

PBFC-2



2nd International Conference on Polymer Batteries and Fuel Cells

*Riviera Hotel • Las Vegas, Nevada, USA
June 12-17, 2005*

co-sponsored by:

Broddarp of Nevada | The Electrochemical Society

Co-Chairs

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Meeting Organization

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Sponsors

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The Conference

Lithium batteries and fuel cells based on polymer components have been under intense research and development over recent years. In many instances, they are competing for the same market area. These polymer devices have potential advantages in terms of versatility in design, safety, and improved energy density. Accordingly, several commercial types of lithium and lithium-ion polymer batteries (LPBs) are now being introduced in the electronics market, and Polymer Electrolyte Fuel Cells (PEFCs) are considered to be the power sources of choice for electric vehicle propulsion. However, despite active research and development, there are still many problems to overcome, from basis to applications, in these polymer devices from the standpoint of both the materials and the manufacturing processes. The next few years will experience significant progress and establish of LPBs and PEFCs as commercial products. Therefore, this conference, focusing on both device types, is an ideal forum to present and discuss the latest developments in the fields. It provides unique opportunities for common discussion and exchange of experiences between battery and fuel cell scientists.

PBFC-2 is an event that cannot be missed for the two communities that rarely meet, in spite of many R&D interests shared in common, such as polymer electrolytes; and final marketing, including consumer electronics and electric vehicles. The scientific program of PBFC-2 includes plenary sessions, where invited speakers will highlight the key advances in the fields, completed by poster sessions. All presentations will be in English. An exhibit of the latest industrial developments in batteries and fuel cells is also planned.

Conference Program

The PBFC-2 Conference will open with two parallel keynote sessions on Monday, June 13 at 08:00. Technical sessions will begin at 09:00 on Monday, June 13 and will continue through Friday, June 17, with the exception of Wednesday afternoon, which is set aside for meeting attendees to explore Las Vegas and its environs. Included in the registration fee for technical registrations are luncheons, morning and afternoon coffee breaks, and the Monday Evening Welcome Reception. (Accompanying persons will enjoy breakfast and the Monday Evening Welcome Reception. Luncheon Tickets are available for a nominal fee at the Conference.) Three poster sessions are scheduled held during the late afternoons of Monday, Tuesday, and Thursday. The PBFC-2 Banquet (tickets sold separately) will be held Wednesday Evening.

Following the tradition of the past PBFC Meeting, invited speakers will highlight key development, results and issues in the polymer battery and fuel cell area. There will be two parallel sessions and three poster sessions will be held in an area adjacent to the meeting rooms, thereby ensuring ready access and prominent display to all meeting attendees.

Information for Speakers and Audio Visual

All presentations (oral and poster) must be in English. There will be two laptops in each technical session room. An audio-visual technician will be available to load and advance your presentations from a designated speaker's area. The presentations need to be given to the technician before the session begins, in a format that is ready to be loaded on a laptop, such as a memory stick or a CD-ROM. A wireless remote will be available for Speakers to advance their presentations from the stage. An overhead projector will also be available in each technical session room. The overhead projector will be placed so the speakers will have access to their transparencies. Authors are not required to bring their laptops for LCD presentations.

Poster Sessions

For those authors presenting posters, please arrive approximately two hours in advance of the start of your session to begin setting up your poster displays. Please do not begin setting up your poster until all the poster boards have been numbered. Plan your display to fit on one upright panel approximately 8 feet wide by 4 feet tall. Present displayed information from left to right, starting at the top left of the panel. The paper title, number, names, and affiliations of all authors MUST be at the top of the display. The recommended print size for the title is approximately 1 to 2" (2.5 cm to 5 cm) high. Authors should minimize written text but use it when necessary to emphasize essential data and/or to stimulate discussion. Posters must be written in English. All illustrations, drawings, charts, pictures, graphs, figures, and written text should be large enough to allow easy reading from a distance of 5' (1.5 m). Matted and finished photographs are recommended to enhance visibility. Pins, tape, and/or thumbtacks will be supplied at the meeting. Commercial advertisements or publicity will NOT be permitted in poster presentations. Authors violating this regulation will be asked to remove their presentations immediately. Authors are responsible for setting up their displays, for being present during the entire scheduled poster session, and for removing their displays at the conclusion of the poster session. No posters will be displayed without author participation. **NO EXCEPTIONS WILL BE GRANTED.** Authors are responsible for the security of their displays and all items of value. The sponsors will not assume any responsibility for lost, stolen, or broken articles. Additional information or special requirements should be addressed to the individual symposium organizers prior to the meeting.

Registration Hours

Meeting Registration will open on Sunday, June 12, from 1:00-5:00 PM in Capri 114, Royale Pavilion. Registration will continue Monday, June 13 through Friday, June 17, from 8:00 AM-5:00 PM.

Invited Speakers

- K. M. Abraham** (E-Kem Sciences)
R. Adzic (Brookhaven National Laboratory)
H. Ahn (Gwangju University)
J. Akridge (Sion Power)
K. Amine (Argonne National Laboratory)
V. Baglio (CNR-ITAE)
R. Baldwin (NASA Glen)
W. Bennett (NASA Glenn)
J. Besenhard (Graz University of Technology)
G. Blomgren (Blomgren Consultants)
O. Borodon (University of Utah)
R. Borop (Los Alamos National Laboratory)
E. Cairns (University of California, Berkeley)
S. Campbell (Ballard Power Systems)
C. Chung (Sungkyunkwan University)
C. Cornelius (Sandia National Lab)
S. Creager (Clemson University)
D. DesMarteau (Clemson University)
B. Dixon (Phoenix Innovation)
M. Doeff (Lawrence Berkeley National Laboratory)
G. Fey (National Central University)
H. Gastenger (GM)
S. Gottesfeld (MTI Micro)
S. Greenbaum (Hunter College of CUNY)
C. Grey (SUNY at Stony Brook)
A. Herring (CSM)
M. Hickner (Sandia National Lab)
D. Ilic (Varta Microbattery)
S. Jang (Kangwon National University)
C. Johnson (Argonne National Lab)
R. Jow (US Army Lab)
P. Jacobsson (Chalmers University of Technology)
J. B. Kerr (Lawrence Berkeley National Laboratory)
Yu S. Kim (Los Alamos National Laboratory)
J. Lee (Korea Institute of Science and Technology)
B-Y Liaw (University of Hawaii)
K. Mauritz (University of Southern Mississippi)
J. McBreen (Brookhaven National Laboratory)
J. McGrath (Virginia Tech)
M. Meador (NASA)
M. Morita (Yamaguchi University)
K. Naoi (Tokyo University of Agriculture and Technology)
H. Ohno (Tokyo University of Agriculture and Technology)
Z. Ogumi (Kyoto University)
T. Ohzuku (Osaka City University)
T. Osaka (Waseda University)
J. Park (Korea Advanced Institute of Science and Technology)
J-K Park (KAIST)
P. Pintauro (Case Western Reserve University)
B. Pivovar (Los Alamos National Laboratory)
V. Rossi (Albertini)
D. Sadoway (MIT)
Y. Saidi (Valence Technology)
Y. Shao-Horn (MIT)
E. Shembel (EnerI)
M. Spahr (Timcal)
P. Stonehart (Stonehart Associates)
Y. Sung (Seoul National University)
H. Tsukamoto (Quallion)
M. Watanabe (Yamanashi University)
M. Stanley Whittingham (SUNY at Binghamton)
R. Wycisk (Case Western Reserve University)
T. Yamaguchi (University of Tokyo)
M. Yandrasits (3M)
X. Yang (BNL)
R. Yazami (CNRS, California Institute of Technology)
M. Yoshio (Saga University)
K. Zaghib (IREQ Hydro-Quebec)
J. Zhang (Celgard)
J. Zheng (Florida State University)

Conference Proceedings

Papers of PBFC-2 will be published in a special issue of the *Journal of Power Sources*. The journal provides an interdisciplinary forum on all aspects of the science, technology, and commercialization of primary/secondary batteries and fuel cells, as well as on their application in important and emerging markets. Acceptance of an abstract does not infer acceptance for the *Journal of Power Sources* by Elsevier Science Publishers. Papers will be subject to the standard review procedure specified by the journal.

