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# PHYSICAL ELECTROCHEMISTRY DIVISION (PED) NEWSLETTER

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April 2003

Division Website: [www.electrochem.org/divisions/ped.htm](http://www.electrochem.org/divisions/ped.htm)

## Division Officers (2001-2003)

**Chair:** Dr. Johna Leddy,  
[jleddy@blue.weeg.uiowa.edu](mailto:jleddy@blue.weeg.uiowa.edu)  
**Vice-Chair :** Dr. Viola Birss,  
[birss@ucalgary.ca](mailto:birss@ucalgary.ca)  
**Secretary-Treasurer** Dr. Gessie Brisard  
[Gessie.Brisard@USherbrooke.ca](mailto:Gessie.Brisard@USherbrooke.ca)

### **Members-at-Large:**

Dr. Maggie Ciszowska, [malgcisz@brooklyn.cuny.edu](mailto:malgcisz@brooklyn.cuny.edu)  
Dr. Michael Mirkin, [Michael\\_mirkin@qc.edu](mailto:Michael_mirkin@qc.edu)  
Dr. Petr Vanýsek, [pvanysek@niu.edu](mailto:pvanysek@niu.edu)  
Dr. Zoltan Nagy, [nagy@anl.gov](mailto:nagy@anl.gov)

### **Advisor to the PED:**

Dr. Jean Lessard, [Jean.Lessard@Usherbrooke.ca](mailto:Jean.Lessard@Usherbrooke.ca)

**Newsletter Editor : Gessie Brisard**

## Recent Activities

### Symposia

During 2001, the PED sponsored or co-sponsored 10 symposia at the Spring Meeting in Washington, and 8 symposia in San Francisco in the fall. At the Centennial Meeting last spring in Philadelphia, 15 symposia were sponsored or co-sponsored by PED and at the fall meeting in Salt Lake City last October (2002), 9 symposia were sponsored or co-sponsored (see pages 7-9 for a listing of symposia sponsored by our division over the last five years).

### Student Travel Awards

#### San Francisco Meeting - Fall 2001

Student travel grants of \$500 each were awarded to **Charlotte W. Eng**, SUNY at Stony Brook, NY, USA and **Jolanta E. E. Swiatowska-Mrowiecka**, University of Mining and Metallurgy, Poland (see photograph on p. 3).

#### Philadelphia Meeting - Spring 2002

Student travel grants of \$500 each were awarded to **Jian Zhou** from North Carolina State U. **Tao Ye** Univ. Pittsburgh (see photograph p. 3) and **Ramit Jain**, CWRU.

#### Salt Lake City Meeting - Fall

**Drew Dunwoody** from the University of Iowa received \$700 and a free registration as a student travel grant (see photograph on p. 4).

We will continue to honor our Student Travel Awardees by including their photos in the PED newsletters and on the PED website.

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# Nomination of officers for 2003-2005

The following is a list of candidates for the executive committee for the next season, as recommended by the nominating committee. Additional nominations for office may be made by petition signed by five (5) members of the Division. The petition(s) must be in the hands of the Chairman of the Nominating Committee at least ten (10) days before the election, with the written assurance of the nominee's willingness to serve. Nominations in the form of a petition signed by five or more members may be made from the floor at the time of the annual meeting at which officers are elected, provided the willingness of the

nominees to serve is expressed in writing prior to the election. The election will take place at the annual business luncheon.

Chair: Dr. Viola I. Birss  
Vice-Chair: Dr. Gessie Brisard  
Secretary-Treasurer: Dr. Petr Vanýsek  
Members at Large:  
Zoltan Nagy  
Michael Mirkin  
Ingrid Fritsch  
Greg Swain  
Robin McCarley  
Tom Zawodinski  
Hugh DeLong

## Message from the Chair

It is with enthusiasm that we look forward to the meeting in Paris at the end of April. At the meeting, we will hold the annual business meeting of the Physical Electrochemistry Division, where we will elect members at large to serve the Division for the next two years. We will also elect a new Secretary -Treasurer. It will be my pleasure to present Andrzej Wieckowski with the 2003 David C. Grahame Award for Physical Electrochemistry. The award committee makes this award to Andrzej for his pioneering adaptation of solid state NMR to *in situ* metal solution interfaces. I thank the Award Committee, chaired by Bob Osteryoung, for their efforts and I congratulate Andrzej on receiving the Grahame Award. Please join us at the reception planned at the meeting to congratulate Andrzej.

