



philadelphia

meeting registration

Centennial Celebration

May 12-17, 2002

Philadelphia, PA, USA



the society for solid-state
and electrochemical science
and technology

**201st Meeting of
The Electrochemical Society**





WELCOME

One hundred years ago, Philadelphia hosted the Society's very first technical meeting. This spring, the Society will be returning to Philadelphia to celebrate its 100th anniversary during the 201st Meeting of The Electrochemical Society.

In addition to the Society hitting a benchmark of 100 years, our meeting program will include a record breaking 58 symposia topics, with 1,576 presentations scheduled. The 201st Meeting will provide individuals with an opportunity and a forum to exchange information on the latest scientific and technical developments in these fields, as well as historical perspectives from some very special retrospective topics.

You are invited to participate not only in the extensive technical program, but also in the many other special events planned for the Meeting. Some highlights include three Plenary Sessions, which will be given by Arnold Thackray, Carver Mead, and Marye Anne Fox, respectively. On May 13, the fun begins with the Monday Evening Mixer (sponsored by Solartron Analytical) and the opening of the Technical Exhibit. Dr. Benjamin Franklin himself will be on hand to start the festivities. As always, refreshments are complimentary and attendees may view the entries in the General Student Poster Session. The highlight of the week will be the pull-out-the-stops Centennial Celebration Party on Wednesday evening (see page 7). Join us for a reception, dinner, and a light-hearted walk down memory lane with our special emcee, Barry MacDougall.

The 201st Meeting of The Electrochemical Society will be held at the Philadelphia Marriott, which is located in the heart of the business district, within walking distance of the Franklin Institute, the Liberty Bell/Independence Hall, and Penn's Landing.

On behalf of ECS, we welcome all our colleagues to Philadelphia for the ECS Centennial Celebration and an unparalleled technical conference. We hope that you will take part in the numerous activities planned for this once-in-a-lifetime Centennial Celebration.

Jan B. Talbot
President, The Electrochemical Society, Inc.

Robert P. Frankenthal
Chairman, Centennial Celebration Committee

TECHNICAL PROGRAM

As part of our Centennial Celebration, we have three exciting speakers lined up for the plenary talks (see page 5). Technical sessions will be scheduled from Monday, May 13, 2002 through Friday, May 17, 2002 accordingly so attendees will be able to attend the plenary sessions.

PAPER PRESENTATION

All presentations (oral and poster) must be in English. LCD and overhead projectors will be available for oral presentations. Authors will be required to bring their own laptop computers for presentation, and we suggest that presenting authors verify laptop/projector compatibility in the speaker ready room at the meeting. Poster presentations will be displayed in English, on a board approximately 4 ft X 8 ft (1.22 m by 2.45 m), corresponding to their abstract number and day of presentation in the final program. Speakers requiring special equipment must make written request to the ECS Headquarters prior to the meeting and appropriate arrangements will be made at the expense of the author.

TECHNICAL EXHIBIT

The Technical Exhibit will be a major feature of the Philadelphia Meeting, and on Monday evening, it will be the site of the official opening of the Centennial Celebration. The Monday Evening Mixer, sponsored by Solartron Analytical, will be the opening of the exhibit, and will include complimentary refreshments, a student poster session, and special guest appearances and

entertainment. This event will be an excellent opportunity to interact with representatives from many major companies to evaluate and see first-hand many of the products and services that will be displayed. Exhibit hours are:

Monday, May 13, 2002—6:00 PM to 8:00 PM

*Tuesday, May 14, 2002—9:00 AM to 2:00 PM
and 6:00 PM to 8:00 PM*

Wednesday, May 15, 2002—9:00 AM to 2:00 PM

Coffee breaks will be sponsored in the exhibition area each day. For more information contact Leslie Lukas by tel: 609.737.1902, ext. 108 or by e-mail: leslie.lukas@electrochem.org.

FINANCIAL ASSISTANCE

Financial assistance is limited and generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS Headquarters Office; such letters will not imply any financial responsibility of ECS.

CONTACT INFORMATION

If you have any questions or require additional information, contact The Electrochemical Society, 65 South Main Street, Pennington, New Jersey, 08534-2839 USA, phone: 609.737.1902, fax: 609.737.2743, e-mail: ecs@electrochem.org, web: www.electrochem.org.

MEETING REGISTRATION INFORMATION

The deadline for advance registration is **April 12, 2002**. Refunds are subject to a 10% processing fee and will only be honored if written requests are received by **April 29, 2002**. All participants of the 201st Meeting of The Electrochemical Society, Inc. are required to pay the appropriate registration fees. Individuals choosing to register in advance or on-site should make check or money order payable to The Electrochemical Society. Payments must be made in U.S. dollars; Visa, MasterCard, and American Express are also accepted. The registration fees are:

Registration Fees*

	<u>Advance</u>	<u>On-Site</u>
ECS Member	\$350	\$380
Nonmember	\$450	\$480
ECS Student Member	\$115	\$140
Student Nonmember.....	\$135	\$160
One Day ECS Member.....	\$245	\$260
One Day Nonmember.....	\$265	\$280
ECS Emeritus & Honorary Member	\$0	\$0
Nontechnical Registration	\$65	\$80

*All technical registrations include the Meeting Abstracts Volume (paper and CD-ROM).

