

# CALL FOR PAPERS



## THE 37<sup>th</sup> IEEE PHOTOVOLTAIC SPECIALISTS CONFERENCE

June 19-24, 2011

Washington State Convention Center  
Seattle, Washington, USA

[www.ieee-pvsc.org](http://www.ieee-pvsc.org)



Sponsored by the IEEE Electron Devices Society



Technical Co-Sponsors



# Invitation from the Chair

On behalf of the Organizing, Cherry and International Committees, it is my great pleasure to invite you to join the 37<sup>th</sup> IEEE Photovoltaic Specialist Conference (PVSC), June 19-24, 2011, at the Washington State Convention Center in Seattle, Washington. This PVSC will be particularly special, as we will be celebrating the 50<sup>th</sup> anniversary of the first PVSC, way back in 1961. Our goal is to continue as the premier technical conference covering all aspects of PV technology, from fundamental physics and basic material science to installed system performance. We will also continue our Industrial Exhibition that brings together PV Specialists with the industry developing the tools of research, development and manufacturing. I invite you to come and be part of THE photovoltaic conference event of the year!

## **Highlights include:**

*Strong Technical Program:* Building off the record number of technical presentation at the 35<sup>th</sup> PVSC, we will continue with our ten (10) technical areas, including the recently added Organic Photovoltaics and Advances in Characterization of Photovoltaics areas.

*Full Day of Tutorials:* We will have ten (10) tutorials scheduled, consisting of half-day lectures taught by experts in the field. The topics will range from the basic physics of solar cell operation to details about the latest trends in the industry that will be valuable to newcomers to PV as well as seasoned veterans.

*Industrial Exhibition:* Within the fantastic Washington State Convention Center, our exhibit space will be designed to bring together the commercial sector and the Photovoltaic Technologist. Our focus will be on R&D as well as tools for commercialization.

*Student Participation:* Our technical community is only as vibrant as our student body, so we have created incentives to encourage students to attend and to be active participants in the conference, including reduced registration and tutorial fees, special hotel rates, and best student presentation awards in each technical area.

*Hotel Accommodations:* The Sheraton Seattle will serve as our primary conference hotel, with the Red Lion as our high value option. Both are right across the street from the Convention Center and are in the heart of great tourist, dining and shopping opportunities. In addition, staying at either conference hotel automatically enters you in a drawing for a **FREE SEVEN (7) DAY ALASKAN CRUISE FOR TWO!**

*Social Program:* Continuing our theme of enhancing our PV Specialists community, our goal is to create relationships on a social as well as professional level amongst our attendees, families, and companions. From the Cherry Award Reception to the Conference Banquet to the daily sightseeing tours, the social program is going to be truly memorable. Plan to arrive early and stay late!

We urge you to register for the meeting, as well as to make your hotel reservation, well ahead of the deadline. The increased interest PV is likely to lead to greatly increased attendance and the hotel will maintain our group rate and room block for a limited time. Please join us in Seattle and help to celebrate the 50<sup>th</sup> anniversary of the oldest and best PV technical conference.

**David Wilt**  
**General Chair**

# Call For Papers

## 37<sup>th</sup> IEEE Photovoltaic Specialists Conference

On behalf of the Technical Program Committee, I invite you to submit an abstract on your latest results and achievements in photovoltaics research, development, and applications to the 37<sup>th</sup> IEEE PVSC. Photovoltaics have become increasingly central in defining our planet's solutions with respect to energy management, renewable and clean energy resources, and energy security. As a result, new opportunities for both established and emergent PV technologies are constantly appearing, which span from research and development to commercialization and full-scale deployment. The resulting exponential rise in photovoltaic production and demand that has been occurring for more than a decade is a global phenomenon. As a result, science and technology developments in PV over the next several years, and their influence on the economics of PV installations, are likely to establish which energy technologies become dominant for decades to come. The chance to share and discuss these crucial PV developments in a timely and influential forum is what the PVSC is all about. Please join us in continuing the PVSC's tradition as the premier international conference on the science and technology of photovoltaics.

Abstracts summarizing original research on all aspects of photovoltaics are encouraged. The technical sessions are organized into 10 major areas as outlined below. We have adopted a system of international chairs and co-chairs for each technical area, to further foster international participation and collaboration at the PVSC.

