells; 9. Metal/polymer nanocomposites and membranes; and 10. Nanostructured sensor surfaces.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **K. Rajeshwar**, Department of Chemistry and Biochemistry, The University of Texas at Arlington, Arlington, TX 76019-0065 USA, Phone: (817) 272-3810, Fax: (817) 272-3808, E-mail: rajeshwar@uta.edu; **P. V. Kamat**, Radiation Laboratory, University of Notre Dame, Notre Dame, IN 46556-0579 USA, Phone: (219) 631-5411, Fax: (219) 631-8068, E-mail: kamat.1@nd.edu; and **H. Arakawa**, Department of Physical Chemistry, National Institute of Materials and Chemical Research, 305 Higashi 1-1, Tsukuba, Ibaraki, Japan, Phone: 81-298-54-4410, Fax: 81-298-54-4524, E-mail: H. Arakawa@ccmail.nimc.go.jp.

K3 - PHOTOVOLTAICS FOR THE 21ST CENTURY



(Energy Technology Division/

National Renewable Energy Laboratory - NREL)

Recent scientific and technical developments made in the photovoltaic (PV) technology have helped lower the cost of PV modules and overall price of PV systems. Consequently, the PV technology is making entry into a variety of commercial markets and it is likely to make significant contributions, globally, to the power generation industry in the 21st century. To achieve this position, the PV technology has to compete economically with the conventional means of power generation from fossil and nuclear fuel. To secure this competitive status, the PV technology has to bring about substantial further cost reductions which may require adaptation of revolutionary concepts rather than slow evolutionary development of the current technologies. A variety of interdisciplinary scientific and technical developments that may be assimilated in the PV technology can help achieve this status. This symposium will focus on using advanced concepts that are not being used in the PV industry today but are likely to be used commonly in the 21st century. Contributed publications of both fundamental and applied nature leading to maximum utilization of solar energy for electric power generation are solicited. Some of the suggested general areas of interest are: 1. New devices and structures

including thin film silicon, organic solar cells and dye-sensitized photo-electrochemical cells; 2. Device modeling; 3. New PV materials including nanoparticle concepts; 4. Material synthesis, smart materials; 5. Thin films; 6. Optical designs including holographic concepts; 7. Interfacial studies; 8. Contacts and interconnects; 9. Recycling of materials; 10. Efficient and low-cost manufacturing techniques; 11. Process control; 12. Materials and device characterization; 13. Batteries for PV systems; 14. PV generated hydrogen; 15. Hybrid systems; and 16. Environmental issues and other related topics.

Publication of a Proceedings volume is planned. Acceptance of a paper for presentation will obligate the author(s) to submit a camera-ready manuscript at the meeting.

Abstracts, suggestions and inquiries should be sent to the ECS Headquarters and symposium organizers: **V. K. Kapur**, International Solar Electric Technology (ISET), 8635 Aviation Boulevard, Inglewood, CA 90301 USA, Phone: (310) 216-4427, Fax: (310) 216-2908, E-mail: vkkapur@earthlink.net; **R. D. McConnell**, National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, CO 80401 USA, Phone: (303) 384-6419, Fax: (303) 384-6481, E-mail: robert_mcconnell@nrel.gov; **D. Carlson**, Solarex, 826 Newtown-Yardley Road, Newtown, PA 18940 USA, Phone: (215) 860-0902, Fax: (215) 860-2986, E-mail: dcarlson@solarex.com; **G. P. Ceasar**, National Institute of Standards and Technology, A415 Administration Building, Gaithersburg, MD 20899 USA, Phone: (301) 975-5069, Fax: (301) 548-1087, E-mail: gerald.ceasar@nist.gov; and **A. Rohatgi**, Georgia Institute of Technology, School of Electrical and Computer Engineering, 777 Atlantic Drive, NW, Atlanta, GA 30332-0250, Phone: (404) 894-7692, Fax: (404) 894-5934, E-mail: ajeet.rohatgi@ece.gatech.edu.

L1 - ALTERNATIVE FUELS AND PROCESSES FOR ELECTROCHEMICAL ENERGY CONVERSION



(Energy Technology Division/

Industrial Electrolysis and Electrochemical Engineering Division)

This Symposium will provide an interdisciplinary forum to present and discuss issues related to the choice of fuels for use with low temperature fuel cells, especially in light duty transportation applications. Fourteen automobile manufacturers are investigating the Polymer Electrolyte Fuel Cell (PEFC) for powering electric vehicles (EVs). The choice of fuels for fuel cell powered EVs is under active debate. Some developers advocate using stored H₂ as the fuel, while other developers advocate on-board generation of H₂ produced by reforming liquid fuels.

Papers are solicited on a broad range of topics including (but not limited to): 1. Comparison of fuel options; 2. Description and modeling of small scale systems for producing H₂ from alcohol and/or hydrocarbon fuels (including steam reforming, partial oxidation reforming, water gas shift and CO cleanup processes, etc.); 3. Advances in catalysts for steam reforming, partial oxidation, water gas shift, and preferential oxidation; 4. Fuel impurity issues (such as CO and "sulfur" tolerance); 5. Novel H₂ storage approaches; 6. Comparison of H₂-fueled PEFCs vs. direct methanol fuel cells; and 7. Fuel infrastructure issues.