SHORT COURSES

The Society will sponsor six short courses in conjunction with the 201st Meeting in Philadelphia. These courses will be held on Sunday, May 12, 2002, from 9:00 AM to 5:00 PM. The registration fee is \$300 for ECS Members and \$375 for nonmembers. The registration fee for the course cov-

ers the course, luncheon, coffee breaks, and text materials; it is not applicable to any other activities of the Society Meeting. Students are offered a 50% discount. The deadline for registration for a course is **April 12, 2002**. If you plan to register for the meeting AND a Short Course, please use the Advance Registration Form. If you plan to register only for a Short Course, you may use the form on page 9. Written requests for refunds will be honored only if received at Society Headquarters before **April 29, 2002**. All courses are subject to cancellation pending an appropriate number of advance registrants.

Course # 1

Plasma Processing of Low k Dielectric Films

Instructor: Dennis W. Hess, Georgia Institute of Technology

Course # 2

Fundamentals and Applications of Electrochemical Capacitors

Instructors: Brian E. Conway, The University of Ottawa;
John R. Miller, JME, Inc.

Course # 3

Luminescence and Luminescent Materials

Instructors: A. Meijerink, Utrecht University; C. Ronda, Philips Research Laboratories; A. Srivastava, GE Research

Course # 4

Rechargeable Lithium Batteries

Instructors: Thomas Reddy, Yardney Technical Products;
K. M. Abraham, E-KEM Sciences

Course # 5

Impedance Spectroscopy: Theory and Applications

Instructor: M. E. Orazem, University of Florida

Course # 6

Battery Design and Simulation

Instructor: Robert Spotnitz, Battery Design Co.

CENTENNIAL SPONSORS



The Electrochemical Society would like to thank their sponsors for supporting the 201st Meeting of ECS. The following Centennial sponsors helped make possible the many special Centennial events. ECS greatly appreciates the continued support of these valued organizations.

Special Event Sponsors

BAE Systems, The Battery Technology Center
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Fullerenes
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Industrial Electrolysis & Electrochemical Engineering
Luminescence & Display Materials
Organic & Biological Electrochemistry
Physical Electrochemistry
Sensor

THREE PLENARY TALKS: REFLECTING ON THE PAST, LOOKING AT THE FUTURE



ARNOLD THACKRAY



CARVER MEAD



MARYE ANNE FOX

ARNOLD THACKRAY, President of the Chemical Heritage Foundation (CHF), will present the first plenary lecture on Monday, May 13. His talk is entitled "Chemistry Is Electric: A Cavalcade of History from Benjamin Franklin and Alessandro Volta to Gordon Moore and Beyond". Dr. Thackray received his PhD from Cambridge University in 1966. He has held faculty appointments in Oxford (Visiting Fellow, All Souls College) and Cambridge (Fellow, Churchill College); at the London School of Economics, Harvard, the Institute for Advanced Study, the Center for Advanced Study in the Behavioral Sciences (Stanford), and the Hebrew University of Jerusalem. He was the founding chairman of the Department of History and Sociology of Science at the University of Pennsylvania, and today is the Joseph Priestley Professor Emeritus. Dr. Thackray's interests lie in the historiography of science, and in understanding technology, medicine, and science as elements of modern culture.

CARVER MEAD, Chairman and Founder of Foveon, Inc., will give us his "Perspectives on the Future of Solid-State Science and Technology." He is the Gordon and Betty Moore professor emeritus at the California Institute of Technology, having taught there for over 40 years. Dr. Mead is a highly respected member of the Silicon Valley scientific and business community. Before starting Foveon, he made many pioneering contributions in solid-state electronics, and was one of the leading forces in VLSI design methodology. Dr. Mead holds BS, MS, and PhD degrees from the California Institute of Technology. Throughout his career as an inventor, author, and educator, Mead has received more than a dozen honors in the microelectronics and engineering fields. He holds over 50 U.S. patents and holds fellowships or distinguished memberships in seven different scientific and professional societies.

MARYE ANNE FOX, North Carolina State University Chancellor, will deliver the plenary talk on Wednesday on "Electrochemistry: A Key Technology in the Nation's Recovery." Fox is the 2001 President of Sigma Xi, the international research society whose programs and activities promote the health of the scientific enterprise and honor scientific achievement. A member of the National Academy of Sciences, Fox is a noted physical organic chemist whose work has application in materials science, solar energy conversion, and environmental chemistry. Prior to her appointment at N.C. State, she was the Waggoner Regents Chair in Chemistry and vice president for research at the University of Texas at Austin. Dr. Fox received her BS from Notre Dame College and her PhD from Dartmouth. After a postdoctoral appointment at the University of Maryland, she joined the faculty at Texas in 1976. Fox has received a number of teaching and mentoring awards throughout her career, and is active as a lecturer nationally on science education. She also advises state and national organizations on science, technology, and chemistry. Fox has served as a member of the executive committee of the National Academy of Sciences, and was vice chair of the National Science Board from 1994 to 1996. She has served on 14 editorial boards, including the *Journal of the American Chemical Society*.