To have your paper considered for presentation at the 37th PVSC, please submit a 3-page evaluation abstract, and a short abstract no more than 300 words in length for display on the PVSC website, by the deadline below. Other than the 3-page limit, there are no format restrictions on the evaluation abstract, except that it be detailed enough to allow a competent technical review. The preferred way to submit your abstract is via the 37th PVSC website at [www.ieee-pvsc.org](http://www.ieee-pvsc.org). Log in with your user name and password and carefully follow the instructions provided to upload your abstract successfully.

**The deadline for electronic submission of the 3-page extended abstract and the short abstract of 300 words or less is February 21, 2011, 12:00 midnight Pacific Standard Time (UTC - 8 hours).** Contributing authors will be notified of the acceptance status of their papers after April 4, 2011. Upon acceptance, we ask all authors to confirm that they will be able to present their work at the conference, and upload their manuscript by the due date of June 6, 2011 (before the conference) for publication in the conference proceedings. A small number of select papers from the IEEE PVSC are planned to be included in a special issue of the newly created IEEE Journal of Photovoltaics. Papers in the PVSC proceedings are searchable and accessible via the internet through the IEEE Xplore® system. To ensure IEEE Xplore®-compliant proceedings, please submit your manuscripts electronically through the website.

### **Best Student Presentation Award**

This year we will once again acknowledge our excellent student contributions at the PVSC and award one student in each Area with a plaque and cash award. This year, however, students **need to complete the Student Award Application to be eligible for an award**. The application consists of some background information and a one to two page research summary written by the student. Prior to the conference, a panel will review this summary and the abstract submitted by the student, to determine 3-5 finalists in each Area. Each finalist will have the opportunity to present their work as an oral publication. A panel of reviewers will assess the overall contribution of the student (presentation, paper, research summary) and determine the winner. To obtain more information about the best student presentation award, including eligibility and how to apply, select the "Student" tab on the PVSC website: <http://www.ieee-pvsc.org/PVSC37/student-central.html>.

Please join us in making the 37<sup>th</sup> PVSC the place to be to present and learn about the latest advances in the science, engineering, and applications of photovoltaics!

*Steven A. Ringel*  
*Program Chair, 37<sup>th</sup> PVSC*

# **Technical Areas**

## **AREA 1: FUNDMENTALS AND NEW CONCEPTS FOR FUTURE TECHNOLOGIES**

**Chair:** Alex Freundlich, *University of Houston, USA*

**Co-Chair:** Stephen Bremner, *University of New South Wales, Australia*

**Co-Chair:** Jean Francois Guillemoles, *IRDEP-CNRS, France*

**Co-Chair:** Masakazu Sugiyama, *University of Tokyo, Japan*

- Sub-area 1.1 Fundamental Conversion Mechanisms
- Sub-area 1.2 Quantum-well, nanowire, and quantum dot -architected devices
- Sub-area 1.3 Hybrid organic/inorganic Solar Cells
- Sub-area 1.4 Advanced Light Management and Spectral Shaping
- Sub-area 1.5 Novel Material Systems

Papers are sought that describe basic research and breakthroughs in physical, chemical and optical phenomena, new materials and novel device concepts, which are essential to feed the innovation pipeline leading to future-generation PV technologies. General areas of interest include, but are not limited to, recent advances in understanding, demonstration and optimization of:

- (1) non-conventional PV conversion processes, intermediate-band solar cells, multiple charge generation, thermophotovoltaics, hot-carrier cells, and other emerging PV device concepts;
- (2) devices based on quantum wells nanowires and quantum dots, as well as deciphering the science at play in photogeneration, recombination, and carrier transport in these devices,
- (3) cross-cutting hybrid devices that leverage on organic/inorganic material and nanostructures (q-dots, graphene and CNTs)
- (4) advanced light management concepts and architectures: including new approaches in spectral engineering (i.e. up-down conversion, luminescent concentrators), light concentration, surface texturing and light trapping (i.e plasmonics, nano/micro engineered ARs)
- (5) Novel material systems and associations for increasing performance, functionality, reliability and scalability of PV devices, including new pseudomorphic and metamorphic photovoltaic material systems, alternative inexpensive substrates, novel doping and defect passivation schemes, novel nanostructures, earth abundant thin films and TCO materials. Novel scalable nano/micro fabrication techniques and processes for synthesis of PV materials.