After the meeting, I step down as Chair, and Viola Birss will become Chair of the Division. The Division is and will be well served by her able leadership and unflagging efforts. Gessie Brisard will become Vice Chair; all of her experiences as Secretary-Treasurer have prepared her well for these new responsibilities. It has been a pleasure to work with them and other members of the Executive Committee of the Division.

One of the projects that the Division has been pursuing over the last year has been the development of a special publication of the Society. The publication, entitled *Historical Perspectives on the Evolution of Electrochemical Tools*, evolves out of a symposium spearheaded by Andrzej Wieckowski at the Centennial Meeting in Philadelphia. The Symposium consisted of five invited talks on the development of electrochemistry and its research tools over the last twenty-five years. The speakers were Brian Conway, Dieter Kolb, Art Hubbard, Bill Heineman, and Royce Murray. Each of these speakers has helped to edit a chapter based on their talks. There are also about fifteen shorter papers solicited from well-recognized leaders in the field. These chapters record the authors' views of how different parts of electrochemistry

has been shaped during the course of their careers. My co-editors are Petr Vanýsek and Viola Birss. The papers have been delightful to read and do an excellent job of conveying the important developments and the personal contributions of many researchers in the field. The pleasures of science are well described in the book. As a special publication of the Society, the volume will be available for sale at the fall meeting. Proceeds will be used to support the interests of the Division.

Thank you for your continued efforts in support of the Division.

Johna Leddy, Chair, Physical Electrochemistry Division

### **Division Finances**

The Physical Electrochemistry Division provides funds to assist several of the invited speakers at its symposia at each meeting. Our principal intent, however, is to offer travel grants as partial support for the attendance of graduate students at the annual conferences. At present, we normally support only 4 or 5 students per meeting (see guidelines for Graduate Student Travel Awards on the PED website). In order to enhance our ability to support student travel, the Division recently agreed to institute annual dues of \$5.00 for each non-student member. If all members paid these dues, we would have sufficient funds to assist up to 10 students per year to attend our meetings.

Therefore, we do need your continuing financial support to fund these Divisional activities. Please ensure that you check off the Divisional dues line on the Membership Renewal or New Member form and add these divisional dues to the Society dues. If your renewal form does not have the PED line and you would like to contribute, you can write it in. If you already paid your Society dues, but overlooked the divisional dues, you can still mail your check to ECS, indicating that this is for the PED dues.

### **New Symposium Volumes**

Solid Oxide Fuel Cells VIII (SOFC-VIII) -- S. C. Singhal and M. Dokiya PV 2003-07

Direct Methanol Fuel Cells , S. Narayanan, T. Zawodzinski, S. Gottesfeld PV 2001-4

Oxide Films , K.R. Hebert, R.S. Lillard, B. R. MacDougall PV 2000-4

Hydrogen at Surfaces and Interfaces , G. Jerkiewicz, J.M. Feliu, B.N. Popov PV 2000-16

The Global Climate Change: A Coordinated Response by Electrochemistry and Solid-State Science and Technology , A. Wieckowski, E. W. Brooman, T. F. Fuller PV 2000-20

Electrochemical Science and Technology of Copper, P. Vanysek, M. Alodan, J. Lipkowski, O. M. Magnussen, PV 2000-30

Electrochemistry of Carbon Materials , K. Zaghbi, D. Belanger, M. T. McDermott, PV 2000-34

Scanning Probe Microscopy for Electrode Characterization and Nanometer Scale Modification , D. C. Hansen, H. S. Isaacs, K. Sieradzki, M. D. Porter, PV 2000-35.



**Figure 1** PED Student Travel Award Winner Jolanta E.E. Świątowska-Mrowiecka, (left) University of Mining and Metallurgy, Poland at the Fall meeting in San Francisco, September 2001, receiving her award from Dr. Gessie Brisard, Secretary-Treasurer of the PED.



**Figure 2** Jian Zhou (left) from North Carolina State University and Tao Ye, Pittsburgh University (left), at the Philadelphia Meeting Spring 2002.



**Figure 3 PED Student Travel Award Winner Drew Dunwoody (right) from University of Iowa receiving his award from Dr. Johna Leddy, chair of the Division in October 2002 at Salt Lake City.**



**Figure 4 Professor George N. Papatheodorou (right) receiving the Max Bredig Award from Johna Leddy during the Physical Electrochemical Division Luncheon in Philadelphia in May 2002.**

## PED Awards

### David C. Grahame Award

This award was established in 1981 to "encourage excellence in physical electrochemistry research." It is sponsored by General Electric and the Ford Foundation. The award winner is presented with a scroll and a cheque for \$1500. A lecture is given in the General Session of the PED or in a PED sponsored symposium.