ECS CENTENNIAL MEETING EVENTS-AT-A-GLANCE

Sunday, May 12

SUNDAY EVENING GET-TOGETHER

*Sponsored by Solartron Analytical
Complimentary for all meeting attendees*

Monday, May 13

PLENARY TALK

ARNOLD THACKRAY, President, Chemical Heritage Foundation
"Chemistry is Electric: A Cavalcade of History from Benjamin
Franklin and Alessandro Volta to Gordon Moore and Beyond"
Sponsored by Wilson Greatbatch, Ltd.

MONDAY EVENING MIXER

Special guest appearances and entertainment; a Student
Poster Session; and the Technical Exhibit opens

*Sponsored by Solartron Analytical
Complimentary for all meeting attendees*

Tuesday, May 14

PLENARY TALK

CARVER MEAD, Foveon, Inc. and the California Institute of
Technology "Perspectives on the Future of Solid-State
Science and Technology"
Sponsored by IBM

ANNUAL SOCIETY LUNCHEON

Formal greetings from invited guest societies
Tickets sold in advance

Wednesday, May 15

PLENARY TALK

MARYE ANNE FOX, North Carolina State University Chancellor,
and 2001 President of Sigma Xi, on "Electrochemistry:
A Key Technology in the Nation's Economic Recovery"
Sponsored by BAE Systems, The Battery Technology Center

CENTENNIAL CELEBRATION PARTY

The main event— a very special dinner and entertainment
at the historic Crystal Tea Room

Reserve your tickets now (see page 7)

[www.electrochem.org/ecs/centennial/
centennial.htm](http://www.electrochem.org/ecs/centennial/centennial.htm)

ADVANCE REGISTRATION INSTRUCTIONS

ADVANCE REGISTRATION

Complete **ALL** sections of the Advance Registration Form located on the adjacent page or the ECS website. Make check or money order payable to The Electrochemical Society, Inc. Payments must be made in U.S. funds drawn on a U.S. Bank. MasterCard, Visa, or American Express also accepted. Completed Registration Forms along with payment must be received by **April 12, 2002**, to qualify for the advance rates. All refunds are subject to a 10% processing fee. Written requests for refunds will be honored if received at Society Headquarters before **April 29, 2002**.

Attendees prepaying by credit card may send their Advance Registration Forms to the Society Headquarters Office by FAX: 609.737.2743. If you send your Advance Registration Form by FAX, please do not send another copy by mail, as this may result in duplicate charges. All Advance Registrations will be confirmed by mail.

REGISTRATION FEES

Meeting registration includes a copy of the meeting abstracts book with CD-ROM, additional copies may be purchased (see below). The categories, which apply to the meeting registration fees, are:

1. **ECS Members** - Individual Members of The Electrochemical Society interested in attending the technical sessions, including Speakers (both submitted and invited) and Session Chairmen.
2. **ECS Student Members** - Qualified Student Members of The Electrochemical Society.
3. **One Day ECS Members** - Members of The Electrochemical Society desiring admittance to Technical Sessions and Meeting Activities on specified day ONLY.
4. **Nonmembers** - Nonmember registrants interested in attending the Technical Sessions, including Speakers (both submitted and invited) and Session Chairmen.
5. **Nonmember Students** - Nonmember full-time undergraduate or graduate students registered for a degree in science or engineering. All students must send verification of student eligibility along with registration.
6. **One Day Nonmembers** - Nonmembers desiring admittance to Technical Sessions and Meeting Activities on specified day ONLY.
7. **Nontechnical Registrants** - Admittance to daily continental breakfast (Monday through Thursday) and other Meeting activities, except for the Technical Sessions.
8. **Short Courses** - Admittance to Sunday Short Courses ONLY; not applicable to any other Meeting activities.

ROBERT P. FRANKENTHAL RECEPTION

A reception will be held on Sunday, May 12, 2002 from 5:30 PM – 6:30 PM in conjunction with the symposium, Corrosion Science: A Retrospective and Current Status in Honor of Robert P. Frankenthal. Tickets are sold separately for \$10 in advance. *This event is sponsored by Princeton Applied Research.*

WAYNE L. WORRELL BANQUET

A banquet will be held at Maggiano's Little Italy Restaurant (1201 Filbert Street, across from the Philadelphia Marriott's main Filbert Street entrance) on Monday, May 13, 2002 from 7:00 PM – 10:00 PM in conjunction with the High Temperature Materials Symposium In Honor of the 65th Birthday of Wayne L. Worrell. Tickets are sold separately for \$60 in advance.