**Area 1 Invited Speakers Include:** Harry Atwater (Caltech), Michael McGee (Stanford) and Alex Zunger (NREL)

## **AREA 2: CHALCOGENIDE THIN FILM SOLAR CELLS AND RELATED MATERIALS**

**Chair:** Sylvain Marsillac, *Old Dominion University, USA*

**Co-Chair:** Chris Ferekides, *University of South Florida, USA*

**Co-Chair:** Takashi Minemoto, *Ritzumeikan University, Japan*

**Co-Chair:** Susanne Siebentritt, *University of Luxembourg, Luxembourg*

- Sub-area 2.1: Absorber Deposition and Characterization
- Sub-area 2.2: Materials for Substrates, Transparent Conductors, Buffers, and Contacts
- Sub-area 2.3: Device Properties, Modeling, and Defects Characterization
- Sub-area 2.4: Novel Processes, New Architecture, In-situ Monitoring
- Sub-area 2.5: Module and Manufacturing Issues: Performance, Reliability, and Process Controls

As the CdTe and CIGS technologies move from the lab to the factory, we encourage contributions addressing recent advances in manufacturing processes utilizing vacuum and/or atmospheric conditions, process controls and diagnostics, alternative buffers, TCOs, novel contacts, moisture barriers and other measures related to stability/reliability of the solar cell. To maintain a strong and broad science foundation for these two thin film technologies, we solicit contributions on the science and engineering of thin-film deposition, characterization of

structural, optical and electrical properties, modeling, and the role of electrically active defects and impurities. Looking forward, we also solicit contributions exploring new materials, wide band gap absorbers, novel device structures, and tandem cells.

**Area 2 Invited Speakers Include:** Marika Edoff (ASC), Robert W. Collins (University of Toledo), Hironori Katagiri (Nagaoka National College of Technology), Roland Scheer (University of Halle) and James R. Sites (Colorado State University)

### **AREA 3: III-V AND CONCENTRATOR TECHNOLOGIES**

**Chair:** Paul Sharps, *Emcore Corporation, USA*

**Co-Chair:** Carlos Algora, *Universidad Politecnica de Madrid, Spain*

**Co-Chair:** Pierre VerLinden *Solar Systems, Australia*

- Sub-area 3.1 III-V Epitaxy, Materials, Processing and Devices; III-V Concentrator Solar Cells
- Sub-area 3.2 High Concentration PV Modules, Optics and Receivers
- Sub-area 3.3 High Concentration PV Systems and Power Plants
- Sub-area 3.4 Low concentration PV - Si Concentrator Cells, Modules and Systems

The highest conversion efficiencies of >40 % are obtained with multijunction solar cells made of III-V compound semiconductors. Materials science is the basis for the continuous improvements in the understanding and further development of these complex solar cell structures. We therefore call for papers on the materials science and technology in this field. This may include (but not be limited to) work on theoretical device modeling, epitaxy, solar cell processing, characterization, and system integration. While III-V multijunction solar cells are the basis for the growing terrestrial market of high concentration photovoltaics, lower concentration approaches using silicon solar cells are gaining attention. At this conference we are encouraging submission of papers in all fields related to the materials science and technology of Si and III-V concentrator solar cells, receivers and systems. Papers on the development of new concentrators including optics for high- as well as low-concentration are welcome. Manufacturing aspects, product reliability, and testing are important aspects to be discussed for both solar cells and concentrator systems. Further topics may focus on: tracker development, thermal hybrid systems, annual power rating, industry standards, CPV market development, cost reduction or ecological impact. Contributions may range from exploratory research through applied research, technology development, and engineering improvements.

**Area 3 Invited Speakers Include:** Prof. Antonio Luque (UPM)

### **AREA 4: CRYSTALLINE SILICON TECHNOLOGIES**

**Chair:** Stuart Bowden, *Arizona State University, USA*

**Co-Chair:** Armin Aberle, *SERIS, Singapore*

**Co-Chair:** Jörg Horzel, *IMEC, Belgium*

- Sub-Area 4.1: Feedstock and Crystallization
- Sub-Area 4.2: Passivation (bulk, surfaces and gettering)
- Sub-Area 4.3: Advances in Industrial Cell Processing (metallization, diffusion, etc)
- Sub-Area 4.4: Advanced device structures (heterojunctions, rear junction, PERL, EWT etc)
- Sub-Area 4.5: Fundamentals (modeling, characterization, optics)

The market for crystalline silicon solar cells continues to expand and is rapidly approaching the tipping point of grid parity in many markets. The continuing drive for higher conversion efficiencies and lower costs of crystalline Si cells demands an increasingly sophisticated understanding of the materials and processes involved, in order to drive the development of new or improved manufacturing methods, materials and device structures. Papers reporting on all aspects of c-Si technology are welcomed, including but not limited to: feedstock materials and crystal growth; defect characterization and passivation; advanced optics for light trapping and reflection control;

new cell designs; device modelling; advanced measurement techniques; and solutions for large scale manufacturing.