Keynote lectures will be presented by invited speakers.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. J. Bellows**, Exxon Research and Engineering, Route 22 East, Annandale, NJ 08801 USA, Phone: (908) 730-2713, Fax: (908) 730-3198, E-mail: rjbello@erenj.com; and **R. F. Savinell**, Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH 44106-7218 USA, Phone: (216) 368-2728, Fax: (216) 368-3016, E-mail: rfs2@po.cwru.edu.

M - FULLERENES: CHEMISTRY, PHYSICS AND NEW DIRECTIONS XII



(Fullerenes Group)

Papers are invited for the symposium in the areas listed below. Authors should clearly state the appropriate subsection, 1 through 10, on the Meeting Abstract. Some papers selected for inclusion in the program may be assigned to a poster session.

Publication of a Proceedings Volume is planned. Acceptance of a

paper for presentation will obligate the author(s) to submit a camera-ready manuscript at the meeting. The Proceedings Volume will include sections as the topics listed below. Specific details about the format for contributed papers for the Proceedings Volume can be obtained from the Session Organizers of each session.

Questions and information may be obtained from: **K. M. Kadish**, University of Houston, Department of Chemistry, Houston, TX 77204-5641 USA, Phone: (713) 743-2740; Fax: (713) 743-2745; E-mail: kkadish@uh.edu, or **P. V. Kamat**, Notre Dame Radiation Laboratory, Notre Dame, IN 46556-0579, Phone: (219) 631-5411, Fax: (219) 631-8068, E-mail: pkamat@nd.edu.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers of the appropriate section listed below:

M1. ELECTROCHEMISTRY AND ESR: **F. D'Souza**, Department of Chemistry, Wichita State University, 1845 Fairmont, Wichita, KS 67260-0051, USA Phone: (316) 978-3120, Fax: (316) 689-3431, E-mail: dsouza@wsuhub.uc.twsu.edu, and **L. Echegoyen**, University of Miami, Department of Chemistry, Coral Gables, FL 33124 USA, Phone: (305) 661-2847, Fax: (305) 284-4571, E-mail: lechegoyen@umiami.edu.

M2. PHOTOPHYSICS AND PHOTOCHEMISTRY (Energy and Electron Transfer, Excited State Properties): **D. M. Guldi**, Radiation Laboratory, University of Notre Dame, Notre Dame, IN 46556, USA Phone: (219) 631-7441, Fax: (219) 631-8068, E-mail: guld@marconi.rad.nd.edu; **K. P. Dinse**, Phys. Chem. III, Tu Darmstadt, Petefrenstrasse 20, D-64287 Darmstadt, Germany, Phone: 49-6151-162607, Fax: 49-6151-164347, E-mail: dinse@pc07.pc.chemie.tu-darmstadt.de; and **R. V. Bensasson**, Laboratoire de Biophysique, Museum National d'Histoire Naturelle, CNRS UA 481, INSERM U201, 43 Rue Cuvier, 75231, Paris Cedex 05, France, Phone: 33-1-4079-3708, Fax: 33-1-4079-3705, E-mail: rvb@mnhn.fr.

M3. FULLERENE FUNCTIONALIZATION (Organic Functionalization and Organometallics): **M. Maggini**, Centro Meccanismi CNR, Department of Organic Chemistry, University of Padova, Via Marzolo, 1, 35131 Padova, Italy, Phone: 39-49-827-5662, Fax: 39-49-827-5239, E-mail: maggini@chor02.chor.unipd.it; and **S. R. Wilson**, Department of Chemistry, New York University, 100 Washington Square East, New York, NY 10003-6688 USA, Phone: (212) 998-8461, Fax: (212) 260-7905, E-mail: spherebio@aol.com.

M4. BIOCHEMICAL/PHARMACEUTICAL (Pharmaceutical, Biological, Biotechnology, and Medical Applications): **S. R. Wilson**, Department of Chemistry, New York University, 100 Washington Square East, New York, NY 10003-6688 USA, Phone: (212) 998-8461, Fax: (212) 260-7905, E-mail: spherebio@aol.com; and **L. Y. Chiang**, Center for Condensed Matter Sciences, National Taiwan University, 1, Roosevelt Road, Section 4, Taipei, Taiwan, Phone: 886-2-2362-5507, Fax: 886-2-2365-5404, E-mail: lychiang@ccms.ntu.edu.tw.

M5. THEORY (Quantum Chemistry, Topology, Statistical Mechanics, and Molecular Dynamics of Fullerenes): **E. Osawa**, Knowledge-Based Information Engineering, Toyohashi University of Technology, Tempaku-cho, Toyohashi 441, Japan, Phone: 81-532-47-0111 ext. 853, Fax: 81-532-48-5588, E-mail: osawa@cochem.tutkie.tut.ac.jp; and **Z. Slanina**, Knowledge-Based Information Engineering, Toyohashi University of Technology, Tempaku-cho, Toyohashi 441, Japan, Phone: 81-532-44-6880, Fax: 81-532-48-5588, E-mail: slanina@cochem2.tutkie.tut.ac.jp.