The Venue

A city renowned for its entertainment attractions, Las Vegas is truly an oasis in the middle of the Mohave Desert. It offers the most unique variety of amusements and leisurely distractions in the world. It truly is a city that never sleeps. Las Vegas offers many attractions that are of appeal to all, including world-class golf courses and water sports. In addition to many world class golf courses and awe-inspiring Hoover Dam, you may wish to hike at Red Rock Canyon or the Valley of Fire State Park. Bus and airplane tours are available for various sites including the Grand Canyon and Zion National Parks. The water show at the Bellagio is not to be missed.

Climate

Las Vegas is located at the southern tip of Nevada in a broad flat basin surrounded by the Sierra Nevada Mountains. The city itself forms a huge oasis in this desert valley. The climate is hot and dry. Las Vegas only receives an average of four inches of rainfall per year, with more than 250 days of sunshine.

Accommodations

The PBFC-2 Conference will be held at the Riviera Hotel in Las Vegas, Nevada. The Riviera enjoys a legendary past as one of the first top-notch Las Vegas Hotels in the state of Nevada, known for its big name entertainment and friendly hospitality, as well as its worldwide name recognition. Over 2,000 refurbished oversized rooms offer maximum comfort and breathtaking views of the glittering Las Vegas Strip with its western scenic panoramas.

Tours

If you wish to book your own tour, you may do so through Casino Travel and Tours located at: <http://www.electrochem.org/meetings/satellite/pbfc/002/Casino%20Travel%20&%20Tours.htm> or by calling 1.702.946.5075. A representative from the company will be available on Sunday, June 12 in the meeting registration area to book your tours and answer any questions you may have.

Welcoming Reception

All participants and accompanying persons are cordially invited to attend the Welcome Reception. The reception will be held on Monday, June 13, 2005, 7:00-9:00 PM, in Royale Pavilion 5.

Conference Banquet

A Conference Banquet will be held on Wednesday, June 15, 2005, 7:00-9:00 PM, in the Top of the Riviera North. During the dinner, jazz pianist Mike Shane will play for your enjoyment. Please be aware that tickets must be purchased separately for the banquet.

Air Travel to Las Vegas

Las Vegas is located in the southwestern United States. McCarran Airport is the main airport serving Las Vegas and Clark County. It is located 1 mile (1.6 km.) from the Strip, 3.5 miles (5.6 km.) from the Riviera Hotel and 5 miles (8 km.) from Downtown Las Vegas. The Las Vegas Airport is ranked among the 10 busiest airports in the world based on the amount of passenger activity. Las Vegas is served by over 60 domestic and international air carriers.

Transportation to the Riviera Hotel

The Riviera Hotel is located 3.5 miles north of McCarran International Airport. There are a variety of shuttle, limousine, and taxi services available at McCarran International Airport. Approximate shuttle prices to the Riviera Hotel are \$5.50 per person.

Website

The following website has been established to provide the latest announcements and most up to date information on 2-PBFC. Visit <http://www.electrochem.org/meetings/satellite/pbfc/002/pbfc.htm>.

Technical Sessions

Monday, June 13, 2005

PBFC2-B Battery

Royale 8, Royale Pavilion

Battery Cathodes

Co-Chairs: R. Brodd and J. K. Park

- 08:00 1 Keynote Address: Cathodes for Polymer-Based Lithium Batteries - M. Whittingham, Y. Song, S. Lutta, and N. Chernova (SUNY at Binghamton)
- 09:00 2 Lithium Metal Phosphate and Fluorophosphate Cathodes for Lithium Polymer Batteries - L. Nazar, Y. Rho, M. Makahnouk, P. Herle, and B. Ellis (University of Waterloo)
- 09:30 3 Optimization of Carbon Coatings on LiFePO_4 - M. Doeff, J. Wilcox, R. Kostecki, and G. Lau (Lawrence Berkeley National Laboratory)
- 10:00 Intermission (30 Minutes)
- 10:30 4 Li-Ion Polymer Battery using LiFePO_4 as Cathode Material - K. Zaghbi (Hydro-Quebec)
- 11:00 5 Review of Phosphate Materials for Use in Lithium Ion Batteries - J. Swoyer, J. Barker, Y. Saidi, and H. Huang (Valence Technology)
- 11:30 6 Novel Coating Techniques for the Preparation of Core-Shell Materials and Thin-Film Electrodes - J. Besenhard (Graz University of Technology), K. Leitner (ICTAS), A. Basch, J. Han, A. Hosseinmardi, P. Raimann, C. Korepp (Institute for Chemical Technology of Inorganic Materials), T. Hamedinger, R. Saf (Institute for Chemical Technology of Organic Materials), F. Hofer, J. Wagner (Austrian Center of Electron Microscopy and Nanoanalysis), B. Gollas, K. Moller, and M. Winter (Institute for Chemical Technology of Inorganic Materials)

Royale 8, Royale Pavilion

Battery Cathodes

Co-Chairs: G. E. Blomgren and T. Osaka

- 14:00 7 In situ Structural Investigations of $\text{LiNi}_{1/2}\text{Mn}_{1/2}\text{O}_2$ During Cycling by X-ray Absorption Spectroscopy - E. Cairns (University of California), A. Deb (Lawrence Berkeley National Laboratory), U. Bergmann (Stanford Linear Accelerator Center), and S. Cramer (Lawrence Berkeley National Laboratory)
- 14:30 8 Approaches to Improving the Stability of Lithium-Ion Battery Cathodes - J. McBreen, W. Yoon, K. Chung, H. Lee, and X. Yang (Brookhaven National Laboratory)
- 15:00 9 Electrochemical Studies on LiCoO_2 Coated with Al_2O_3 Derived from Carboxylate-alumoxane - G. Fey, J. Chen, T. Kumar, P. Muralidharan, and H. Kao (National Central University)
- 15:30 Intermission (30 Minutes)
- 16:00 10 Indirect Measurement of Self-Discharge Current in LiMn_2O_4 and LiCoO_2 Cathodes - R. Yazami and Y. Ozawa (California Institute of Technology)
- 16:30 11 Layered Composite Cathode Material for High-Energy Li Batteries - S. Kang (Argonne National Laboratory), S. Park, Y. Sun (Hanyang University), and K. Amine (Argonne National Laboratory)

Royale 6, Royale Pavilion

Monday Evening Poster Session – 18:00-20:00

Co-Chairs: S. Whittingham and Y. Shao-Horn

- 12 The Synthesis of LiFePO_4 Cathode Material Using Fe^{3+} Raw Material and Effect of Fe_2P on Electrochemical Characteristics - K. Lee, C. Kim, and J. Park (Hanyang University)