**Area 4 Invited Speakers:** TBD

## **AREAS 5: AMORPHOUS, NANO AND FILM Si TECHNOLOGIES**

**Chair:** Arno Smets, *Delft University of Technology, the Netherlands*

**Co-Chair:** Hiroyuki Fujiwara, *Gifu University, Japan*

**Co-Chair:** Aad Gordijn, *Forschungszentrum Jülich, Germany*

Sub-area 5.1: Fundamental properties of thin silicon films

Sub-area 5.2: Processing issues for thin silicon films and devices

Sub-area 5.3: Novel concepts for thin silicon solar cell devices

Sub-area 5.4: Amorphous, nano/microcrystalline and silicon film devices and modules

Thin-film photovoltaics based on amorphous, nano/microcrystalline and polycrystalline silicon on non Si-substrates have matured through three decades of advances in the design and processing of high-quality materials, solar cells and modules. Detailed research studies and visionary papers addressing the entire spectrum of the subject are welcomed, including material characterization concerning microstructure, light induced degradation, SiGe:H, SiC:H, SiO:H alloys, film oxidation; processing issues concerning large throughput, large area, high deposition rates, processing routes for polycrystalline silicon; novel concepts for thin silicon solar cells concerning films with new functionalities, like enhanced light trapping using texturing of interfaces, multi-layers, intermediate reflective layer between junctions or integrated in doped layers, plasmonic enhancement, photonic structures, “3D” structures (nanowires, nanorods)”, advanced transparent conductive oxide layers; and all topics related to amorphous/microcrystalline and silicon film solar cells and modules such as multi-junction structures, performance and long-term reliability

**Area 5 Invited Speakers:** TBD

## **AREA 6: ORGANIC PHOTOVOLTAICS**

**Chair:** David Ginley, *National Renewable Energy Laboratory, USA*

**Co-Chair:** Eva Bundgaard, *Risoe, Denmark*

**Co-Chair:** Darin Laird, *Plextronics, USA*

Sub-area 6.1 New materials for Absorbers and Donors in Excitonic Solar Cells

Sub-area 6.2 Materials and Approaches for Contacts for Organic Photovoltaic Devices

Sub-area 6.3 Lifetime and Stability in Organic Photovoltaics

Sub-area 6.4 Device Concepts for Excitonic Solar Cells

Organic, hybrid inorganic/organic, and dye sensitized solar cells are rapidly advancing technologies that are beginning to demonstrate initial commercial viability. The flexibility to model and produce different donor/acceptor combinations including both organic small molecule and polymer as well as nanostructured inorganic materials stimulate a large diversity of possible approaches to realize promise of efficient and highly stable devices. Many of the devices are excitonic in nature necessitating new models and understanding of the critical interfaces in the bulk heterojunction and the contacts. This is more so since there are interfaces between very heterogeneous materials with different structural, thermal and chemical properties. The symposium will focus on the examination of many of the key areas evolving in this diverse approach to solar energy. This includes papers in the broad spectrum of areas but will focus on: the modeling synthesis and evaluation of new materials for the donor and acceptor in the bulk heterojunction; developing high performance contacts for organic and excitonic based devices with the associated interfacial science, studies on the lifetime and mechanisms for degradation in OPV devices and new device concepts for OPV including QD composites, tandem cells and others.

**Area 6 Invited Speakers:** TBD

## AREA 7: SPACE TECHNOLOGIES

**Chair:** Alex Howard, *AFRL, USA*

**Co-Chair:** Mitsuru Imaizumi, *JAXA, Japan*

**Co-Chair:** Carla Signorini, *ESA, Netherlands*

Subarea 7.1 Space Materials and Devices

Subarea 7.2 Space Systems

Subarea 7.3 Flight Performance and Environmental Effects

Topics of interest are solar cells suited for space use, especially devices capable of high efficiency or high specific power, including solar array designs. The scope includes III-V, thin-film, and novel solar cells. Also of interest are papers concerning space reliability, space environmental effects, and protective materials for the space environment. We welcome papers concerning characterization and qualification of space solar cells and papers concerning flight experiments and missions.