The 10<sup>th</sup> recipient of the David C. Grahame Award was Dr. Dan Scherson of Case Western Reserve University. An award reception was held at 7:30 pm on Tuesday March 27<sup>th</sup>, 2001 in the Renaissance Ballroom East, Ballroom Level.

The 11<sup>th</sup> recipient of the David C. Grahame Award is Dr. Andrzej Wieckowski of the University of Illinois, Urbana Champaign. An award reception will be held at the next ECS Meeting in Paris, April 30<sup>th</sup> 2003 .

The David C. Grahame Award is made every two years. Watch Interface or check out the ECS website at [www.electrochem.org](http://www.electrochem.org) for details regarding the David C. Grahame Award.

### Max Bredig Award

This award was established in 1984 to "recognize excellence in molten salt chemistry research." It is awarded biannually and is sponsored by ARCO Metals Company and the Aluminum Company of America. The award winner is presented with a scroll and a cheque for \$1500. A lecture is given in the International Molten Salt symposium, sponsored by the PED.

The most recent recipient was Professor George N. Papatheodorou in 2002. He received his award during the Physical Electrochemical Division Luncheon in Philadelphia in May 2002 (see photograph on p. 3).

*Nominations are currently being sought for the Max Bredig Award. We encourage nominations of appropriate individuals, who are currently active members of the Society, for the 2004 Award* Watch Interface or check out the ECS website at <http://www.electrochem.org/awards/rules/bredig.htm> for details regarding deadlines for nominations.

### Upcoming Activities

#### Division Luncheon/Business Meeting

We invite you to join us at the division luncheon/business meetings held at each of the Spring Meetings on **Mondays, at 12:15 pm** . You can purchase the luncheon ticket conveniently when you are sending in your meeting registration. Watch Interface or check out the ECS meeting website at [www.electrochem.org](http://www.electrochem.org) for further information. This year, it will be April 28, in Paris, with the advanced reservation the cost is \$ 24.00.

#### Future PED-Sponsored Symposia Plans

Following is a list of the symposia planned for the Spring and Fall ECS meetings in 2003 and beyond. We hope that you can identify symposia in which you can participate.

Also, we continue to need the input of our membership in terms of suggesting novel and appropriate symposium topics, which the PED could sponsor. A list of recent symposium topics is also attached, so that duplication is avoided, but also to provide our members with ideas regarding suitable symposium topics. Contact any of the Officers listed on page 1, if you would like to suggest a symposium topic. You may wish to be involved in organizing the symposium as well, or you may prefer to suggest the names of other individuals who would be willing to serve as the

## UPCOMING SYMPOSIA

### 202th meeting Paris 2003, Apr. 27-May 2. (Abstracts were due November 15th)

#### *PED Organized Symposia:*

1. AE1-Physical Electrochemistry General Session– V. Birss
2. Z1-Computational Chemistry (PED/ Industrial Electrolysis and Electrochemical Engineering /Battery) – P.B. Balbuena, J. M. Seminario and John Van Zee
3. AE2-Electrochemistry of novel electrodes materials – G. Brisard and A. Lasia
4. P1-Hydrogen Electrochemistry - G. Jerkiewicz and J. M. Feliu, B. N. Popov and A. M. Brass. co-sponsored by Energy Technology
5. AG1-Interfacial Studies by Synchrotron techniques- O'Grady, H. You, Z. Nagy
6. AF1-Gerischer Symposium on Nanostructured Semiconductor Materials and Interfaces (PED/Fullerenes/Energy Tech) – C. Levy-Clement, P. V. Kamat, W. Jaegermann, Y Nakato N. Lewis and B. Parkinson
7. AI1-Chemical Sensors and Electroanalytical Methods and Systems – Sensors/PED) – D. Buttry and M. Ciszowska
8. T1-8<sup>th</sup> Int Symp on Diamond Materials– PED/Dielectric Science and Technology/High Temp Materials/Electronics) G. Swain
9. A2-Nanotechnology (all Division and Groups)