M6. ENDOFULLERENES: **T. Akasaka**, Graduate School of Science and Technology, Niigata University, Niigata 950-2181, Japan, Phone: 81-25-262-7390, Fax: 81-25-262-7390, E-mail: akasaka@gs.niigata-u.ac.jp.

M7. NANOTUBES AND NANOCARBONS: **S. Subramoney**, E. I. DuPont de Nemours & Company, DuPont Experimental Station, Building 228, Room 114, Route 141 and Rising Sun, Henry Clay, Wilmington, DE 19880-0228 USA, Phone: (302) 695-2992, Fax: (302) 695-1351, E-mail: subrams@esvax.dnet.dupont.com.

M8. SOLID-STATE PHYSICS (Structures, New Compounds, Superconductivity, Surfaces, Thin Films, Diffraction Studies, Thermal Properties and Electronic Properties, etc.): **K. Prassides**, School of Chemistry and Molecular Science, University of Sussex, Brighton, BN1 9QJ, UK, Phone: 44-273-677-7196, Fax: 44-273-677-7196, E-mail: k.prassides@sussex.ac.uk; **V. Buntar**, Atomic Institute of the Austrian Universities, Stadionallee 2, A-1020 Vienna, Austria, Phone: 43-1-72-701-296, Fax: 43-1-72-89-220, E-mail: buntar@ati.ac.at; and **K. Tanigaki**, Fundamental Research Laboratories, NEC Corporation, 34-Miyukigaoka, Tsukuba 305, Japan, Phone: 81-298-50-1138, Fax: 81-298-56-6136, E-mail: kat@ep.cl.nec.co.jp.

M9. Thermodynamics and Mass Spectroscopy (Solubility and

Solution Studies, Gas Phase Energetics and Formation Enthalpies): **O. V. Boltalina**, Chemistry Department, Moscow State University, 119899, Moscow, Russia, Phone: 095-939-53-73, Fax: 095-939-12-40, E-mail: ovb@capital.ru; and **A. L. Smith**, Chemistry Department, Drexel University, 32nd and Chestnut Streets, Philadelphia, PA 19104, USA, Phone: (215) 895-1861, Fax: (215) 895-1265, E-mail: allan.smith@drexel.edu.

M10. OPTICAL PROPERTIES OF FULLERENES (cosponsored by the Luminescence and Display Materials Division): **K. Hoffman**, Whitman College, Department of Physics, Walla Walla, WA 99362 USA, Phone: (509) 527-5273, Fax: (509) 527-5904, E-mail: hoffman@whitman.edu; and **W. M. Yen**, University of Georgia, Department of Physics and Astronomy, Athens, GA 30602 USA, Phone: (706) 542-2491, Fax: (706) 542-2492, E-mail: wyen@hal.physast.uga.edu.

N1 - SOLID-STATE IONIC DEVICES



(High Temperature Materials Division/
Sensor Division/Battery Division)

Solid-state electrochemical devices are becoming pervasive in our technologically driven lifestyles, and will become even more so as we enter the 21st century. A fundamental understanding of ionic transport and interfacial phenomena in ceramics is imperative to a wide variety of these devices, from solid oxide fuel cells and ceramic membranes to solid-state sensors and battery electrodes. The intent of this symposium is to provide a forum for current advances in ion conducting ceramics and the design, fabrication, and performance of devices that utilize them.

Papers are solicited in modeling and characterization of defect equilibria, ionic and electronic transport, stability, interfacial and electrocatalytic properties of ion conducting ceramics as well as design, fabrication, and evaluation of ionic devices. Specific topical areas of interest include: novel synthesis and processing of thin films, membranes, and nanostructured materials or devices; the effect of nanostructures on ionic transport and catalytic activity; recent advances in ionic and mixed electronic-ionic conducting materials; theoretical treatments of mixed conduction; and electrode kinetics, interfacial phenomena, and electrode microstructure pertaining to fuel cells, gas separation membranes and reactors, solid-state battery and microbattery electrodes, and chemical sensors.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **E. D. Wachsman**, Department of Materials Science and Engineering, University of Florida, Gainesville, FL 32611-6400 USA, Phone: (352) 846-2991, Fax: (352) 392-7219, E-mail: ewach@mse.ufl.edu; **M.-L. Liu**, School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0245 USA, Phone: (404) 894-6114, Fax: (404) 894-9140, E-mail: meilin.liu@mse.gatech.edu; **J. R. Akridge**, Eveready Battery Company, Inc., P.O. Box 450777, Westlake, OH 44145-0616 USA, Phone: (440) 835-7754, Fax: (440) 835-8685, E-mail: jamesr.akridge@energizer.com; and **N. Yamazoe**, Department of Molecular and Material Science, Graduate School of Engineering Science, Kyushu University, Kasuga-shi, Fukuoka 816-8580, Japan, Phone: 81-92-583-7537, Fax: 81-92-575-2318, E-mail: noborigz@mbox.nc.kyushu-u.ac.jp.