- 13 Soybean Oil PEFC - S. Minter and J. Kerr (Saint Louis University)
- 14 Temperature Dependence of O₂ Reduction Catalyzed by Iron Fluoro-Porphyrin Adsorbed on a Graphite Electrode - L. Zhang, J. Zhang, C. Song (National Research Council), D. Wilkinson (University of British Columbia), and R. Baker (National Research Council)
- 15 Eutectic Self-mixing Method for the Preparation of LiMn₂O₄ Without any Mixing Procedures - K. Han and W. Ahn (Chungnam National University)
- 16 Preparation of LiMn₂O₄ at the Low Temperature of 250 Degrees Using a Novel Eutectic Self-mixing Method - K. Han and J. Na (Chungnam National University)
- 17 Nano-sized LiCoO₂ Manufactured in a Single Synthetic Step Using United Eutectic Self-mixing Method - K. Han and S. Lee (Chungnam National University)
- 18 Morphological Changes of Lithium Metal Powder Electrodes During Discharge/Charge - J. Kim, W. Yoon (Korea University), and B. Kim (Kwangwoon University)
- 19 The Preparation of Pt/C Catalysts Using Various Carbon Materials for the Cathode of PEMFC - M. Kim, J. Park, H. Kim, and W. Lee (LG Chem, Ltd/Research Park)
- 20 Effect of Fluorine Doping on Li[Ni_{0.43}Co_{0.22}Mn_{0.35}]O_{2-y}F_y Materials by Carbonate Precipitation - H. Shin, S. Park and Y. Sun (Hanyang University)
- 21 Effect of Carbon Materials and Operating Condition on PEMFC Performance - C. Huang (Tianjin University)
- 22 The Electrochemical Properties of Spherical-LiNi_{0.5-x}Mn_{0.5}Co_xO₂ Cathode Material for Lithium Rechargeable Batteries - J. Song, O. Kwon, H. Oh, E. Kang (JES E CHEM), and S. Oh (Seoul National University)
- 23 Synthesis and Electrochemical Properties of Li[Ni_{0.8}Co_{0.1}Mn_{0.1}]O₂ via Co-precipitation - M. Kim and Y. Kook Sun (Hanyang University)
- 24 Electrochemical Properties of ZnO-coated LiMn₂O₄ by Hydrothermal Method - J. Han and Y. Kook Sun (Hanyang University)
- 25 The Electrochemical Properties of Spherical-LiNi_{1/3}Co_{1/3}Mn_{1/3}O₂ and Its Modifications for Lithium Ion Batteries - E. Kang, J. Song, O. Kwon, H. Oh (JES E CHEM), and S. Oh (Seoul National University)
- 26 Combinatorial Investigation of PtRuSn Alloys as an Anode Electrocatalysts for the Direct Alcohol Fuel Cell - Y. Chu, Y. Shul, and H. Han (Yonsei University)
- 27 Optimization of Cathode Electrode for Li-Ion Battery - S. Na, H. Kim, and S. Moon (Korea Electrotechnology Research Institute)
- 28 Pt Particle Size Effect and Metal-Support Interaction Observed by 13C NMR - O. Han, K. Han (Korea Basic Science Institute) and P. Babu (University of Illinois at Urbana-Champaign)
- 29 Electrochemical Characterization and Structural Analysis by using Neutron Scattering of Zr-LiCoO₂ Powder - S. Jang (Korea Atomic Energy Research Institute), S. Lee (Kangwon National University), B. Seong (Korea Atomic Energy Research Institute), and S. Lee (Kangwon National University)
- 30 Investigation of the Electrochemical Properties of MoO₃-Pt Nanocomposite Thin Film Electrode - Y. Kim, H. Ahn, H. Shim, and T. Seong (Gwangju Institute of Science & Technology)
- 31 The Effect of Electrolytes on the Low Temperature Characteristics of Li/S Battery - H. Ryu, H. Ahn, K. Kim, J. Ahn, K. Cho, T. Nam, J. Kim, and G. Cho (Gyeongsang National University)
- 32 First-Principle Molecular-Dynamics Study of Hydrogen Adsorption on an Aluminum-Doped Carbon Nanotube - A. Tachibana (Kyoto University)
- 33 Effects of Gradient Loading of Cathode Catalyst on the Fuel Cell Performance - E. Cho, M. Prasanna, H. Kim, T. Lim, I. Oh, and S. Hong (Korea Institute of Science and Technology)
- 34 In Situ XRD Studies of the Structural Changes of ZrO₂ Coated LiCoO₂ During Cycling and Their Effects on Capacity Retention in Lithium Batteries - K. Chung, W. Yoon, H. Lee, J. McBreen, X. Yang (Brookhaven National Laboratory), S. Oh, W. Ryu, J. Lee, W. Cho, and B. Cho (Korea Institute of Science and Technology)
- 35 Electrochemical Characteristics of the LiCoO₂ Thin Film Cathode Deposited on Flexible Substrate - S. Jeon, D. Park, and B. Jeon (Kangwon National University)
- 36 Time Resolved XRD Study on the Thermal Decomposition of Lithium Nickel Oxides for Li-Ion Batteries - W. Yoon, K. Chung, and X. Yang (Brookhaven National Laboratory)
- 37 Soft X-ray Absorption Spectroscopic Studies of Cathode Materials for Li Rechargeable Batteries - W. Yoon, K. Chung, X. Yang, and J. McBreen (Brookhaven National Laboratory)
- 38 Electrochemical Performance of LiCoO₂ Thin Film Cathode with Trench Structure - D. Park, S. Jeon, and B. Jeon (Kangwon National University)

- 39 Adoption of Carbon Nanomaterials for the Gas Diffusion Layer of Polymer Electrolyte Membrane Fuel Cells - G. Park, Y. Sohn, S. Yim, S. Um, T. Yang, Y. Yoon, W. Lee, and C. Kim (Korea Institute of Energy Research)
- 40 Electro-oxidation of Methanol and Formic Acid on PtRu and PtAu for DLFCs - J. Choi (Gwangju Institute of Science and Technology), Y. Sung (Seoul National University), and J. Han (Korea Institute of Science and Technology)
- 41 Characterization of LiMn_2O_4 - Coated LiCoO_2 Film Electrode Prepared by Electrostatic Spray Deposition - W. Yoon, K. Chung (Brookhaven National Laboratory), and K. Kim (Yonsei University)
- 42 Fluoropolymer Functionalization of Carbon Nanofoams - M. Perpall, H. Mei, B. Liu, D. DesMarteau, S. Creager, and D. Smith, Jr. (Clemson University)
- 43 Preparation and Electrochemical Performance of $\text{La}_{1-x}\text{Sr}_x\text{MnO}_3$ Catalyst for Zn/Air Secondary Batteries - S. Eom, C. Lee, S. Moon, and M. Yun (Korea Electrotechnology Research Institute)
- 44 Analysis on the Structure of Lithium Titanium Oxide Due to Lithium Ratio 5% to 20% by Neutron Powder Diffraction with Rietveld Method - S. Kim and Y. Yoon (Konkuk University)
- 45 Synthesis of Nanoporous Materials by Reduction of KMnO_4 with $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ in Aqueous Solutions - J. Kim and S. Kim (Chonnam National University)
- 46 Effect of Ultrasonic Treatment and Temperature on Nanocrystallized TiO_2 - J. Kim, D. Kim, J. Moon, and H. Ryu (Chonnam National University)
- 47 The Synthesis of Transition Metal Compound by Redox Reactions in Solutions - J. Kim and S. Kim (Chonnam National University)
- 48 The Nano-Whisker/Graphite Composite Anode Materials for Li-Ion Batteries - Y. Lin, J. Chen, and Y. Lin (Industrial Technology Research Institute)
- 49 Electrochemical Analysis of Borohydride Hydrolysis in a Direct Borohydride Fuel Cell - T. Yang (Korea Institute of Energy Research), J. Lee, Y. Shul (Yonsei Univ.), W. Lee, and C. Kim (Korea Institute of Energy Research)
- 50 Fuel Cells Using Dimethyl Ether - S. Cho, J. Ryu, B. Kim, H. Choi, Y. Lee, J. Nam, and C. Chung (Sungkyunkwan University)
- 51 Structural Properties of Lithium Titanium Oxide Have Different Colors Due to Oxygen Excess Ratio by Neutron Powder Diffraction with Rietveld Method - K. Lee and Y. Yoon (Konkuk University)