#### *Co-sponsoring:*

1. O1-Fuel Cells from Materials to Systems – Energy Tech J. Leddy
2. R10-Porphyrins and Supramolecular Assemblies – Fullerenes J. Hupp and D. Crooks
3. X1-Transient Techniques in Electrochemistry – Ind Electrolysis and Electrochem. Eng./Corr) P. Vanysek, D. Harrington and A. Baranski

### Orlando 2003, October 12-17

#### *PED Organized Symposia:*

1. U1-Physical Electrochemistry General Session - G. Brisard
2. U3- 3-D Batteries H. White, D. Rolison, B. Dunn

April 2003

3. V1 Surface Oxide Films 'Publication of a Proceedings Volume is planned after the meeting. V. Birss, R. Hillman, D. Burke and S. Lillard.
4. X1 Electrochemistry Symposium in Honor of Michael Weaver -R. Corn, J. Hupp, C. Korzeniewski, A. Wieckowski and Flavio Maran.
5. U2 Hyphenated Techniques Involving Electroanalytical Chemistry
6. X2 Charge Transfer Processes in Biological Systems
7. W1 Symposium on Fundamental Understanding of Electrode Processes in Memory of Professor Ernest B. Yeager - Prakash, Chu, Scherson, Enayetullah, Bae

#### *Co-sponsoring:*

1. T1 Biological Fuel Cells -Shelley Minter
2. O1 Advanced Materials for Fuel Cells and Batteries - Tom Zawodzinski

### San Antonio 2004, May 9-14

#### *PED Organized Symposia:*

1. Physical Electrochemistry General Session - G. Brisard
2. Electrochemistry at electrodes modified with organized organic monolayer assemblies - S. Creager, I. Fritsch
3. Electrochemical Detection of Biomolecules - H. DeLong, B. Horrocks, H. Thorp, C. Bruckner-Lea.
4. Molecular Electronics - R. McCreery
5. Scanning Electrochemical Microscopy - C. Zoski, P. Unwin and M. Mirkin.
6. Transport in Complex Media - J. Leddy and M. Majda

### Honolulu, 2004, October 3-8

#### *PED Organized Symposia:*

1. Physical Electrochemistry General Session - G. Brisard
2. 14<sup>th</sup> Molten Salt Symposium - H. DeLong, P. Trulove and Victor Koch
3. Liquid-Liquid Interfaces and Phase Transfer Catalysis - Petr Vanysek, M. Philpott, Ilan Benjamin and Takashi Kakiuchi
4. Electrode Processes - V. Birss, Mira Josovicz, and Dennis Evans
5. Physical Electrochemistry of Energy

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- Generation and Storage - D. Scherson
- Biophysical Electrochemistry - R. Guidelli, A. Plant and J. Lipkowski
  - Electrophoresis and Microfluidics - P. Vanysek, I. Fritsch, Tony Ricco and Joe Stetter

**Co-sponsoring:**

- Membranes and Separators for Fuel Cells and Batteries - Lead is IEEE, PED would like to co-sponsor (Steve Creager).

**Quebec City 2005, May 15-20**

***PED Organized Symposia:***

- Physical Electrochemistry General Session - G. Brisard (Sherbrooke).
- Nanostructured and functionalized conducting polymer films - P. Kulesza and M. Vorotyntsev; Co-sponosred by Sensors Cindy Bruckner-Lea.
- Electrocatalysis - R. Adzic, A. Wieckowski

*We have so far no plans for the following meetings. Please, contact the PED officers with suggestions.*

**Los Angeles, California  
October 16-21, 2005**

**Denver, Colorado  
May 7-12, 2006**

**PREVIOUS SYMPOSIA SPONSORED  
AND CO-SPONSORED BY THE PED**

Codes for Divisions - Numbers in () are the number of symposia co-sponsored with PED since the 187<sup>th</sup> Meeting:

- BAT Batteries (10)  
COR Corrosion (9)  
DST Dielectric Science and Technology (3)  
ED Electrodeposition (12)  
ELE Electronics (1)  
ETD Energy Technology Division (21)  
HTM High Temperature Materials (7)

- IEE Industrial Electrolysis & Electrochemical Engineering (3)  
OBE Organic & Biological Electrochemistry(7)  
PED Physical Electrochemistry  
SEN Sensors (12)

**PARIS - 192 - Fall 1997**

- F1** - Chemical and Biological Sensors and Analytical Electrochemical Methods  
**G1** - Interfacial Structure, Kinetics, and Electrocatalysis  
**H1** - Photoelectrochemistry  
**I1** - Bioelectrochemistry and Organic Electrochemical Reactions and Conducting Polymers