O1 - TUTORIALS IN ELECTROCHEMICAL ENGINEERING- MATHEMATICAL MODELING



(Industrial Electrolysis and Electrochemical Engineering
Division/Energy Technology Division/Battery Divisions)

Modeling and simulation are important tools for developing an understanding of electrochemical processes and phenomena. The uses of these techniques often accelerate optimization and implementation of technology as well as reduce developing costs. In this symposium tutorial papers will be presented on mathematical techniques, solution algorithms, and approaches in simulating electrochemical phenomena and

processes. All scales are to be addressed including molecular, microscopic, macroscopic, and system levels.

The papers may address issues related to interfacial process, transport processes, coupled and complex phenomena. Advanced problem formulations that enhance solution efficiency will be relevant. Also of interest will be papers that demonstrate the use of commercially available simulation packages. Application papers that demonstrate techniques, validity, interpretation, parameter estimation, and model limitations are sought. Fields of applications will include batteries, fuel cells, electrodeposition and corrosion, electrosynthesis, and a generalization to all fields of electrochemical applications. The papers will be tutorial in nature to advance the education of scientists and engineers.

The symposium will consist of both invited and contributed papers.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript and list of key words by January 1, 1999.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. F. Savinell**, Department of Chemical Engineering, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106 USA, Phone: (216) 368-2728, Fax: (216) 368-3016, E-mail: rfs2@po.cwru.edu; **A. C. West**, Department of Chemical Engineering, Columbia University, New York, NY 10027 USA, Phone: (212) 854-4452, Fax (212) 854-3054, E-mail: acw17@columbia.edu; **J. M. Fenton**, University of Connecticut, Department of Chemical Engineering, U-222, Room 208, Storrs, CT 06269-3222 USA, Phone: (860) 486-2490, Fax: (860) 486-2959, E-mail: jmfent@eng2.uconn.edu; and **J. Weidner**, Department of Chemical Engineering, Swearingen Engineering Center, University of South Carolina, Columbia, SC 29208 USA, Phone: (803) 777-3207, Fax: (803) 777-8265, E-mail: weidner@engr.sc.edu.

O2 - INDUSTRIAL ELECTROLYSIS AND ELECTROCHEMICAL ENGINEERING GENERAL SESSION



(Industrial Electrolysis and Electrochemical Engineering Division)

Papers are solicited in areas of industrial electrochemical engineering that are not covered by other symposia at this Meeting. Of particular interest are papers concerning: design, operation, testing, and/or modeling of industrial electrochemical systems; electrochemical waste treatment technologies; methods for electrosynthesis; electrode and membrane technologies; development of microelectrochemical systems; electrolytic recovery of process materials; and electrocatalysts. Contributed papers will be programmed in some related order, depending on the titles and content of the abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizer: **G. Pillay**, Los Alamos National Laboratory, TSA-10, M/S K-575, Los Alamos, NM 875-45 USA, Phone: 505-667-4134, Fax: 505-665-7429, E-mail: gpillay@lanl.gov.

P1 - ELECTRODE AND CELL DESIGN ADVANCES IN MOLTEN SALT SYSTEMS: ELECTROLYSIS, BATTERIES, AND FUEL CELLS



*(Industrial Electrolysis and Electrochemical Engineering Division/
Energy Technology Division/Battery Division)*

This symposium will provide a forum to review recent progress in new electrochemical technology using molten salt electrolytes. Topics will include new electrode designs and materials, and novel cell design and operation. Papers are solicited from all areas and industries, including electrolysis, electrodeposition, batteries, fuel cells, and environmental applications. Presentations on such industrially significant processes as fluorine production, manufacture of aluminum, magnesium, titanium, lithium and other metals, and electrorefining are welcome. Also included are papers on the use of electrochemically-regenerated molten salt electrolytes in chemical synthesis or destruction, or other novel applications.

Papers are encouraged in fundamental laboratory studies, mod-

eling and recent industrial applications of advanced technologies and technological improvements in cell design, operations, equipment, and components. Presentations dealing with the business and economic aspects of new electrode technology or implementation of new cell designs are also encouraged. Other papers that relate to the symposium title will be considered.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **C. W. Walton**, FMC Corporation, Chemical R&D Center, US Highway 1 at Plainsboro Road, P.O. Box 8, Princeton, NJ 08543-0008 USA, Phone (609) 951-3189, Fax: (609) 951-3668, E-mail: clifford_walton@fmc.com; **R. Keller**, EMEC Consultants, 4221 Roundtop Road, Export, PA 15632-1834 USA, Phone: (724) 325-3260, Fax: (724) 335-8402, E-mail: emec@westol.com; or **J. R. Selman**, Illinois Institute of Technology, Center for Electrochemical Science and Engineering, 10 West 33rd Street, Chicago, IL 60616-3730 USA, Phone: (312) 567-3970, Fax: (312) 567-6914, E-mail: selman@charlie.cns.iit.edu.