MAX BREDIG AWARD DINNER

The Max Bredig Award Dinner will be held at Maggiano's Little Italy Restaurant (1201 Filbert Street, across from the Philadelphia Marriott's main Filbert Street entrance) on Tuesday, May 14, 2002 from 7:00 PM – 10:00 PM in honor of the 2002 Max Bredig Award Winner, George Papatheodorou. Professor Papatheodorou will deliver his award address after dinner. Tickets are sold separately for \$30 in advance.

CENTENNIAL CELEBRATION PARTY

The Centennial Celebration Party is the pull-out-the-stops event of the Society's special anniversary year. The Party will be held on Wednesday, May 15, 6:30-10:30 PM, in the historic Crystal Tea Room (in the Wanamaker Building), just 1 block from the Philadelphia Marriott. There will be a cocktail reception followed by an elegant dinner and a light-hearted walk down memory lane with our special emcee, Barry MacDougall. The dress code is business attire, but feel free to come in your best party clothes!

ECS members may obtain a free ticket to this event. Nonmembers and guests of members may purchase tickets at \$40 each. (You must register for the meeting.)

SEATING IS LIMITED and tickets will be distributed on a first-come, first-served basis. If you are a member and would like to attend, you must reserve your ticket. Please use the Advance Registration Form to reserve your free ticket (if you are a member) and to purchase any additional tickets. Don't miss out on the ECS Party of the century, reserve or buy your tickets now.

LUNCHEONS

The ECS Annual Luncheon and Business Meeting and all Division and Group Luncheons will be held at the Downtown Courtyard Marriott located next to the Philadelphia Marriott. Luncheon participants should exit the Philadelphia Marriott via the Filbert Street entrance and bear left. Tickets are sold separately for \$20 each in advance.

MEETING ABSTRACTS—ADDITIONAL COPIES

For those individuals who wish to obtain additional copies of the Meeting Abstracts, or for those individuals who are not planning on attending the meeting and still wish to purchase the Meeting Abstracts, the Meeting Abstracts are available for \$70 to Members and \$84.00 to Nonmembers. Use the Additional Line in Section E of the Advance Registration Form to order. Please add the following amounts for additional postage: first class mailing within the U.S. is \$8.00, air mail postage to Canada is \$14.00, and air mail postage to all other countries is \$24.00.



FORTHCOMING TITLES

The following proceedings volumes are scheduled for publication after the meeting (on or before September 1, 2002). If you would like to receive information on these titles when they become available, please check the appropriate boxes, complete the form below, and return at any time to the Society.

Yes, please send me information on the books I have checked below:

- I1 Chemical Mechanical Planarization V; S. Seal et al., Editor
- AD1, AC1, & AC2 Advanced Luminescent Materials, Devices, and Nanostructures; M. Cahay, Editor
- D1 Advances in Electrochemical Capacitors and Hybrid Power Systems; R. J. Brodd, Editor
- F1 Corrosion Science: A Retrospective and Current Status—In Honor of Robert P. Frankenthal; G. Frankel, Editor
- J1 Plasma Processing XIV; G. S. Mathad, Editor
- K1 Cold Cathodes II; M. Cahay, Editor
- P1 Environmental Issues in the Electronics and Semiconductor Industries V; L. Mendicino, Editor
- Q1 Rapid Thermal and Other Short-Time Processing Technologies III; P. J. Timans, Editor
- S2 Hydrogen Storage Materials and Hydrogen Generators; G. A. Nazri, Editor
- V1-9 Fullerenes Volume 12; D. Guldi, Editor
- Z1 Design and Mathematical Modeling of Electrochemical Systems; J. W. Van Zee, Editor
- AE1 Organic Electrochemistry: Manuel M. Baizer Award (5th); M. Workentin, Editor
- AG1 Molten Salts XIII; H. C. DeLong, Editor

Please send information on the above checked titles by (select as many notification methods as you like)

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PLEASE RETURN THIS FORM TO: THE ELECTROCHEMICAL SOCIETY
65 South Main Street, Building D, Pennington, NJ 08534-2839, USA
Tel: 609.737.1902 • Fax: 609.737.2743

1 • Plasma Processing of Low k Dielectric Films *Instructor: D. W. Hess, Georgia Institute of Technology*

This course will describe the physics and chemistry of rf and microwave glow discharges as they pertain to the processing of low k dielectric films for silicon-based integrated circuits (ICs). The course will address both the fundamentals of glow discharges and the plasma processing issues faced by the need to deposit, etch, and integrate low k dielectric layers into ICs. Initially, the physics and chemistry of glow discharges or plasmas used in microelectronic device and IC applications will be discussed. Characterization and diagnostics of these discharges by spectroscopic means and by Langmuir probes will be described briefly. The variety of reactor configurations available will be indicated, with particular emphasis on parallel plate, downstream, and high density reactors. Following this introduction, plasma processing approaches and results that focus on the etching and deposition of films with dielectric constants between 3.7 and 2 will be presented. In particular, the patterning of low k materials such as silicon-based layers (e.g., SiOF, SiCOH, HSO, MSO) and organic films (e.g., fluorocarbons, a-C-F, SiCOH) will be discussed. Plasma-assisted deposition of low k polymer layers (e.g., fluorocarbons, a-C-F, SiCOH) will be described. Critical integration issues for plasma processing of low k materials such as photoresist stripping, anisotropic etching, and residue removal will also be presented. In addition, radiation damage and particulate formation in plasmas will be described and mitigation methods indicated.