PBFC2-FC Fuel Cells

Royale 7, Royale Pavilion

Chair: J. E. McGrath

- 08:00 173 Keynote Address: Nanostructures of Polymer Membranes and Water Control in Self-Humidifying Membranes for PEMFCs - P. Stonehart (Stonehart Associates, Inc.)
- 09:00 174 Self-Assembled Organic/Inorganic Hybrids as Membrane Materials - K. Mauritz, R. Storey, and J. Kopchick (University of Southern Mississippi)
- 09:30 175 Proton Polymer Electrolytes - B. Yabari Mohammad and T. Safari (Azad University)
- 10:00 Intermission (30 Minutes)
- 10:30 176 Applications of Nuclear Magnetic Resonance to Transport Studies of Fuel Cell Membranes and SEI Characterization in Li Ion Batteries - S. Greenbaum (Hunter College of CUNY)
- 11:00 177 Proton Conductive Poly(arylene ether) Ionomers for High Temperature PEFCs - K. Miyatake, Y. Chikashige, Y. Chikyu, and M. Watanabe (University of Yamanashi)
- 11:30 178 In-situ Observation of Distribution and Real Time Dynamics of Water in a Fuel Cell PEM Upon Working - V. Rossi-Albertini (CNR), B. Paci (ISM-CNR), F. Nobili, R. Marassi (Universita di Camerino), M. Navarra, S. Panero (University of Rome, La Sapienza), and M. Di Michiel (ESRF)

Royale 7, Royale Pavilion

Chair: K. Mauritz

- 14:00 179 Sulfonated Diels-Alder Polyphenylenes: Physical Properties and Hydrogen Fuel Cell Performance - C. Cornelius, C. Fujimoto and M. Hickner (Sandia National Laboratories)
- 14:30 180 Advanced Materials for Proton Exchange Membranes - J. McGrath (Virginia Tech)
- 15:00 181 Supramolecular Rigid-Rod Polymers as Ionically Conducting Membranes - H. Every, E. Mendes and S. Picken (Delft University of Technology)
- 15:30 182 Proton Conducting Plasma-Polymerized Membranes - N. Ponath, D. Gruber, and J. Mueller (Hamburg University of Technology)
- 16:00 183 The Use of Heteropoly Acids in Composite Membranes for Elevated Temperature or Low Humidity PEM Fuel Cell Operation - A. Herring (CSM), J. Turner (NREL), S. Dec (CSM), J. Malers (CSM/NREL), F. Meng, J. Horan, and N. Aieta (CSM)

Tuesday, June 14, 2005

PBFC2-B Battery

Royale 8, Royale Pavilion

Battery Anodes

Co-Chairs: L. F. Nazar and M. Yoshio

- 08:30 52 Science and Technology of Layered-Layered Composite Cathodes for Li-Ion Batteries - C. Johnson, S. Kang, J. Kim, N. Li, J. Vaughey, K. Amine, and M. Thackeray (Argonne National Laboratory)
- 09:00 53 Lithium Nickel Manganese Oxides with or without Cobalt for Advanced Lithium-Ion (Shuttlecock) Batteries - T. Ohzuku, K. Ariyoshi, and N. Yabuuchi (Osaka City University)
- 09:30 54 NMR Studies of Battery Materials: Applications to the $\text{Li}_2\text{MnO}_3\text{-Li}(\text{NiMn})_{0.5}\text{O}_2$ System, Lithium Manganese Nitrides and Other Paramagnetic Materials - C. Grey, J. Breger, M. Jiang, N. Dupre (Stony Brook University), J. Cabana Jimenez, and M. Palacin (Institut de Ciencia de Materials de Barcelona)
- 10:00 Intermission (30 Minutes)
- 10:30 55 Time Resolved X-ray Diffraction Studies of the Thermal Stability of MgO Modified $\text{Li}(\text{NiCo})\text{O}_2$ Cathode Material in Li-Ion Batteries - X. Yang, W. Yoon, K. Chung, J. McBreen (Brookhaven National Laboratory), and J. Chen (Industrial Technology Research Institute)
- 11:00 56 Neutron Diffraction and EPR Studies of Lithium Excess LiCoO_2 Cathode Materials - S. Jang, Y. Choi, B. Seong (Korea Atomic Energy Research Institute), and S. Lee (Kangwon National University)
- 11:30 57 Electrochemistry of $0.5\text{Li}_2\text{MnO}_3\text{-}0.5\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ Composite Cathode Material Doped with Co and F - S. Kang (Argonne National Laboratory), P. Kemppens, S. Greenbaum (Hunter College of CUNY), A. Kropf, and K. Amine (Argonne National Laboratory)

Royale 8, Royale Pavilion

Battery Anodes

Co-Chairs: J. McBreen and J. O. Besenhard

- 14:00 58 Optical and Electrical Anisotropy of Molybdenum-doped Rhenium Diselenide - S. Hu (Tung-Nan Institute of Technology), C. Liang, and K. Tiong (National Taiwan Ocean Univ.)
- 14:30 59 Discharge Mechanism of Disordered Carbon Anode for High-Rate Lithium Ion Battery and Hybrid Supercapacitor - K. Naoi, N. Ogihara (Tokyo University of Agriculture & Technology), Y. Kusachi, and K. Utsugi (NEC Corporation)

- 15:00 60 The Entropy of Lithium Intercalation into Disordered Carbonaceous Materials - R. Yazami, Y. Reynier, and B. Fultz (California Institute of Technology)
- 15:30 Intermission (30 Minutes)
- 16:00 61 Active Surface Area of Graphite and Its Reactivity towards Lithium Battery Electrolytes - M. Spahr (TIMCAL Ltd.), P. Novak (Paul Scherrer Institute), C. Vix-Guterl (ICSI-CRNS Mulhouse), H. Buqa (Paul Scherrer Institute), H. Wilhelm, D. Goers (TIMCAL Ltd.), A. Wuersig, L. Hardwick (Paul Scherrer Institute), F. Krumeich (Swiss Federal Institute of Technology), and J. Dentzer (ICSI-CRNS Mulhouse)
- 16:30 62 AC Impedance and ESEM Analysis of Li_xC_6 Electrode in Li-Ion Polymer Batteries with Continuous Cycling - P. Moss, J. Zheng (Florida A&M University and Florida State University), G. Au, and E. Plichta (U.S. Army Communications-Electronics Command)