O1 - MECHANISTIC ASPECTS OF BIOLOGICAL ELECTRON TRANSFER



(Organic and Biological Electrochemistry Division)

Electron-transfer (ET) reactions are key steps in a diverse array of biological transformations ranging from photosynthesis to aerobic respiration. The unique simplicity of ET reactions has fostered the development of highly successful theoretical models that describe rates in terms of a small number of experimentally accessible parameters. A vital synergy between theory and experiment provides the foundation for efforts to explain how biological ET reactions can proceed rapidly over quite long distances, at low driving forces, with remarkable selectivities. This symposium will focus on important current issues in biological electron transfer. Both electrochemical and non-electrochemical approaches for investigating these reactions are of interest. Contributions are solicited in the following areas: ET in proteins and protein-protein complexes; ET of proteins at electrode interfaces; conformational control in biological ET reactions; the role of ET reactions in enzyme function and electrocatalysis; ET in nucleic acids; and theory of biological ET reactions.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **E. F. Bowden**, Department of Chemistry, North Carolina State University, Raleigh, NC 27695-8204 USA, Phone: (919) 515-7069, Fax: (919) 515-5079, E-mail: bowden@chemdept.chem.ncsu.edu; **K. Niki**, Department of Chemistry, Iowa State University, Ames, IA 50011-3111 USA, Phone: (515) 294-3955, Fax: (515) 294-0105, E-mail: kniki@iastate.edu; **F. A. Schultz**, Department of Chemistry, Indiana University - Purdue University Indianapolis, Indianapolis, IN 46202-3274 USA, Phone: (317) 278-2027, Fax: (317) 274-4701, E-mail: schultz@chem.iupui.edu; and **J. R. Winkler**, Beckman Institute, Mail Code 139-74, California Institute of Technology, Pasadena, CA 91125 USA, Phone: (626) 395-2834, Fax: (626) 449-4159, E-mail: winklerj@cco.caltech.edu.

O2 - ORGANIC ELECTROCHEMISTRY: 2000 AND BEYOND



(Organic and Biological Electrochemistry Division)

This symposium is intended to highlight areas where organic electrochemistry might be expected to witness new advances and developments in the 21st century such as Smart Electrodes (electrodes modified to respond selectively to specific components of a solution); Design of New Electrolysis Media; Asymmetric Electroorganic Synthesis; Design of New Electroactive Functional Groups; New Strategies for Electron Transfer Control; Visualization of the Structures of Intermediates on Electrodes by scanning electrode potential microscopy; Atomic force microscopy, and other techniques capable of nanometer-scale resolution; and Sensors. The preceding topics may be considered as representative examples; they are not meant to be restrictive. In general, we hope to showcase a variety of new directions that organic electrochemistry may take in the future, as well as newer develop-

ments in more well-established areas of the science. Both invited and contributed papers are planned. Contributions are solicited in the above areas and related topics.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **J. Lessard**, Department of Chemistry, University of Sherbrooke, Sherbrooke, Quebec, Canada J1K 2R1, Phone: (819) 821-7091, Fax: (819)821-8017, E-mail: jlessard@courrier.usherb.ca; **A. J. Fry**, Department of Chemistry, Wesleyan University, Middleton, CN 06459 USA, Phone: (203) 685-2622; Fax: (203) 685-2211; E-mail: afry@wesleyan.edu; and **H. Tanaka**, Department of Applied Chemistry, Faculty of Engineering, Okayama University, Okayama 700-8530, Japan, Phone: 81-86-251-8074, Fax: 81-86-255-3424, E-mail: tanaka95@cc.okayama-u.ac.jp.

Q3 - ORGANIC AND BIOLOGICAL ELECTROCHEMISTRY GENERAL SESSION



(Organic and Biological Electrochemistry Division)

Papers concerning any aspect of organic and biological electrochemistry not covered by topic areas of other specialized symposia at this Meeting are welcome. Contributed papers will be programmed in some related order depending on the titles and contents of the Meeting Abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizer: **F. A. Schultz**, Department of Chemistry, Indiana University Purdue University Indianapolis (IUPUI), 402 North Blackford Street, Indianapolis, IN 46202-3272, USA, Phone: (317) 278-2027, Fax: (317) 274-4701, E-mail: schultz@chem.iupui.edu.

R1 - MODELING OF PROCESSES AT ELECTROCHEMICAL INTERFACES AND IN ELECTROCHEMICAL SYSTEMS



(Physical Electrochemistry Division)

Papers are solicited for the Physical Electrochemistry Division Symposium on Modeling of Processes at Electrochemical Interfaces and in Electrochemical Systems. Subjects can range from microelectrodes to industrial cells and batteries, but the emphasis should be on the elucidation of physical phenomena, including, possibly, complex chemistries and complex geometries. Papers of a general or philosophical nature dealing with the directions of computational architectures are also welcome.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **S. W. Feldberg**, Brookhaven National Laboratory, Building 815, Upton, NY 11973-5000 USA, Phone: (516) 344-4480, Fax: (516) 344-3137, E-mail: feldberg@bnl.gov; and **J. Newman**, University of California at Berkeley, Department of Chemical Engineering, 201 Gilman Hall #1462, Berkeley, CA 94720-1400 USA, Phone: (510) 642-4063, Fax: (510) 642-4778, E-mail: newman@cchem.berkeley.edu.