**Area 7 Invited Speakers:** TBD

## AREA 8: ADVANCES IN CHARACTERIZATION OF PHOTOVOLTAICS

**Chair:** Manuel Romero, *National Renewable Energy Laboratory, USA*

**Co-Chair:** Daniel Abou-Ras, *Hahn Meitner Institute, Germany*

**Co-Chair:** Clemens Heske, *University of Nevada Las Vegas, USA*

**Co-Chair:** Sergio Molina, *University of Cadiz, Spain*

Sub-area 8.1: Defects in Photovoltaic Materials and Solar Cells

Sub-area 8.2: Progress in Micro- and Nano-scale Measurements for Photovoltaic Applications

Sub-area 8.3: Next Generation of Instruments for the Characterization of Solar Cells

Sub-area 8.4: Characterization Methods for the Photovoltaic Industry: In-Situ Measurements, Process Control, Defect Monitoring.

Sub-area 8.5: Modules and Photovoltaic System Performance, Reliability Testing, and Standards

The focus of Area 8 is to present works primarily focused on methods of characterization of photovoltaic materials and devices as distinct from focusing on the materials and devices characterized. Thus papers submitted to this area could range from new scanning probe methods to determine semiconductor properties to methods to calibrate an accelerated lifetime testing apparatus. In-situ characterization methods and process control methods are appropriate to Area 8 because they are about implementing a method in a given environment. Papers describing the performance or properties of specific materials and devices, if focused primarily on those materials and devices should go to the areas concerned with the relevant technology. However, a paper describing the application of a technique to a material, focused primarily on demonstrating the capabilities of a technique, belong in Area 8. Thus, a paper describing cathodoluminescence (CL) of CuInSe<sub>2</sub> would belong in Area 2 if focused on the CIS but in Area 8 if focused on how to conduct CL or the capabilities of a CL instrument. Exciting new work is being reported in this area ranging from novel methods of photoemission to advanced imaging and characterization methods for individual Si wafers through full modules.

**Area 8 Invited Speakers:** TBD

## AREA 9: PV MODULES AND TERRESTRIAL SYSTEMS

**Chair:** Angèle Reinders, *University of Twente, The Netherlands*

**Co-Chair:** Terry Jester, *Hudson Clean Energy Partners, USA*

**Co-Chair:** Scott Norquist, *3M Renewable Energy Division, USA*

**Co-Chair: B.J. Stanberry, *Heliovolt, USA***

- Sub-area 9.1: Irradiance Resources
- Sub-area 9.2: PV Module Materials, Durability and Performance
- Sub-area 9.3: Inverters, Batteries and other BOS Components
- Sub-area 9.4: Grid Connected Systems and Smart Grids
- Sub-area 9.5: Stand Alone Applications and PV products

PV modules are a vital commodity in the market of PV systems. We encourage submissions in all subjects associated with PV module materials, durability and the performance of PV modules. Also papers reporting on irradiance resources in relation to the energy yield (kWh/kWp) of PV modules and PV systems are encouraged. In particular we are interested in testing protocols for site- dependent energy yields. Power conditioning equipment affects the reliability and efficiency of PV systems. Therefore, contributions describing technical issues and standardization of inverters and Balance-of-Systems (BOS) components are encouraged. Papers about design engineering, monitoring and control of very large scale grid-connected PV installations are welcome, as well as papers about incentives for, and experiences with residential grid-connected systems and building-integrated PV systems in the context of smart grids. The growing need for renewable electricity supply is advancing the development of stand-alone PV solutions and various innovative PV products for both grid-connected and autonomous applications. As such we welcome contributions that explore the development of system integrated PV in the context of functionality, regulations and costs.

**Area 9 Invited Speakers Include:** Michael Kempe (NREL), Klaus Kiefer (FhG-ISE), Joop Schoonman (Delft University of Technology)

## **AREA 10: PV VELOCITY FORUM: ACCELERATING THE PV ECONOMY**

**Chair: John Benner, *National Renewable Energy Laboratory, USA***

**Co-Chair: Izumi Kaizuka, *RTS Corporation, Japan***

**Co-Chair: Carol Tombari, *National Renewable Energy Laboratory, USA***

- Subarea 10.1 PV Programs, Policies and Incentives
- Subarea 10.2 PV Markets
- Subarea 10.3 Sustainability and Environmental Issues

The PV Velocity Forum brings investors, regulators and policy-makers together with the assembled PV technology specialists to explore methods for driving more cost-effective emerging technologies through production and into the market. Speakers and panelists will engage with attendees to explore gating factors affecting the adoption of new PV technologies, such as research support, policy development, regulations, supply chain, workforce development, environmental issues and market-based project management. The Forum will address strategies to sustain or accelerate the high growth rate and drive costs down faster.