Royale 6, Royale Pavillon

Tuesday Evening Poster Session – 18:00-20:00

Co-Chairs: T. Ohzuku and C. J. Cornelius

- 63 Preparation of Multi-layer Proton Conducting Membrane Using Porous PE Substrate Film - M. Cho, H. Son, and L. Youngkwan (Sunkyunkwan University)
- 64 Solid Polymer Electrolytes Based on Comb-Type Polymers - T. Itoh (Mie University)
- 65 Electrochemical Characterization of Blend Polymer Electrolytes Based on Poly(oligo[oxyethylen]oxyterephthaloyl) for Rechargeable Lithium Batteries - D. Kim, J. Oh, S. Kim (Hanbat National University), and Y. Kang (Korea Research Institute of Chemical Technology)
- 66 A Study on the Electrochemical Characteristics of Sulfonated Poly(ether ether ketone) for Solid-State Electric Double Layer Capacitors - D. Kim, J. Ko, W. Kim (Hanbat National University), and J. Kim (Korea Institute of Energy Research)
- 67 Properties of PVdF-HFP/(SiO_2 or TiO_2) Phase Inversion Electrolyte Membranes and the Performances of Lithium Rechargeable Battery - K. Kim, N. Park, K. Ryu, and S. Chang (Electronics and Telecommunications Research Institute)
- 68 Nonflammable Gel Electrolyte Containing Alkyl Phosphate for Rechargeable Lithium Batteries - N. Yoshimoto, Y. Niida, M. Egashira, and M. Morita (Yamaguchi University)
- 69 DLC(Diamond Like Carbon)-Coated Silicon Thin Films Deposited on a Copper Foil for the Anode of Lithium Secondary Batteries - J. Lee (Korea Institute of Science and Technology), H. Shim, and D. Byun (Korea University)
- 70 Submicroporous/Microporous and Compatible/Incompatible Multi-Functional Dual-Layer Polymer Electrolytes and Their Interfacial Characteristics with Lithium Metal Anode - Y. Lee (Electronics & Telecommunications Research Institute), K. Kyhm (Pusan National University), N. Choi (Samsung SDI Co. Ltd.), K. Kim, K. Ryu, and S. Chang (Electronics and Telecommunications Research Institute)
- 71 Nafion/e-PTFE Composite Membrane for Polymer Electrolyte Fuel Cells - H. Kim (Korea Institute of Science and Technology), J. Shim (Yonsei University), and E. Cho (Korea Institute of Science and Technology)
- 72 Synthesis, Ionic Conductivity, and Thermal Properties of Proton Polymer Electrolyte for High Temperature Fuel Cell - T. Itoh (Mie University) and Y. Aihara (Samsung Yokohama Research Institute)
- 73 Characterization and Modeling of the Transport Properties in PVdF-HFP/EC/PC/LiPF₆ Electrolytes - A. Nyman, M. Behm, and G. Lindbergh (Royal Institute of Technology, KTH)
- 74 Transport Properties of Nafion based Nanocomposite Membranes for Direct Methanol Fuel Cells - Y. Kim, M. Kim, and H. Rhee (Sogang University)
- 75 High Temperature Membranes using Poly(dimethylsiloxane) Derivatives for PEMFCs - Y. Kim, J. Kim, and H. Rhee (Sogang University)
- 76 Ionic Conductivity and Electrochemical Properties of Solid Polymer Electrolyte Using Star-shaped Siloxane Acrylate - Y. Kang, J. Lee, J. Lee, and C. Lee (Korea Research Institute of Chemical Technology)
- 77 Ionic Liquids as Electrolytes in Lithium Metal Batteries - G. Annat, D. MacFarlane, M. Forsyth, P. Howlett (Monash University), A. Hollenkamp, and A. Best (CSIRO)
- 78 Gel Electrolyte Having Micro Phase Separation Structure for Lithium Secondary Batteries - T. Momma, H. Nara (Waseda University), S. Passerini (ENEA), and T. Osaka (Waseda University)

- 79 Electrochemical Characterization and Cycle Performance of Electrospun Fibrous Polymer Electrolyte for Li-Ion Battery - S. Lee and J. Sung Mu (Korea Institute of Science and Technology)
- 80 Thermal Properties and Shut Down Function of Poly(vinylidene fluoride-hexafluoropropylene)(PVdF-HFP) Separator for Li-ion Battery - S. Lee and J. Sung Mu (Korea Institute of Science and Technology)
- 81 Characteristics of Polymeric -SO₃H Group on the Activated Site and the Deactivate Site - K. Sung, K. Cho, H. Jung and J. Park (Korea Advanced Institute of Science and Technology)
- 82 Proton Conductive Polymer Electrolyte Based on Polyparabanic Acid Doped with H₃PO₄ for High Temperature Fuel Cell - Y. Aihara and A. Sonai (Samsung Yokohama Research Institute)
- 83 Preparation of Novel Microporous Membrane by Means of Phase Inversion and Their Enhancement of Mechanical Properties - W. Seol, Y. Lee, D. Go, J. Seo (Korea Advanced Institute of Science and Technology), J. Lee (SKC), and J. Park (Korea Advanced Institute of Science and Technology)
- 84 New Type SEI Layer Stabilizer for the Graphite and Its Electrochemical Characteristics - J. Seo, Y. Lee, W. Seol, D. Ko, and J. Park (Korea Advanced Institute of Science and Technology)
- 85 High Ion Conductive Solid Polymer Electrolytes Based on the Organic-Inorganic Hybrid Matrix - D. Ko, Y. Lee, W. Seol, J. Seo, and J. Park (Korea Advanced Institute of Science and Technology)
- 86 ZrO₂-Nafion Composite Membrane for Polymer Electrolyte Fuel Cell (PEFCs) at Intermediate Temperature - A. Sacca (National Council of Research), I. Gatto (CNR ITAE), A. Carbone (National Council of Research), R. Pedicini, and E. Passalacqua (CNR ITAE)
- 87 Sulphonated Poly(ether ether ketone) Membranes for Fuel Cell Application: Thermal and Structural Characterization - A. Carbone (National Council of Research), R. Pedicini, E. Passalacqua (CNR ITAE), G. Portale (University), A. Longo (CNR-ISMN), and L. D'Ilario (University of Rome, "La Sapienza")
- 88 Novel Poly-lithium Non-fluorinated Salt for Lithium-ion Battery Electrolytes - K. Luo, R. Filler, and B. Mandal (Illinois Institute of Technology)
- 89 Preparation of Polymer Gel Electrolyte Using Atom Transfer Radical Polymerization at Room Temperature - J. Lee, M. Wu, H. Liao, and F. Wang (Industrial Technology Research Institute)
- 90 Effect of Borate Ester Plasticizer on PEO-based Solid Polymer Electrolytes - A. Chakrabarti, R. Filler, and B. Mandal (Illinois Institute of Technology)
- 91 Experimental Investigations on the Electrical Conduction Mechanism of Electrolyte Thin Films - S. Choi (Korea Institute of Science and Technology), W. Kim (MIT), H. Jung, J. Lee, H. Lee, and J. Kim (Korea Institute of Science and Technology)
- 92 Molecular Dynamics Simulation Studies of Liquid and Gel Electrolytes and Their Interaction with Model Electrode Surfaces - G. Smith and O. Borodin (University of Utah)
- 93 Coated Nafion Membrane with PVdF Copolymer / Nafion Blend for Improved Cell Performance of DMFC (Direct Methanol Fuel Cell) - K. Cho, H. Jung, K. Sung, and J. Park (Korea Advanced Institute of Science and Technology)
- 94 Surface Modified Polyethylene Separators with Various Chemicals Having Polar Group for Li-based Secondary Batteries - J. Ko (Hanbat National University), K. Ryu (Electronics and Telecommunications Research Institute), S. Kim, R. Song, and J. Park (Hanbat National University)
- 95 A Novel Water-Free Proton Conducting Solid Electrolyte based on Organic/Inorganic Hybrid - S. Lee (LGChem), G. Scharfenberger, H. Meyer, and G. Wegner (Max Planck Institute for Polymer Research)
- 96 Polymer Electrolytes from Cyclosiloxanes with Oligo(Ethylene Oxide) Side-chains Materials - J. Kim (LGChem), W. Lee (Seoul National University), S. Lee, S. Ahn (LGChem), and D. Yoon (Seoul National University)
- 97 The Conductivity Studies of Polyelectrolyte-Ionic Liquid System - S. Lim (Seoul National University), E. Cha, C. Lee (Korea University), and M. MacFarlane (Monash University)
- 98 Tris(pentafluorophenyl) Borane as an Anion Receptor on Ionic Conductivity of LiClO₄-based Electrolyte for Lithium Batteries - Y. Lee, J. Seo, W. Seol, D. Ko, and J. Park (Korea Advanced Institute of Science and Technology)
- 99 Investigation of Water Removal from a Polymer Electrolyte Membrane Fuel Cell by using Impedance Spectroscopy - Y. Yoon, C. Kim, W. Lee, and G. Park (Korea Institute of Energy Research)
- 100 Thiazolium-based Ionic Liquids for Electrochemical Applications - A. Best (CSIRO), M. Haeusler (CSIRO Energy Technology), A. Hollenkamp (CSIRO), G. Annat, P. Howlett, M. Forsyth, and D. MacFarlane (Monash University)

