7th International Aerosol Conference

September 10-15, 2006 • Crowne Plaza St. Paul Riverfront • St. Paul, Minnesota, USA

REGISTRATION BROCHURE

* Globe courtesy of NASA/JPL-Caltech

www.AAAR.org/iac2006

INTERNATIONAL AEROSOL RESEARCH ASSEMBLY
www.iara.org

ORGANIZED BY
AMERICAN ASSOCIATION FOR
AEROSOL RESEARCH (AAAR)
www.AAAR.org

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David Y.H. Pui and Gilmore J. Sem

Technical Program Co-Chairs:
Pratim Biswas and Da-Ren Chen

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Dear Colleagues:

We invite you to participate in the 7th International Aerosol Conference in St. Paul, Minnesota's capital city on the banks of the Mississippi River. This IAC will bring together much of the worldwide aerosol research community to share the results of recent research.

On Sunday, September 10, we will enjoy a choice of many tutorials taught by experts in the field. The conference begins in earnest on Monday, September 11, and continues through Friday, September 15 with a full schedule of oral and poster sessions covering a wide variety of aerosol topics.

Every morning begins with a plenary lecture on a current or emerging topic of aerosol science. We anticipate over 1,150 high-quality papers on the latest aerosol science and technology. Participants may tour local areas of interest such as the Science Museum of Minnesota, the University of Minnesota's Particle Technology Laboratory, TSI, Donaldson Company, MSP Corporation, 3M, and the Mall of America. Wednesday evening we will enjoy a conference dinner on a riverboat on the Mississippi.

The 2006 IAC will be preceded by a special symposium on the history of aerosol science, Friday and Saturday, September 8-9, 2006. The history symposium will have its own registration fee. This is the third in a series of symposia on aerosol history, the first in 1999 in Vienna and the second in Portland in 2001. A peer-reviewed proceedings book of the symposium contributions is planned. Learn more about the history symposium on the AAAR Web site, www.aaar.org.

A special event will mark the 25th Annual Conference of AAAR. The Fuchs Award will be presented to one or more individuals for their lifetime achievements in the field of aerosol science. The first Fissan-Pui-TSI Award will recognize excellence in intercontinental cooperation in the field of aerosol science and technology. The International Aerosol Fellow Award presentation will also be made.

Your participation at this important conference is crucial to its success. We look forward to seeing you in September!

Sincerely,

David Y. H. Pui
Conference Co-Chair

Gilmore J. Sem
Conference Co-Chair

International Aerosol Research Assembly
Constitution

The International Aerosol Research Assembly (IARA) is an organization consisting of national, regional, and special interest aerosol research associations. The purpose of IARA is to promote scientific knowledge and cooperation in the field of aerosol research internationally, to select a host organization for the international aerosol conference held every four years, and to recognize prominent aerosol scientists with the International Aerosol Fellow Award every two years and the Fissan - Pui - TSI Award every four years.

The International Aerosol Research Assembly (IARA) was first discussed at the First International Aerosol Conference in Minneapolis, Minn., USA, in 1984, and the Assembly was formally organized at the Second International Aerosol Conference in West Berlin, Germany, in 1986. The founding members were the American Association for Aerosol Research (AAAR), Gesellschaft für Aerosolforschung (GAeF) and the Japan Association for Aerosol Science and Technology (JAAST).

As of January 2006, IARA has 12 member societies:

Aerosol Society (AS) (UK and Ireland)
American Association for Aerosol Research (AAAR)
Association Française d'Etudes et de Recherches sur les Aérosols (ASFERA)
Chinese Association for Aerosol Research in Taiwan (CAART)
Finnish Association for Aerosol Research (FAAR)
Gesellschaft für Aerosolforschung (GAeF)
Indian Aerosol Science and Technology Association (IASTA)
International Society for Aerosols in Medicine (ISAM)
Israeli Association for Aerosol Research (IAAR)
Japan Association of Aerosol Science and Technology (JAAST)
Korean Association for Particle and Aerosol Research (KAPAR)
Nordic Society for Aerosol Research (NOSA)

Important Information

Program Information

Platform Session

A platform session is based on a submitted and approved abstract. Each oral presentation is limited to 20 minutes, including time for questions, and may be accompanied by PowerPoint presentations. No other visual equipment (overhead projectors, slide projectors, etc.) will be provided.