**Area 10 Invited Speakers: TBD**

### **GENERAL CHAIR**

**David Wilt**

**US Air Force Research Laboratory**

**Space Vehicles Directorate**

**3550 Aberdeen Ave SE**

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### **PROGRAM CHAIR**

**Steven A. Ringel**

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## WILLIAM R. CHERRY AWARD

This award is named in honor of William R. Cherry, a founder of the photovoltaic community. In the 1950's, he was instrumental in establishing solar cells as the ideal power source for space satellites and for recognizing, advocating, and nurturing the use of photovoltaic systems for terrestrial applications. The William R. Cherry award was instituted in 1980, shortly after his death. The purpose of the award is to recognize an individual engineer or scientist who devoted a part of their professional life to the advancement of the science and technology of photovoltaic energy conversion. The nominee must have made significant contributions to the science and/or technology of PV energy conversion, with dissemination by substantial publications and presentations. Professional society activities, promotional and/or organizational efforts and achievements are not considerations in the election for the award.

This award is presented at each IEEE Photovoltaic Specialists Conference. The recipient is selected by the William R. Cherry Committee, which is composed of past PVSC conference chairpersons and past recipients of the award.

To be eligible for the award, the nominee must currently be active in the science and technology of PV conversion. He/she must have been active in the field for an extended period with the expectation of continued activity. Short-term activities in the field, and/or single outstanding contributions are not sufficient to make a person eligible for the award.

Nominations are due to the Cherry Award Chair by January 10 of each year. A nomination will remain active for 3 award cycles, after which a new nomination may be submitted.

To make a nomination, please submit a completed electronic nomination form and accompanying materials at: (<http://www.ieee-pvsc.org/ePVSC/cherry/form.php>). The information required on the electronic form is listed below:

1. The name of your nominee, and his/her current affiliation and contact information.
2. A rationale (less than 150 words) of the nominee's contributions to the advancement of the PV field.
3. A citation (less than 40 words) listing the nominee's specific contributions to make them deserving of the award.
4. A list of the nominee's activities in the field.
5. A current CV for the nominee.
6. Nominator's name, address, phone number and e-mail address.

**The deadline for Cherry Award nominations to be considered for the 37<sup>th</sup> IEEE PVSC is  
January 10, 2011.**

**Previous recipients of the William R. Cherry Award:**

<b>Dr. Paul Rappaport</b>	<b>1980</b>	<b>Dr. Adolf Goetzberger</b>	<b>1997</b>
<b>Dr. Joseph L. Loferski</b>	<b>1981</b>	<b>Dr. Richard J. Schwartz</b>	<b>1998</b>
<b>Prof. Martin Wolf</b>	<b>1982</b>	<b>Dr. Christopher R. Wronski</b>	<b>2000</b>
<b>Dr. Henry W. Brandhorst</b>	<b>1984</b>	<b>Dr. Richard M. Swanson</b>	<b>2002</b>
<b>Mr. Eugene L. Ralph</b>	<b>1985</b>	<b>Dr. Ajeet Rohatgi</b>	<b>2003</b>
<b>Dr. Charles E. Backus</b>	<b>1987</b>	<b>Dr. Timothy J. Coutts</b>	<b>2005</b>
<b>Dr. David E. Carlson</b>	<b>1988</b>	<b>Dr. Antonio Luque</b>	<b>2006</b>
<b>Dr. Martin A. Green</b>	<b>1990</b>	<b>Dr. Masafumi Yamaguchi</b>	<b>2008</b>
<b>Mr. Peter A. Iles</b>	<b>1991</b>	<b>Dr. Stuart Wenham</b>	<b>2009</b>
<b>Dr. Lawrence L. Kazmerski</b>	<b>1993</b>	<b>Dr. Richard King</b>	<b>2010</b>
<b>Prof. Yoshihiro Hamakawa</b>	<b>1994</b>		
<b>Dr. Allen M. Barnett</b>	<b>1996</b>		