**SAN DIEGO - 193 - Spring 1998**

- H1** - Processing Structure Property Relationships in Electrochemically Prepared Materials  
**W1** - Electrochemistry in Unusual Media and Under Unusual Conditions  
**V1** - SECM and Submicron Electrochemistry  
**X1** - Molten Salts XI  
**Z1** - Liquid/Liquid Interfaces  
**V2** - Physical Electrochemistry General Session

**BOSTON -194 - Fall 1998**

- M1** - Molecular Structure of the Solid Liquid Interface and its Relationship to Electrodeposition II.  
**M2** - Electrodeposition of Nanoscale and Nanophase Materials.  
**R1** - Photoelectrochemistry and Solar Energy Conversion .  
**W1** - Molecular Functions of Electroactive Thin Films.  
**X1** - Second International Symposium on Proton Conducting Membrane Fuel Cells.  
**Z1** - Acoustic Wave based Sensors.  
**W2** - Physical Electrochemistry General Session

**SEATTLE - 195 - Spring 1999**

- C1** - Corrosion and Prevention in Air and Spacecraft  
**R1** - Modeling of Processes at Electrochemical Interfaces and in Electrochemical Systems



**S1** - Spectroscopic Tools for Analysis of Electrochemical Systems

**U1** - New Directions in Electroanalytical Chemistry

**U2** - Single Crystal and Nanostructured Electrodes

**HONOLULU-196 - Joint with Electrochemical Society of Japan - Fall 1999**

**X1** - Electrocatalysis

**Y1** - Electrochemistry of Ordered Interfaces

**Z1** - 12<sup>th</sup> International Symposium on Molten Salts

**N1** - Photoelectrochemistry, Photocatalysis, and Photoactive Materials

**V2** - Electroorganic and Electroanalytical Aspects of Environmental Chemistry

**H1** - Sixth International Symposium on Diamond Materials

**W2** - General Session

**TORONTO -197- Spring 2000**

**M1** – Applications of Surface Science to Energy Technologies

**V2** – Hydrogen at Surfaces and Interfaces

**V3** – Organic Monolayers at Electrodes

**V4** – Physical Electrochemistry General Session

**W1** – Electrochemistry of Novel Electrode Materials

**Z1** – Electrochemical Impedance for Analysis of Chemical and Electrochemical Processes and Mechanisms

**PHOENIX -198- Fall 2000**

**A2** – Electrochemistry vs. The Global Climate Change: A Coordinated Response

**K1** - Electrochemical Science and Technology of Copper

**P1** - Physical Electrochemistry General Session

**Q1** - Electrochemistry of Carbon Electrodes

**R1** - New Horizons in Spectroelectrochemistry and Photoelectrochemistry

**S1** - Scanning Probe Microscopy for Electrode Characterization and Nanometer Scale Modification

**WASHINGTON DC- 199 - 2001**

**C1** - DIRECT METHANOL FUEL CELLS

Co-sponsors: Battery Division/ Energy Technology Div./ Physical Electrochemistry Div.

Organizers: S. Narayananan, S. Gottesfeld and T. Zawodzinski

**D1** - POLYMER ELECTROLYTES FOR BATTERIES AND FUEL CELLS

Co-sponsors: Battery Division/ Physical Electrochemistry Division/ Energy Technology Division