2 • Fundamentals and Applications of Electrochemical Capacitors *Instructors: B. E. Conway, University of Ottawa; J. R. Miller, JME, Inc.*

Electrochemical capacitors, sometimes called supercapacitors or ultracapacitors, are receiving increased attention in power sources for many applications. They offer extraordinarily high power density compared with batteries as well as high cycle-life and maintenance-free operation. Recently, emphasis has broadened from the traditional low-power to the emerging high-power applications. Optimized power systems using battery-capacitor combinations are now appearing. Systems developed specifically for power quality applications are appearing.

This course is targeted at technologists interested in advancing and/or exploiting electrochemical capacitor technology. The fundamentals part of the lecture covers the nature and significance of electric double layer and pseudocapacitance charge storage and compares and contrasts these charge storage mechanism with traditional capacitor and battery technology.

The applications part of the lecture covers the two-terminal electrical response of electrochemical capacitors and describes how to derive and use an equivalent circuit model. The goal is to provide basic understanding, necessary tools, and general information needed to successfully use such capacitors. Power/energy behavior is discussed and used to help select the optimum product. Reliability aspects are discussed and include voltage balance issues for multi-cell devices, typical failure modes, and recommended derating approaches to meet desired operational life.

A review of capacitor property and performance measurement procedures will be given with special emphasis on electrochemical capacitor technology. A pulsed-load example will be examined to "size" a capacitor so as to develop the minimum mass solution for the application.

The course will conclude with a summary of the present status of electrochemical capacitor technology, available commercial and near-commercial products, and sources to procure these products.

(Short Courses continued on next page)

PROFESSIONAL DEVELOPMENT WORKSHOPS

ECS will sponsor the following three professional development workshops. These workshops are free to all meeting registrants.

Cover Letter for Your Resume

Sunday, May 12 — 3:00 PM - 3:45 PM
Meeting Room 310, Level 3
Monday, May 13 — 12:00 PM - 12:45 PM
Meeting Room 310, Level 3

by John R. Susko

Director Product Development, Technical Consumer Products, Inc.

This informal workshop will discuss the need for the cover letter, how to write it, as well as the many "do's" and "don'ts" in preparing such a letter.

Job Interviewing Tips

Sunday, May 12 — 4:00 PM - 4:45 PM
Meeting Room 310, Level 3
Monday, May 13 — 1:00 PM - 1:45 PM
Meeting Room 310, Level 3

by John R. Susko

Director Product Development, Technical Consumer Products, Inc.

This informal workshop will discuss the "art of interviewing." How to improve your chances of properly impressing the interviewer, key

questions to ask, and other pertinent issues about being selected for the job.

Resume Round Table

Monday, May 13 — 3:00 PM - 5:00 PM
Meeting Room 310, Level 3

by John R. Susko

Director Product Development, Technical Consumer Products, Inc.

This informal round table workshop is designed to provide feedback on resumes by publicly critiquing participants' resumes and offering suggestions on ways to make them more effective. Two 20-minute presentations are planned, one at 3:00 PM and one at 4:00 PM, which will be followed by individual critiques.



www.electrochem.org



ECS SHORT COURSES (continued)

3 • Luminescence and Luminescent Materials *Instructors: A. Meijerink, Utrecht University; C. Ronda, Philips Research Laboratory; and A. Srivastava, GE Research*

Luminescent materials are applied widely and are in the focus of research both in industrial and academic institutes. Recent developments like white light emitting phosphor-LEDs, organic LEDs, and phosphors for VUV excitation have given a strong impetus to this field.

The short course will start with an overview of luminescence mechanisms in inorganic and organic materials. This part will be given by Dr. Ronda. Dr. Meijerink will continue this part and will also deal with luminescence spectroscopy and instrumentation. Finally, Dr. Srivastava will give a comprehensive review of application of luminescent materials.

This short course is highly recommended for researchers with an industrial or academic affiliation.

4 • Rechargeable Lithium Batteries *Instructors: T. Reddy, Yardney Technical Products; K. M. Abraham, E-KEM Sciences*

This short course will deal with the fundamentals and applications of rechargeable lithium batteries with liquid and polymer electrolytes. Specific topics covered include: electrochemical principles of batteries with Li metal and alternative anodes; guest-host chemistry of the electrode materials; Li-ion batteries; requirements of electrolytes including liquid and polymer electrolytes; performance data for commercial Li-ion batteries; and future prospects for rechargeable lithium batteries.