- 101 Fabrication of Hybrid Solid Electrolyte by LiPF_6 Liquid Electrolyte Infiltration into Nano-porous $\text{Li}_2\text{O-SiO}_2\text{-B}_2\text{O}_3$ Glass - D. Shin, C. Kangil, and K. Kiyoul (Hanyang University)
- 102 The Conductivity Studies of Lithium Polyelectrolyte Mixing with Ionic Liquid - E. Cha (Korea University), D. MacFarlane (Monash University), and C. Lee (Korea University)
- 103 Siloxane-based Electrolytes for Rechargeable Lithium-Ion Batteries - Q. Wang, K. Amine, and D. Vissers (Argonne National Laboratory)
- 104 Si-Carbon Core-Shell Powders as an Anode for Lithium Secondary Batteries - Y. Jung, K. Lee, H. Yoo, and S. Oh (Seoul National University)
- 105 Pyrolytic Carbons from Biomass Precursors as Lithium Insertion Anodes - T. Premkumar, S. Manuel (Central Electrochemical Research Institute), S. Venkatachalam, B. Wei (Louisiana State University), and R. Ramesh (Central Electrochemical Research Institute)

PBFC2-FC Fuel Cells

Royale 7, Royale Pavilion

Chair: S. Greenbaum

- 08:30 184 A Fundamental Approach Toward the Non-precious Metal Catalysts for Oxygen Reduction Reaction in PEM Fuel Cells - S. Campbell (Ballard Power Systems), D. Susac, P. Wong, L. Zhu, A. Sode, M. Teo, D. Bizzotto, K. Mitchell, and R. Parsons (University of British Columbia)
- 09:00 185 PEM Electrocatalyst Durability Measurements - R. Borup (Los Alamos National Lab), F. Garzon (Los Alamos National Laboratory), D. Wood, J. Davey (Los Alamos National Lab), and E. Brosha (Los Alamos National Laboratory)
- 09:30 186 Polymers for the Systematic Study of Proton Conducting Membranes - S. Holdcroft (Simon Fraser University), K. Shi (National Research Council of Canada), and Y. Yang (Simon Fraser University)
- 10:00 Intermission (30 Minutes)
- 10:30 187 Novel Design Methodology for Fuel Cell MEAs Using Nanoscale Modeling - T. Yamaguchi, Y. Nishiyama, A. Yamauchi, and H. Zhou (The University of Tokyo)
- 11:00 188 Polymer Electrolyte Development at NASA Glenn - M. Meador (NASA Glenn Research Center), W. Bennett (QSS Group at NASA Glenn), D. Tigelaar (Ohio Aerospace Institute), and J. Kinder (NASA Glenn)
- 11:30 189 Mechanical Property Measurements of PFSA Membranes at Elevated Temperatures and Humidities - M. Yandrasits (3M)

Royale 7, Royale Pavilion

Chair: S. Holdcroft

- 14:00 190 Internal Polymer Electrolyte Membrane Fuel Cell/Supercapacitor Hybrid Power Systems - C. Wang and S. D'Souza (Tennessee Tech University)
- 14:30 191 Proton-Conducting Polymeric Electrolytes for Electrochemical Capacitors - M. Morita, N. Ohsumi, N. Yoshimoto, and M. Egashira (Yamaguchi University)
- 15:00 192 Alkaline Fuel Cells Using Anion-Exchange-Membrane - Z. Ogumi, K. Matsuoka, T. Abe, and Y. Iriyama (Kyoto University)
- 15:30 Intermission (30 Minutes)
- 16:00 193 Engineering Effective Bioelectrocatalysis Electrodes for Power Generation - B. Liaw, M. Cooney (University of Hawaii at Manoa), F. Quinlan, V. Svoboda, and N. Maynard (University of Hawaii)

Wednesday, June 15, 2005

PBFC2-B Battery

Royale 8, Royale Pavilion

Battery Anodes

Co-Chairs: K. Zaghbi and K. Naoi

- 08:30 106 Alloy Electrodes for Lithium Ion Polymer Batteries - G. Blomgren (Blomgren Consulting Services Ltd.)
- 09:00 107 Electrochemical Characteristics of Nano Silicon and Carbon Black Coated Graphite for the Anode Materials of Lithium Secondary Battery - J. Lee and B. Cho (Korea Institute of Science and Technology)
- 09:30 108 Growth and Characterization of Si-based Nanocomposite Electrode - H. Ahn, Y. Kim, H. Shim, and T. Seong (Gwangju Institute of Science & Technology)
- 10:00 Intermission (30 Minutes)
- 10:30 109 Silicon/Graphite Composites as an Anode Materials for Lithium Ion Batteries - M. Yoshio, T. Tsumura and N. Dimov (Saga University)
- 11:00 110 Highly Reversible Ultrahigh Capacitors Based on Nanocrystalline Vanadium Nitride - P. Kumta, D. Choi (Carnegie Mellon University), and G. Blomgren (Blomgren Consulting Services, Ltd.)

PBFC2-FC Fuel Cells

Royale 7, Royale Pavilion

Chair: M. A. Meador

- 08:30 194 A NMR Spectroscopic Study of Water and Methanol Transport Properties in DMFC Composite Membranes - V. Baglio, A. Arico (CNR-ITAE), V. Antonucci (ITAE-CNR), I. Nicotera, C. Oliviero, L. Coppola (Università della Calabria), and P. Antonucci (Università Reggio Calabria)
- 09:00 195 Kinetics Study of Methanol Oxidation Reaction (MOR) in Carbon Dioxide Poisoned Alkaline Fuel Cells - A. Tewari, V. Sambhy, and M. Macdonald (Pennsylvania State University)
- 09:30 196 Hybridization of Micro Fuel Cells and Rechargeable Batteries for Consumer Electronics Applications - S. Gottesfeld (MTI Microfuel Cells)
- 10:00 Intermission (30 Minutes)
- 10:30 197 Hydrogels in Fuel Cartridge Used as a Diffusion-Rate-Controlling Agent Suppressing the Methanol Crossover in Passively Operated Flat-Pack Type DMFC System - C. Chung, W. Kim, H. Choi, Y. Lee, J. Nam, and S. Cho (Sungkyunkwan University)
- 11:00 198 A Microfabricated PEMFC with Low Catalyst Loading Prepared by Sputter Deposition - D. Gruber, N. Ponath, and J. Mueller (Hamburg University of Technology)
- 11:30 199 The Performance and Durability of PtCo/C Alloy Catalysts in PEMFCs - S. Kocha, F. Wagner, and H. Gasteiger (General Motors Fuel Cell Activities)

Thursday, June 16, 2005

PBFC2-B Battery

Royale 8, Royale Pavilion

Battery Electrolytes

Co-Chairs: J. B. Kerr and C. Grey

- 08:30 111 The Liquid to Polymer Electrolyte Continuum in Lithium Battery Electrolytes - K. Abraham (E-KEM Sciences)
- 09:00 112 Molecular Dynamics Simulation Studies of Dry Polymer Electrolytes, Single Ion Conductors, and Ionic Liquids - O. Borodin and G. Smith (University of Utah)
- 09:30 113 Network Polymer Electrolytes for Use in Multifunctional Structures - J. Snyder, R. Carter, M. Hagon, and E. Wetzel (U.S. Army Research Laboratory)
- 10:00 Intermission (30 Minutes)
- 10:30 114 Novel Cation Conductors Based on Boron-containing Polymer and Ionic Liquids - H. Ohno, T. Mizumo, and N. Matsumi (Tokyo University of Agriculture and Technology)
- 11:00 115 Single Ion Conductor Polymer Electrolytes for Lithium Batteries and Fuel Cells - J. Kerr (Lawrence Berkeley National Laboratory), X. Sun, C. Reeder, G. Liu, K. Shin, and Y. Han (Lawrence Berkeley National Lab)
- 11:30 116 Lithium-Conducting Ionic Melts Having High Ionic Conductivity - S. Creager, P. Hallac, O. Geiculescu, R. Rajagopal, and D. DesMarteau (Clemson University)