S1 - SPECTROSCOPIC TOOLS FOR ANALYSIS OF ELECTROCHEMICAL SYSTEMS



(Physical Electrochemistry Division/Electrodeposition Division)

This symposium will provide an interdisciplinary forum on the application of spectroscopic methods for study of electrochemical interfacial phenomena. Topics of interest include in situ spectroscopies and scanning probe microscopies, e.g. FTIR, Raman, ellipsometry, AFM, STM, NMR, and synchrotron-based techniques, such as surface diffraction and x-ray absorption fine structure (EXAFS), and ex situ electron-based spectroscopies such as Auger electron, X-ray photo electron, and electron (ion) scattering. Of particular interest are illustrations of the use of these methods to the study of well-ordered systems, e.g. adsorbates and deposits on single crystal surfaces, nanostructures, intermetallics, self-organizing systems, islands and defects. Also to be included are some theoretical aspects of interfacial systems.

Publication of a Proceedings Volume is planned. Acceptance of a

paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **F. Argoul**, Centre de Recherche Paul Pascal, Avenue Schweitzer 33600 PESSAC, France, Phone: (33) 55 684 5665, Fax: (33) 55 684 5600, E-mail: argoul@crpp.u-bordeaux.fr; **J. McBreen**, Department of Applied Science, Building 815, P.O. Box 5000, Brookhaven National Laboratory, Upton, NY 11973-5000 USA, Phone: (516) 344-4513, Fax: (516) 344-4071, E-mail: mcbreen@bnlarm.bnl.gov; **D. A. Scherson**, Department of Chemistry, Case Western Reserve University, Cleveland, OH 44106 USA, Phone: (216) 368-5186, Fax: (216) 368-3006, E-mail: dxs16@po.cwru.edu; and **A. Wieckowski**, Department of Chemistry, Box 56-5, University of Illinois, 600 South Mathews, Urbana, IL 61801 USA, Phone: (217) 333-7943, Fax: (217) 244-8068, E-mail: andrzej@aries.scs.uiuc.edu.

T1 - PHYSICAL ELECTROCHEMISTRY/FULLERENES JOINT GENERAL SESSION



(Physical Electrochemistry Division/Fullerenes Group)

Papers concerning any aspect of physical electrochemistry or fullerenes not covered by topic areas of other specialized symposia at this Meeting are welcome. Contributed papers will be programmed in some related order, depending on the titles and content of the Meeting Abstracts.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Session Organizers: **A. Wieckowski**, Department of Chemistry, RAL 58B, Box-56-5, University of Illinois, 600 South Mathews Avenue, Urbana, IL 61801-3602 USA, Phone: (217) 333-7943, Fax: (217) 244-8068, E-mail: andrzej@aries.scs.uiuc.edu; and **R. S. Ruoff**, Novel Carbon Materials Laboratory, Department of Physics, Washington University, CB 1105, One Brookings Drive, St. Louis, MO 63130-4899 USA, Phone: (314) 935-8746, Fax: (314) 935-5258, E-mail: ruoff@wuphys.wustl.edu.

U1 - NEW DIRECTIONS IN ELECTROANALYTICAL CHEMISTRY



*(Physical Electrochemistry Division/Sensor Division/
Organic and Biological Electrochemistry Division)*

This symposium will be a forum to present the newest methods and technologies of electroanalytical chemistry. Instruments, methods, unusual media, materials and environments, spectroscopy, microscopy, separations, detection, data processing, and modeling, all fall within the purview of this symposium. Nonstandard electrode materials, solvents, electrolytes, and media as well as reference electrodes for these systems are appropriate topics. Protocols for measurements in situ, in vivo, and in systems with only adventitious electrolyte are apropos, as is electrode assembly and miniaturization. Improved electroanalytical selectivity, especially in biological matrices, is of interest. Sensor topics include devices based on any chemical and physical transduction mechanism derived from or applied to electrochemistry. New spectroelectrochemical and in situ spectroscopic techniques, as well as separation methods (e.g., CZE), are appurtenant. Electrochemical detection coupled to other analytical methods, and new microscopy methods, including improvements in SECM, SEM, voltage perturbations for voltammetry, and models for microelectrodes of unusual geometry and in low electrolyte media are of interest.