Organizers: K. M. Abraham and T. Zawodzinski

**L1** - ELECTRODEPOSITION OF NANOSCALE AND NANOPHASE MATERIALS II

Co-sponsors: Electrodeposition Division/ Physical Electrochemistry Division

Organizers: J. A. Switzer, and J.-L. Delplancke

**L2** - MOLECULAR STRUCTURE OF THE SOLID-LIQUID INTERFACE AND ITS RELATIONSHIP TO ELECTRODEPOSITION III

Co-sponsors: Electrodeposition Division/ Physical Electrochemistry Division

Organizers: D. M. Kolb and R.C. Alkire

**Y1** - INORGANIC TEMPLATES AS DESIGN ELEMENTS IN NANOCOMPOSITES AT ELECTRODE SURFACES

Organizers: A. Fitch and M.M. Collinson

**Y2** - SYNCHOTRON RADIATION STUDIES OF ELECTROCHEMICAL SYSTEMS

Organizers: S.R. Conradson and S. Mukerjee

**Y3** - PHYSICAL ELECTROCHEMISTRY GENERAL SESSION

Organizers: J. Leddy

**SAN FRANCISCO, CA September 2-7, 2001**

**C1** - FUEL CELLS AND CONDUCTING POLYMERS

**G1** - CHEMICAL AND BIOLOGICAL SENSORS AND ANALYTICAL METHODS

**H1** - INTERFACIAL STRUCTURE, KINETICS AND ELECTROCATALYSIS

I1 - SEMICONDUCTOR- AND PHOTO-ELECTROCHEMISTRY  
J1a - BIOELECTROCHEMISTRY AND ORGANIC ELECTROCHEMICAL REACTIONS Electron-Transfer Reactions in Biological Systems  
J1b - BIOELECTROCHEMISTRY AND ORGANIC ELECTROCHEMICAL REACTIONS Mechanistic Organic and Organometallic Electrochemistry  
J1c - BIOELECTROCHEMISTRY AND ORGANIC ELECTROCHEMICAL REACTIONS: Advances in Electroorganic Synthesis  
J1d - BIOELECTROCHEMISTRY AND ORGANIC ELECTROCHEMICAL REACTIONS: Applications of Electrochemistry in Electrophysiology and Medical Therapy

**PHILADELPHIA - 201 - (May 12-17, 2002)**

*PED Organized Symposia*

**Inorganic Templates as Design Elements in Nanocomposites at Electrode Surfaces** (PED) (M.M. Collinson and A. Fitch).

**Progress in Methods used to Solve Electrochemical Problems.**

**Part 1** - A Historical Perspective (J. Leddy, A. Wieckowski, V. Birss)

**Part 2** - New Developments in Electrochemical Methods (D.A. Buttry)

**Part 3** - New Developments in Optical Methods (T. Kuwana, W. Heineman and N.R. Armstrong)

**Part 4** - New Developments in UHV and Synchrotron X-Ray Methods (J. McBreen and A. Wieckowski)

**Part 5** - New Developments in *in situ* Surface Imaging Methods (M. D. Porter, and N. J. Tao)  
Physical Electrochemistry General Session (V. Birss)

**13<sup>th</sup> International Symposium on Molten Salts** (PED/High Temperature Materials / Electrodeposition) (H. C. De Long, R. W. Bradshaw, M. Matsunaga, G. R. Stafford and P.C. Trulove).

**Electrocatalysis of Reduction Processes** (A. Wieckowski and D. A. Scherson) .

**Chemically modified Electrodes** (PED/Organic and Biological Electrochemistry/Sensors) (P. N.

Bartlett, I. Taniguchi, R. B. Lennox and B. Marsan).

**Microanalytical Devices and Instrumentation** ((PED/Organic and Biological Electrochemistry/Sensors/ Energy Technology) (R. L. McCarley and M. A. Ryan)

*Symposia Co-sponsored by PED*

**Nanotechnology** (All division and groups) (W. A. van Schalkwijk, W. Schindler, and S. Seal).

**Nanophase Materials for Batteries and Fuel Cell** (Battery/Energy Technology/PED) (S. R. Nara-yanan and B. V. Ratnakumar).

**Electrochemical Capacitor and Hybrid Power Sources**(Battery/Energy - Techn./PED/Capacitor technology committee of the ECS, Japanese and Korean Institute of Energy Research) (R.J. Brodd, D.H. Doughty, K. Naoi, M. Morita, C. Nanjundiah, J.H. Kim, and G. Nagasubramanian).

**SALT LAKE CITY – 202 - (Oct. 20-24, 2002)**

**PED Organized Symposia**

**U1** Liquid/Liquid Interfaces (PED)- M. Philpott, P. Vanýsek; co-sponsored by Sensors

**U2** Physical Electrochemistry General session (PED) V. Birss

**U3** Electrochemistry at Nanoscale Dimensions (PED) - R. Crooks

**U4** Magnetic Effects in Electrochemical Systems (PED) – J. Leddy, H. White

**Q1** Combinatorial Chemical Electrode Arrays in Electrochemical Systems (PED/Energy and Technology/ Organic and Biological Electrochemistry/Sensors)- D. Buttry

**Symposia Co-sponsored by PED**

Electrochemistry vs. the Global climate change : A coordinated response II. (All).

**A3** Nanotechnology (All divisions and groups)  
Fuel Cells for Consumer applications (Battery/Energy Technology/PED).

**S1** Third International Symposium on proton conducting membrane fuel cells (Industrial Electrolysis and Electrochemical Eng. / Energy Technology /PED).

(END)