5 • Impedance Spectroscopy: Theory and Application *Instructor: M. E. Orazem, University of Florida*

This course is intended for chemists, physicists, materials scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes. The attendee will develop a basic understanding of the technique, the sources of errors in impedance measurements, the manner in which experiments can be optimized to reduce these errors, and the use of regression to interpret measurements in terms of meaningful physical properties. The topics to be covered include: (1) The motivation for using impedance spectroscopy advantages as compared to other transient techniques and the conditions under which its use is ideally suited; (2) The type of information that can be extracted from impedance measurements, including the limitations of the technique; (3) Proper selection of experimental parameters; (4) The types of errors expected in impedance measurements, and methods to assess the importance of these errors and to reduce their magnitude; (5) Use of the Kramers-Kronig relations as a tool for evaluating impedance data; (6) Use of regression techniques and appropriate selection of weighting strategies; (7) Application of electrical circuit analogues; (8) Development of mathematical models appropriate for interpretation of impedance spectra in terms of physical properties; (9) Applications to different systems including corrosion, characterization of electronic materials, transport through membranes such as skin; and (10) Generalization of impedance concepts to other spectroscopy measurements such as acoustophoretic spectroscopy and complex viscometry.

6 • Battery Design and Simulation *Instructor: R. Spotnitz, Battery Design Co.*

This course is designed for both battery users and developers. Attendees will learn how to select batteries for specific applications, and techniques for sizing and estimating performance. Attendees will also develop an appreciation for the types of battery processes that are currently amenable to simulation, the types of simulation models available, and how these models can be applied to simulate battery performance. This introductory course requires no prior experience in battery modeling. The major topics covered are: (1) Survey of battery systems (markets, applications, general behavior); (2) Equivalent circuit modeling of battery systems (discrete circuit elements, applications in circuit design, state of charge determination, state of health determination); (3) First principles modeling of battery systems (fundamental laws, cell models for specific chemistries, battery versus cell design, numerical methods); (4) Design of battery systems (electrode sizing, tab placement, electrode formulations, abuse tolerance, thermal management); and (5) Simulation of battery performance (discharge/charge behavior, thermal behavior, fade, abuse).



ECS SHORT COURSE REGISTRATION FORM

(If you are registering for the meeting, please use the Advance Registration Form; if you are registering only for a Short Course, please use this form.)

Please check one: Course #1 Course #2 Course #3 Course #4 Course #5 Course #6

Please check one: ECS Member—\$300 Nonmember—\$375 ECS Student Member—\$150 Student Nonmember—\$187.50

Name: _____

Address: _____

City, State, Zip, Country: _____

Business Affiliation: _____

E-mail _____ Phone # _____ Fax # _____

Check Enclosed (Make payable to The Electrochemical Society, Inc. Check must be drawn in U.S. funds from a U.S. bank)

Amex Mastercard Visa Card #: _____ Exp. Date: _____

Signature: _____

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HOTEL, AIRLINES, & GROUND TRANSPORTATION

Hotel Reservation Information

The Philadelphia Marriott is the primary headquarters hotel where the meeting will take place. In addition, the Philadelphia Downtown Courtyard Marriott (21 N. Juniper Street, Philadelphia, PA, next to the Philadelphia Marriott) will offer alternative rooms to attendees of the 201st Meeting. We are financially responsible for all of the meeting space used. The amount charged for the meeting space is dependent upon the total number of guestrooms reserved using our special convention rates during the dates of the meeting. Therefore, we encourage all attendees to stay at the Philadelphia Marriott or the Marriott Courtyard.

The Marriott reservations phone number is 1.800.320.5744. The deadline for reservations is **April 12, 2002**. Reservations received after the deadline will only be accepted on a space available basis. Be sure to mention that you are planning to attend the 201st Meeting of The Electrochemical Society, Inc. to obtain our special reduced convention rates. The special convention rates are:

PHILADELPHIA MARRIOTT

\$162 single / \$182 double

PHILADELPHIA DOWNTOWN COURTYARD MARRIOTT

\$149 single / \$159 double

In addition, a limited number of government and student rate rooms are available (please contact the ECS headquarters office for details). Please note that May is a very busy month in Philadelphia and space is limited, so we encourage you to make your reservations early. To obtain the special convention rates listed above, you must mention that you are planning to attend the 201st Meeting of The Electrochemical Society.

Airline Reservation Information

US Airways has been designated as the "Official" carrier for the 201st Meeting of The Electrochemical Society. US Airways offers a majority of the direct flights in

and out of Philadelphia. US Airways is offering special discounted meeting fares! Fares booked at least 60 days in advance will receive a 10% discount off the lowest applicable fare. Fares booked less than 60 days in advance will receive a 5% discount off the lowest applicable fare. To obtain this discount, call your local US Airways agent or in the US 1.877.874.7687; 8:00 AM – 9:30 PM Eastern Time. Refer to our Gold File Number 15122269. Book your flight early to take advantage of promotional fares that give you the greatest discount.

Ground Transportation

Rental Car—The Philadelphia Marriott is located 8 miles northeast of the Philadelphia International Airport. Budget Rent a Car will provide special discounted rates to attendees of the 201st Meeting with rates ranging between \$25.99 - \$69.99 per day. For details or reservations, contact Budget at 1.800.772.3773 and refer to Budget Convention Discount Code #U063114.