Royale 8, Royale Pavilion

Battery Electrolytes

Co-Chairs: C. S. Johnson and M. M. Doeff

- 14:00 117 Microphase-Separating Copolymer Electrolytes for High-Performance, Solid-State, Lithium Batteries - D. Sadoway, P. Trapa, E. Olivetti, S. Mui, and A. Mayes (Massachusetts Institute of Technology)
- 14:30 118 Ion Conduction Mechanism in Polymer Electrolytes based on Oxalic Acid: Effect of Plasticizer and Polymer - H. Missan and S. Sekhon (Guru Nanak Dev University)
- 15:00 119 The Characterization of Lithium Polyelectrolyte Mixing with Ionic Liquid - E. Cha (Korea University), D. Macfarlane (Monash University), C. Lee (Korea University), and S. Lim (Seoul National University)
- 15:30 Intermission (30 Minutes)
- 16:00 120 Electrochemical Properties of Imidiazolium-based Ionic Liquids - A. Best (CSIRO), J. Nerkar, F. Ooms, and S. Picken (Delft University of Technology)
- 16:30 121 Miniature Size Hermetically Sealed Lithium Rechargeable Battery with Liquid Siloxane Electrolyte for Implantable Medical Applications - S. Yoon, H. Nakahara, H. Tsukamoto (Quallion LLC), Q. Wang, K. Amine (Argonne National Laboratory), Z. Zhang, and R. West (University of Wisconsin at Madison)

Royale 6, Royale Pavilion

Thursday Evening Poster Session – 18:00-20:00

Co-Chairs: M. Watanabe and N. L. Garland

- 122 Characteristics of Lithium Lanthanum-Titanates Solid Electrolyte Thin Film for Microbattery - J. Lee (Inha University), Y. Yoon (Konkuk University), and Y. Tak (Inha University)
- 123 Safe, Low Cost, and Sustainable High Voltage Lithium Ion Polymer Batteries - P. Reale, S. Panero, and B. Scrosati (University of Rome, La Sapienza)

- 124 Diesel Reforming with SOFC Anode Exhaust Recycle - R. Borup, M. Inbody, G. Dennis, and P. Jerry (Los Alamos National Lab)
- 125 Used Lithium Ion Rechargeable Battery Recycling Using Etoile-Rebatt Technology - K. Han and D. Na (Chungnam National University)
- 126 Lithium Rechargeable Micro-battery for Electric Trans-dermal Drug Delivery System, ETDDS - S. Jeon (Tegoscience) and K. Han (Chungnam National University)
- 127 Methanol Crossover Controlled by Porous Carbon Plate as Support - N. Nakagawa and K. Kamata (Gunma University)
- 128 Acid Doped Polybenzimidazole (PBI) as a Catalyst Binder for High Temperature Polymer Electrolyte Fuel Cell Operations - H. Kim (Korea Institute of Science and Technology), J. Kim (Seoul National University), and E. Cho (Korea Institute of Science and Technology)
- 129 Ni-P Coated Sn Powder as the Anode for Li-Ion Batteries - Y. Jo, J. Mun, and S. Oh (Seoul National University)
- 130 Addition of Pt-Ru Catalyst to the Anode/Electrolyte Interface in a Direct Methanol Fuel Cell by Sputtering - Y. Xiu and N. Nakagawa (Gunma University)
- 131 Sulfonated Poly(ether ether ketone) based Composite Membranes for Polymer Electrolyte Membrane Fuel Cell - J. Park, K. Palanichamy, T. Yang, S. Yim, W. Lee, and C. Kim (Korea Institute of Energy Research)
- 132 Carbon Monoxide Tolerance of Poly(2,5-benzimidazole) Membrane Based Polymer Electrolyte Membrane Fuel Cell - K. Palanichamy, J. Park, T. Yang, G. Park, W. Lee, and C. Kim (Korea Institute of Energy Research)
- 133 Development of Inhibited Coolants for Fuel Cell Powered Vehicles - B. Yang (Honeywell-CPG), P. Woyciesjes, A. Gershun, and F. Marinho (Honeywell CPG)
- 134 Acid Doped Polybenzimidazole Membrane for High Temperature Operation of Polymer Electrolyte Membrane Fuel Cell - E. Ahn (Korea Institute of Energy Research), J. Park, K. Palanichamy, T. Yang, W. Lee, and C. Kim (Korea Institute of Energy Research)
- 135 The Volume and SEI Changes of Lithium Powder Electrodes During Discharge/Charge in the Li-Metal Secondary Battery - J. Chung, W. Kim, W. Yoon (Korea University). and S. Min (Kwangwoon University)
- 136 Advances in Lithium Metal Batteries - A. Best (CSIRO), J. Huang, M. Haesular, A. Hollenkamp (CSIRO Energy Technology), G. Annat, P. Howlett, M. Forsyth, and D. MacFarlane (Monash University)
- 137 Improved Electrochemical Capacitive Characteristics of Carbon Nanotubes Grown on the Nanoporous Template - S. Wen (Ajou University), O. Joo (KIST), I. Yeo (Dongguk University), and S. Mho (Ajou University)
- 138 Electrospun PVdF Separators for Electrochemical Capacitors - Y. Ahn, J. Kim, S. Jo, and D. Kim (Korea Institute of Science and Technology)
- 139 Proton Conducting Membranes Based on Sulfonated Polynorbornene Copolymer Composite for Direct Methanol Fuel Cell Applications - J. Yang, J. Choi, and J. Lee (Gwangju Institute of Science and Technology)
- 140 Electrochemical Properties and Interfacial Stabilities of (PEO)₆LiBF₄-Al₂O₃ Composite Polymer Electrolyte Prepared by Ball Milling for Li/S Battery - S. Jeong, Y. Lim, Y. Choi, G. Cho, K. Kim, H. Ahn, K. Cho, and J. Ahn (Gyeongsang National University)
- 141 Quick Chargeable Organic Radical Battery - M. Satoh, K. Nakahara, J. Iriyama, S. Iwasa, and M. Suguro (NEC Corporation)
- 142 Development of Compact Fuel Processor for 2 kW class Residential PEMFCs - W. Yoon, D. Seo, Y. Seo (Korea Institute of Energy Research), and J. Jeong (Kyungpook National University)
- 143 Electrochromic Properties of WO₃-Ta₂O₅ Nanocomposite Electrodes - H. Shim, H. Ahn, Y. Kim, and T. Seong (Gwangju Institute of Science & Technology)
- 144 Micro Heat Exchanger for Gas Phase Reaction - S. Yu (Korea Institute of Energy Research)
- 145 Electrochemical Characteristics of Room-temperature Li/FeS₂ Batteries - J. Choi, J. Kim, H. Ahn, K. Kim, and J. Ahn (Gyeongsang National University)
- 146 Fabrication and Electrochemical Characteristics of Crack Free Si-based Anode Material for All-Solid-State Thin Film Batteries - B. Jeon, D. Park, S. Jeon, and H. Lee (Kangwon National University)
- 147 Influence of Sulfonated Poly(arylene ether sulfone) as a Binder in the Catalyst Layer for DMFC - H. Jung, K. Cho, K. Sung, and J. Park (Korea Advanced Institute of Science and Technology)