Publication of a Proceedings Volume is planned to be available at the Meeting. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript by December 1, 1998 to the editor J. Leddy. In the event of a large number of papers, some papers may be presented in a poster session.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **J. Leddy**, University of Iowa, Department of Chemistry, Iowa City, IA 52242 USA, Phone: (319) 335-1720, Fax: (319) 335-1270, E-mail: jleddy@blue.weeg.uiowa.edu; **M. D. Porter**, Iowa State University, Department of Chemistry, Ames, IA 50011 USA, Phone: (515) 294-6433, Fax: (515) 294-3254, E-mail: mporter@porter1.ameslab.gov; and **P. Vanysek**, Northern Illinois University, Department of Chemistry and

U2 - SINGLE CRYSTAL AND NANOSTRUCTURED ELECTRODES



(Physical Electrochemistry Division/Sensor Division/
Organic and Biological Electrochemistry Division)

This symposium provides forum for presentation of new results on electrochemistry on single-crystal and nanostructured electrodes in the context of the recent developments in surface science and nanotechnology. It provides an opportunity for interdisciplinary exchange between researchers in electrochemistry, surface science and materials science. Specific areas of interest (session topics) include: 1. Surface crystallography; 2. Characterization of adsorbates and metal deposits; 3. Electrode kinetics and catalysis at single crystal and nanostructured electrodes; 4. Double layer structure and supramolecules at solid electrodes; and 5. Electrochemical nanotechnology.

While the main emphasis in the symposium is on results obtained with single- and multi-component single crystal or nanostructured materials, papers which describe procedures, formalisms and methods useful in characterization of single-crystal and nanostructured electrodes will be accepted.

Publication of a Proceedings Volume is planned. Acceptance of a paper in this symposium obligates the authors to submit a typed camera ready copy of the full manuscript at the Meeting.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. Adzic**, Chemical Sciences Division, Department of Applied Sciences, Brookhaven National Laboratory, Upton, NY 11973 USA, Phone: (516) 344-4522, Fax: (516) 344-3137, E-mail: adzic@solids.phy.bnl.gov; **G. Brisard**, Departement de Chimie, 2500 Boul. Universitaire, Université de Sherbrooke, Sherbrooke, QC, Canada J1K 2R1, Phone: (819) 821-7093, Fax: (819) 821-8017, E-mail: gessie.brisard@courier.usherb.ca; **J. Lipkowski**, Department of Chemistry and Biochemistry, University of Guelph, Guelph, Ontario, Canada N1G 2W1, Phone: (519) 824-4120, ext. 8543, Fax: (519) 766-1499, E-mail: lipkowski@chembio.uoguelph.ca; and **E. Stuve**, Department of Chemical Engineering, Box 351750, University of Washington, Seattle, WA 98195-1750 USA, Phone: (206) 543-1056, Fax: (206) 543-3778, E-mail: stuve@u.washington.edu.

V1 - TRANSPORTATION SENSORS



(Sensor Division)

Modern automobiles, trucks, aircraft, watercraft, and rail vehicles employ an ever increasing number of sensors to monitor critical system functions. The information from these sensors is used for component and system diagnostics and for feedback control to improve performance and fuel efficiency, to decrease emissions and wastes, to increase personnel safety, and to reduce maintenance down-time and costs. In order to operate properly in highly demanding environments, many of the present on-vehicle sensors have required significant advances in materials and device design. Additional government mandates and customer demands create further need for improvements in sensor technology. Research and development programs now involve multidisciplinary teams of scientists and engineers from industry, government, and universities.

This symposium will focus on recent developments in transportation sensor technologies and is intended to act as a forum for the large and diverse technical community involved in this area of research. Contributions are solicited on a broad range of sensor topics. These include the fundamental sensor sciences as well as the applications engineering, and the traditional device developments along with the emerging technologies. Suggested presentation areas are: lean burn

oxygen sensors, selective gas constituent sensors, new semiconductor and ceramic sensor materials, photonic physical and chemical sensors, fluid level and fluid quality sensors, fuel composition sensors, combustion sensors, pressure and temperature transducers, accelerometers, position/displacement/rotation sensors, hall effect sensors, air and fluid flow sensors, acoustic sensors and vibration damping control, corrosion and integrity sensors, smart sensor systems (for engine, powertrain or total vehicle control), health-based maintenance sensor systems, sensors for cabin air quality, navigation and guidance sensors, sensors for intelligent highway systems, collision avoidance sensors, sensors for extreme environments, electronic subsystems for sensors, algorithms or data processing strategies for use with advanced sensors, and reliability of sensors. Contributions in other transportation sensor areas not mentioned above are also welcomed.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **R. W. Cernosek**, Microsensor R&D Department, Sandia National Laboratories, P.O. Box 5800, M/S 1425, Albuquerque, NM 87185-1425 USA, Phone: (505) 845-8818, Fax: (505) 844-1198, E-mail: rwcerno@sandia.gov; **R. E. Soltis**, Ford Research Laboratories, MD 3028/SRL, 20,000 Rotunda Drive, Dearborn, MI 48121-2053 USA, Phone: (313) 323-1708, Fax: (313) 322-7044, E-mail: rsoltis@ford.com; and **E. N. Balko**, Auto Emissions Systems R&D, Engelhard Corporation, 101 Wood Avenue, Iselin, NJ 08830-0770 USA, Phone: (732) 205-5288, Fax: (732) 205-5300, E-mail: ed.balko@engelhard.com.

W1 - SECOND INTERNATIONAL SYMPOSIUM ON GOVERNMENT, ACADEMIC, AND INDUSTRIAL INTERACTIONS IN THE NEW GLOBAL ECONOMIC ENVIRONMENT



(New Technology Subcommittee/Electronics Division/
Dielectric Science and Technology Division)

The object of this symposium is to provide a window for members of the Electrochemical Society on the changing research and development environment. An international group of contributed and invited speakers, representing industry, government, and academia, would address these important issues.