Shuttle—The Marriott offers a shuttle service to and from the Airport. The hours of operation are Monday – Saturday 5:00 AM – 10:00 PM and Sunday 5:00 AM – 7:00 PM. The cost is \$8 per passenger. Tickets can be purchased in the baggage claim area of the airport, or at the hotel.

Train—The SEPTA R1 high-speed rail service provides a convenient and economical service from the airport's five terminals to the downtown area. Transit from the airport to downtown Philadelphia takes about 20 minutes and trains depart every 30 minutes. Trains run from 6 AM to midnight. A one-way ticket on the R1 service costs just \$5 and stops at Market East/The Gallery station in the Pennsylvania Convention Center, which is connected by an airwalk to the Philadelphia Marriott.

Taxi—Taxis are also available 24 hours a day. Usually a flat rate of \$20 is charged for a ride from the airport to the downtown area.

TOUR REGISTRATION

Nontechnical Registrants Program and Optional Tours

Monday through Friday

A fully narrated 90 minute city tour.

Philadelphia City Trolley Tour

(Every 30 minutes 9:00 AM - 4:00 PM)

Price: \$18 and includes on/off privileges for the day of purchase

Monday, May 13, 2002

Lecture #1—Welcome to Philadelphia

(8:30 AM - 9:30 AM)

A representative of Philadelphia Trolley Works will give a one-hour orientation to inform Nontechnical Registrants about the city and tours available to them.

Price: Complimentary for Nontechnical Registrants

Tour #1—Experience Philadelphia on Foot

(10:00 AM - 12:30 PM)

Philadelphia, the birthplace of the nation is known for Independence Hall and Benjamin Franklin. A very experienced guide will take you through the National Historical Park and Old City to point out some of the items you might miss on your own. Walking on the oldest continuously residential street in the country, imagining Benjamin Franklin under his favorite tree or seeing the spot where Gilbert Stuart painted the famous George Washington picture. Comfortable clothing and shoes are recommended, as you will be walking for approximately 2 hours. If you would like to stay in that area after the tour to eat lunch or to go inside Independence Hall you are welcome to do so. Your hotel is just 10 minutes walking distance. There will be transportation available for guests who prefer to ride back to the hotel.

Tickets are \$13 in advance or \$18 onsite

Tuesday, May 14, 2002 **Lecture #2—The History of the Philadelphia Mafia**

(8:30 AM - 9:30 AM)

Today's speaker is Celeste A. Morello, a local expert, criminologist, historian, and author of "Before Bruno," and "The Italian Market Cookbook." Plan to join Mrs. Morello this morning to review her series "Before Bruno," the two-book series about the history of the Philadelphia Italian Mob. The first book in the series covers the time period of 1880-1931 and includes information about when and why the Sicilian Mafiosi came to the area, the Pennsylvania Crime Commission, and mafia myths. The second book in the series covers the time period of 1931-1946. Mrs. Morello will also be available to sign any of her books that participants bring to the lecture. Books will not be available for purchase onsite, but can be purchased from any major bookstores prior to the lecture.

Price: Complimentary for Nontechnical Registrants

Tour #2—Italian Market Tour with Mrs. Morello

(10:00 AM - 2:30 PM)

After this morning's lecture, continue with Mrs. Morello's guided tour of the Italian Market. The local historical and cultural sites of Little Italy are surveyed along with visits to stores where food-making demonstrations and tastings will be given by culinary experts. The best of the famous 9th Street Italian Market will be highlighted! Guests will have 1 hour free time for lunch. Comfortable clothing and shoes are recommended as part of the tour will be on foot. The number of tickets for this event is limited, so we suggest you register in advance!

Tickets are \$30 per person in advance or \$35 onsite

Wednesday, May 15, 2002

Tour #3—Longwood Gardens

(10:00 AM - 4:00 PM)

May is the perfect month to visit one of the most beautiful gardens in Pennsylvania. Pierre du Pont, great grandson of Eleuthere Irenee du Pont, founder of the DuPont chemical company, purchased Longwood Garden. At this time it was a working farm with a large collection of different trees. Seeing how it is today, you understand the workings of generations of DuPonts who put their time, imagination, and funds into this property. Do not miss the 3 acre indoor display containing a showcase hall, exotic foliage, cacti, ferns, and bonsai. Guests will have three hours to tour Longwood Gardens. A restaurant and a cafeteria are available for lunch on your own.

Tickets are \$35 in advance and \$40 onsite per person

Thursday, May 16, 2002

Morning Book Chat

(8:30 AM - 9:30 AM)

This morning, the group will be reviewing two books by Lisa Scottoline, *New York Times* National Best Selling Author of eight legal thriller novels. All of Lisa's books draw on her experience as a trial lawyer as well as her judicial clerkships in the state and federal justice systems. The group will be reviewing Scottoline's most recent title, "The Vendetta Defense," about an old Italian pigeon-keeper fully admits to settling a fifty-year-old vendetta by killing. But is it really murder? Judy Carrier must reevaluate her own definition of justice while launching a no-holds-barred defense. Along the way she finds more trouble than she bargained for. The group can also read Scottoline's novel "Final Appeal." It is recommended that participants read the novels prior to the review. For more information about the books or the author go to: www.scottoline.com/home.htm. Please note that copies will not be available onsite. Books may be purchased at your local bookstore and are available in paperback.