- 148 Effects of Shutdown Procedure on Long-term Stability of PEM Fuel Cells - E. Cho (Korea Institute of Science and Technology), J. Lee (Sejong Univ.), H. Kim (Korea Institute of Science and Technology), T. Lim (Korea Institute of Science and Technology), I. Oh (KIST), S. Hong (Korea Institute of Science and Technology), and J. Won (Sejong University)
- 149 Mechanochemical Synthesis of Hybrid Electrolytes from the $\text{Li}_2\text{S-P}_2\text{S}_5$ Glasses and Polyethers - A. Hayashi, T. Harayama, F. Mizuno, and M. Tatsumisago (Osaka Prefecture University)
- 150 Mechanochemically Activated S/Cu and $\text{Li}_2\text{S/Cu}$ Composite Electrodes for All-Solid-State Lithium Sulfur Batteries - A. Hayashi, T. Ohtomo, F. Mizuno, K. Tadanaga, and M. Tatsumisago (Osaka Prefecture University)
- 151 Evaluation of PVDF-PSSA Membrane under PEMFC Conditions - Y. Chun (Korea Institute of Energy Research)
- 152 The Characteristics of Electrochemical Capacitor Using the Polymer Electrolyte Based on the PVDF-HFP - K. Shin and C. Jin (Korea Institute of Energy Research)
- 153 Supercapacitive Properties of Ruthenium Oxide/Polyaniline Composite Electrodes - J. Ko (Hanbat National University), D. Kim, S. Jo (Korea Institute of Science and Technology), S. Kim, and R. Song (Hanbat National University)
- 154 Alkaline Polymer Gel Electrolyte Composites Using Glass Fiber Reinforcement for Supercapacitors - J. Ko, J. Park (Hanbat National University), J. Kim, C. Jin (Korea Institute of Energy Research), S. Kim, D. Kim, and R. Song (Hanbat National University)
- 155 Study on the Morphology of CsH_2PO_4 Using the Mixture of Methanol and Polyols - J. Kim and Y. Ahn (Chonnam National University)
- 156 3W DMFC System Performances with a Methanol Sensing System - H. Choi, S. Cho, C. Chung, Y. Lee, J. Nam, J. Ryu, C. Kim, and H. Kim (Sungkyunkwan University)
- 157 Development of Hydrogen Generator Using Sodium Borohydride - T. Yang, P. Krishnan (Korea Institute of Energy Research), J. Lee, Y. Shul (Yonsei Univ.), W. Lee, and C. Kim (Korea Institute of Energy Research)
- 158 Air-breathing Polymer Electrolyte Membrane Fuel Cell System: Integration and Operation - Y. Sohn, G. Park, S. Um, S. Yim, T. Yang, Y. Yoon, W. Lee, and C. Kim (Korea Institute of Energy Research)
- 159 The Characterization of Lithium Polyelectrolyte Mixing with Ionic Liquid - E. Cha (Korea University), D. MacFarlane (Monash University), C. Lee (Korea University), and S. Lim (Seoul National University)
- 160 Multidisciplinary Analysis and Optimization of a PEMFC Using Approximate Models - J. Park (Hankuk Aviation University)
- 161 Modification of Carbon Support to Improve Catalyst Utilization for DMFC - H. Ha and M. Scibioh (Korea Institute of Science and Technology)
- 162 A Two-Dimensional Modeling of a Lithium-Polymer Battery - C. Shin, K. Kwon (Ajou University), T. Kang, and C. Kim (VK Corporation)

PBFC2-FC Fuel Cells

Royale 7, Royale Pavilion

Chair: A. Herring

- 08:30 200 Instability of Pt/C Electrocatalysts in Proton Exchange Membrane Fuel Cells: A Mechanistic Investigation - Y. Shao-Horn (Massachusetts Institute of Technology), P. Ferreira (MIT and the University of Texas, Austin), and G. la O' (MIT)
- 09:00 201 Utilization of Pt-(Ru) Catalysts in MEA for Fuel Cell Application by Hot-Embossing and Breathing Process of Proton-Exchange Membrane - C. Chung, K. Yu, and W. Kim (Sungkyunkwan University)
- 09:30 202 Supporting Materials for Enhanced Electrode Performance in Direct Methanol Fuel Cells - Y. Sung (Seoul National University)
- 10:00 Intermission (30 Minutes)
- 10:30 203 A Simple Semi-Analytic Method for Analyzing Fuel Cell Polarization Curves - J. Wang (Brookhaven National Lab), F. Uribe (Los Alamos National Laboratory), and R. Adzic (Brookhaven National Laboratory)

- 11:00 204 A New and Comprehensive Algorithm for Optimum Design & Macro Model Development in PEMFC with Complementary Approach of Exergy and Cost Considerations - H. Ghadamiyan (Azad University) and S. Seyedi Namini (MEI Co.)
- 11:30 205 Proton Transfer Salts: A New Class of Solvent-free, Involatile, Fuel Cell Electrolytes - D. Gervasio, J. Belieres, C. Angell (Arizona State University), H. Markusson (Chalmers University of Technology), and W. Xu (Ferro Corporation)

Royale 7, Royale Pavilion

Chair: J.E. McGrath

- 14:00 206 A Comparative Study on Polyaniline Modified Cathodes in PEMFC - H. Gharibi, M. Zhiani (Tarbiat Modarres University), A. Entezami (Tabriz University), R. Abdullah Mirzaiea, M. Khairmand, and K. Kakaei (Tarbiat Modarres University)
- 14:30 207 Proton Conducting Membranes from Nafion Blends and Composites - R. Wycisk, J. Lin, J. Lee, and P. Pintauro (Case Western Reserve University)
- 15:00 208 Key Phenomena in Proton Exchange Membrane Fuel Cells- Liquid Water Transport - M. Hickner (Sandia National Laboratories)
- 15:30 Intermission (30 Minutes)
- 16:00 209 Direct Methanol Fuel Cell (DMFC) Performance of Alternative Membranes Under Optimizing Conditions - Y. Kim and B. Pivovar (Los Alamos National Laboratory)
- 16:30 210 Multifunctional Battery and Fuel Cell Composite Structures for U.S. Army Applications - J. Snyder, R. Carter, J. South, M. Hagon, D. DeSchepper, and E. Wetzel (U.S. Army Research Laboratory)

Friday, June 17, 2005

PBFC2-B Battery

Capri 115-116, Royale Pavilion

Battery Systems

Co-Chairs: B. Liaw and H. Ohno

- 08:30 163 A Symbiosis of Polymer Electrolyte Safety & High Energy Density: Secondary Lithium Batteries - B. Dixon, B. Gall, R. Morris (Phoenix Innovation, Inc.), and T. Gennett (Rochester Institute of Technology)
- 09:00 164 Battery Separators - Z. Zhang and P. Arora (Celgard)
- 09:30 165 Novel Coated Separator Based on Poly(ethylene glycol) Borate for Lithium Secondary Batteries - J. Park, Y. Lee, J. Lee, W. Seol, J. Seo, and D. Ko (Korea Advanced Institute of Science and Technology)
- 10:00 Intermission (30 Minutes)
- 10:30 166 $\text{Li}_2\text{O}-\text{B}_2\text{O}_3-\text{P}_2\text{O}_5$ Solid Electrolyte for Thin Film Batteries - D. Shin, C. Kangil, and C. Kihyun (Hanyang University)
- 11:00 167 Incorporating Ionic Liquids into Li-Ion Microbatteries - A. Stux, K. Swider-Lyons (Naval Research Laboratory), W. Henderson, and P. Trulove (U.S. Naval Academy)
- 11:30 168 Surface Morphology and Spectroscopic Investigations of Nano-Composite Polymer Electrolytes for Lithium Batteries - N. Karan, B. Natesan, and R. Katiyar (University of Puerto Rico)

Battery Systems

Co-Chairs: J. McGrath and R. J. Brodd

- 14:00 169 Advanced VARTA PoLiFlex Polymer Batteries - D. Ilic (Varta Microbattery GmbH)
- 14:30 170 Handling Ultra-Thin Film Polymer Substrates - I. Clelland and R. Price (ITW Paktron)
- 15:00 171 Lithium Polymer Electrolytes. Mechanism of Conductivity - E. Shembel, V. Redko, V. Khandetsky, P. Novak, K. Kykyvnyk, O. Chervakov and T. Pastushkin (Ener1, Inc.)
- 15:30 Intermission (30 Minutes)
- 16:00 172 Effect of Inorganic Fillers on the Electrochemical Properties of Poly (vinylidene fluoride-hexafluoropropylene) Lithium Salt- Composite Electrolytes - S. Manuel (Central Electrochemical Research Institute), S. Venkatachalam, B. Wei (Louisiana State University), N. Renganathan, S. Gopukumar, and T. Premkumar (Central Electrochemical Research Institute)

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