These issues will include but are not restricted to: the impact of the new global economic perspective on research and development; current policy perspectives on long term research and development; the amount of basic research performed in industrial labs; the relationships between research groups across national borders; the interrelationship of industry, academia, and government labs around the globe; expanded expectations of the scientist and engineer in today's environment; changing skills for scientists and engineers; the changes in the university science and engineering curricula; technical management; preparation for tomorrow's challenges.

After a full day session on these topics, an evening rump session will take place where you are encouraged to bring your concerns and questions on these important issues to our community.

Abstracts, suggestions, and inquiries should be sent to the ECS Headquarters Office and to the Symposium Organizers: **V. R. McCrary**, National Institute of Standards and Technology, Room B256/225, Gaithersburg, MD 20899 USA, 301-975-4321, E-mail: victor.mccrary@nist.gov; **R. L. Opila**, Lucent Bell Laboratories, Room 1D-352, 600 Mountain Avenue, Murray Hill, NJ 07974-0636 USA, Phone: (908) 582-3390, Fax: (908) 582-3957, E-mail: opila@lucent.com; **B. Schwartz**, Consultant, 321 Orenda Circle, Westfield, NJ 07090 USA, Phone: (908) 233-6444; **T. Sugano**, Tokyo University, 5-28-20 Hakusan, Bunkyo-ku, Tokyo, Japan, Phone: 81-33 94 57 241, E-mail: sugano@hakusan.tokyo.ac.jp; **J. P. Dismukes**, College of Engineering, 1016 Nitschke Hall, University of Toledo, Toledo, OH 43606-3390 USA, Phone: (419) 530-8060, Fax: (419) 530-8065, E-mail: jdismuke@eng.utoledo.edu; and **D. N. Buckley**, Department of Physics, University of Limerick, Limerick, Ireland, Phone: 383-61-202-902, Fax: 383-61-207-423, E-mail: noel.buckley@ul.ie.

Abstract Preparation Instructions

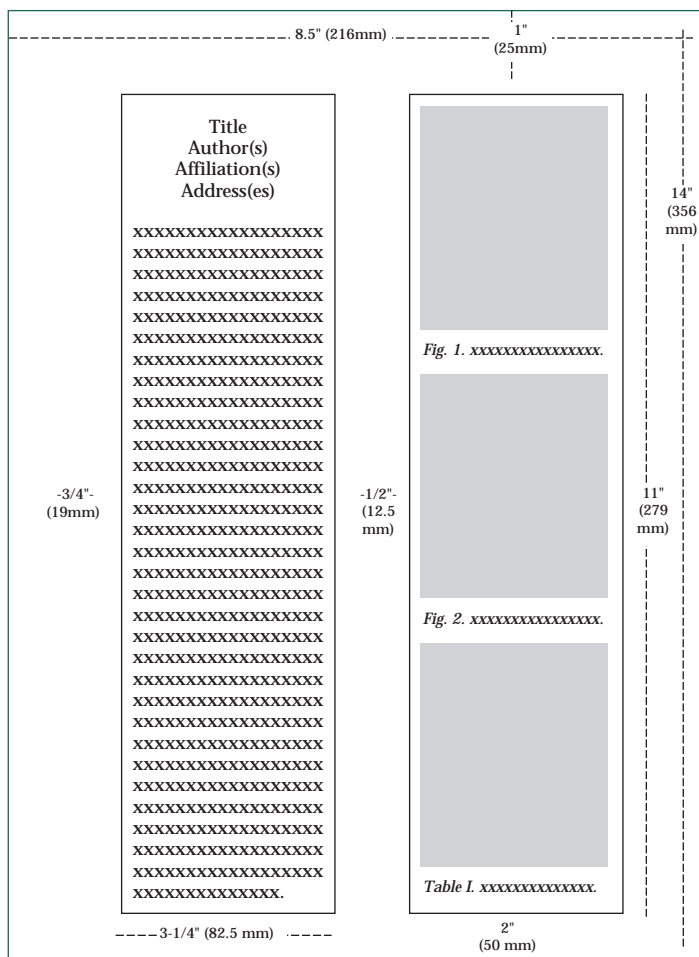
Abstract Format—Abstracts are required to be no more than one page in length consisting of two columns 3.25 x 11 in. (82.5 x 279 mm), approximately 800 words total or 400 words per column. A recommended format is one column of text and references and an additional column of tables, graphs, or figures. You may use any white bond paper 8.5 x 14 in. (216 x 356 mm). For international standards, white bond A3 paper (297 x 420 mm) may also be used, but the right side should be trimmed so that the total trimmed width is 216 mm and trim the length so that the total trimmed length is 356 mm. Type the body of the abstract **single-spaced** using black ink. The preferred font for laser printers is 10-point Times. Type author(s), affiliation(s), and address(es) at the top as shown above. Failure to follow these guidelines will result in the rejection of the paper. Abstracts may be submitted either electronically or on paper.

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