HOTEL REGISTRATION-PHILADELPHIA MARRIOTT HOTEL

The 201st Meeting of The Electrochemical Society, May 12-17, 2002

Reservations for this group received after April 12, 2002 will be accepted on a space and rate availability basis.

Please complete all the following information to confirm your reservation and to ensure a speedy check in.

Name(s) _____ Sharing with _____
 Organization/Company _____ Arrival _____
 Address _____ Departure _____
 City/State _____ Arrival Time _____
 Telephone #—Area Code () _____ Fax #—Area Code () _____

Please indicate below which room type you wish to reserve. (Check-in time 2:00 pm / Check-out time 12:00 noon)

Standard Room Single \$162 Double \$182 Triple \$202 Quadruple \$222

Number of Rooms _____ Number of People _____ Additional persons (third and fourth occupant) \$20 per night (* Children under 18 free in same room as parent).

One Bed Two Beds

Non- Smoking Smoking (If your requested room and bedding type is not available, you will be confirmed in the next higher available category.)

Special Requests _____ Check here for Accessible Accommodation _____

All reservations must be accompanied by a deposit for the first night room and 14% occupancy tax. There is no penalty for reservations cancelled 72 hours prior to the date of arrival. After check-in, any departure prior to the stated departure date will be assessed a \$100.00 charge. The deposit will be non refundable if the reservation is cancelled within 72 hours of arrival.

A. Enclosed is a check/money order for \$ _____ (Please make check payable to Philadelphia Marriott Hotel)

B. Credit Card for 1st Night's Deposit: American Express Diners Club MasterCard Carte Blanche

Credit Card # _____ Expiration Date _____

If the name on the credit card differs from the registered guest, please indicate below what charges are to be billed to the above card.

Print name as it appears on card _____ Signature _____

PLEASE RETURN THIS FORM WITH PAYMENT TO: PHILADELPHIA MARRIOTT HOTEL

1201 Market Street, Philadelphia, PA 19107, USA • Reservations telephone: 215.625.2900 or 800.320.5744 • Reservations fax: 215.625.6101



TOUR REGISTRATION-CONNECTIVE TOURS

The 201st Meeting of The Electrochemical Society, May 12-17, 2002

Tour registration forms must be received on or before **April 1, 2002**. Refunds available until **April 1, 2002**. On site registrations will be taken based on availability and subject to a surcharge. Comfortable shoes are advisable on all tours. All tours will depart from the 12th Street entrance at the times printed in this brochure. To register, mail or fax your completed tour registration form and payment in full (checks payable to CONNECTIVE TOURS) to the address located on the bottom of this form. Please pick up your tour tickets at the Tour Registration Desk in the Meeting Registration area upon arrival in Philadelphia.

TOUR	DATE	PRICE	NUMBER OF TICKETS	TOTAL FOR TOUR
Lecture #1: Welcome to Philadelphia	Monday, May 13, 2002	complimentary*	_____	_____
Tour #1: Experience Philadelphia on Foot	Monday, May 13, 2002	\$13.00 per person	_____	_____
Tour #2: Italian Market Tour	Tuesday, May 14, 2002	\$30.00 per person	_____	_____
Tour #3: Longwood Gardens	Wednesday, May 15, 2002	\$35.00 per person	_____	_____
Philadelphia City Trolley Tour	Monday, May 13, 2002 - Friday, May 17, 2001	\$18.00 per person	_____	_____

*Complimentary for Nontechnical Meeting Registrants only.

TOTAL ENCLOSED: _____

Name _____
 Address _____
 City _____ State _____ Zip _____ Country _____
 Tel (Home) _____ (Work) _____ (Fax) _____
 E-mail Address _____

METHOD OF PAYMENT (Credit card orders will be charged to your account): American Express Visa MasterCard Check or Money Order

CREDIT CARD # _____ **EXP. DATE** _____ **SIGNATURE (REQUIRED)** _____

PLEASE RETURN THIS FORM WITH PAYMENT TO: CONNECTIVE TOURS

1119 North Bodine Street, Philadelphia, PA 19123, USA • Reservations telephone: 215.923.8522, Ext. 23 • Reservations fax: 215.923.8517

ECS • The Electrochemical Society, Inc.
65 South Main Street
Pennington, NJ 08534-2839, USA



philadelphia

Meeting
Registration



Centennial Celebration

May 12-17, 2002

Philadelphia, PA, USA

201st Meeting of The Electrochemical Society

www.electrochem.org/meetings/future/201/meeting.htm

Wednesday, May 15
(see inside for details)

CENTENNIAL CELEBRATION PARTY

**DON'T FORGET TO RESERVE YOUR
TICKETS FOR THE**