Poster Sessions

Poster Session 1 and Continental Breakfast:
Tuesday, September 12, 2006
9:15 a.m. – 11:20 a.m.

Poster Session 2 and Continental Breakfast:
Thursday, September 14, 2006
9:15 a.m. – 11:20 a.m.

A poster in the poster session is based on a submitted and approved abstract. The size of a poster can not exceed 4 feet by 4 feet. Posters will be located in the Great River Ballroom and Garden Court East and West located on the first level of the Crowne Plaza St. Paul Riverfront. There are two poster sessions during which alternating authors will present their posters and will be available for discussions. Please check the final program at the conference for exact poster viewing times.

New this year will be a series of concurrent poster viewing opportunities in conjunction with the scheduled platform sessions. Check the final program for the exact schedule.

Speaker Ready Room

There will be a presentation preview/speaker ready room at the Crowne Plaza St. Paul Riverfront. Please check your final program for the hours and location. All speakers must visit the speaker ready room the day prior to your presentation. There will be a technician in the room to assist you with your presentation. Please note: LCD projectors are the only form of visual equipment that will be provided.

Late Breaking Posters

Please call the AAAR office at 856-439-9080 for more information.

CM Points

The American Board of Industrial Hygiene will award CM points to CIHs as follows:
.5 points per half day, 4.5 Industrial Hygiene CM points – approval #: 06-070

All participants of the 2006 International Aerosol Conference are encouraged to contact their respective professional certifying agency for the applicability of the IAC conference program toward additional CM points and CEU credits.

Student Assistant Program

Applications are now being accepted for student assistants for the 2006 International Aerosol Conference. Student assistants perform a variety of important tasks that ensure the smooth functioning of tutorials, platform and poster sessions, as well as numerous other activities.

Student assistants must work a minimum of four sessions. They may attend two tutorials free of charge. All student assistants are required to attend an orientation meeting at the Crowne Plaza St. Paul Riverfront on Saturday evening, September 9 at 8:30 p.m.

Important Information (continued)

If you are interested in participating in the student assistant program, please complete the online application at www.aaar.org or contact Deanna Bright at the AAAR office at 856-642-4202 or e-mail info@aaar.org subject: Student Assistant Program. Applications must be received in the AAAR office by Monday, July 10, 2006.

Student Travel Grants

There are a limited number of student travel grants available for this conference. More information and an application can be found on the IAC Web site, www.aaar.org.

AAAR Annual Business Meeting

This year the Annual Business Meeting takes place on Monday, September 11, 5:30 p.m. – 6:30 p.m. This important session provides an overview of the highlights of AAAR today and tomorrow. There will be a special tribute to the current conference chairs, technical program chairs, and their committees, as well as others who have served AAAR during the year. During this meeting, the ceremonial passing of the gavel will mark the transfer of leadership responsibility from Tony Wexler to incoming president, Pratim Biswas.

Welcome Reception

Sunday, September 10, 2006
6:30 p.m. – 8:30 p.m.

This is your opportunity to meet and greet the exhibitors. Representatives from well-known and respected vendors are happy to discuss their products and talk with you about the latest in technology and advances in the field.

Exhibitors' Reception

Monday, September 11, 2006
6:30 p.m. – 8:30 p.m.

The Exhibitors' Reception, an IAC tradition, is a time to visit with the exhibitors and all conference attendees in an informal, relaxed atmosphere.

IAC Conference Dinner

Wednesday, September 13, 2006

Join your friends and colleagues on Wednesday evening, September 13, 2006, for an evening dinner cruise aboard the Anson and Betsey Northrup vessels of the Padelford Packet Boat Co.

Founded in 1969, the Padelford Packet Boat Co. is Minnesota's oldest and largest riverboat company. The Padelford fleet of four large riverboats has welcomed over 3 million passengers on board to cruise the Mississippi from its landings in Minneapolis and St. Paul.

The IAC private charter cruise will leave from the Harriett Island landing in St. Paul. Transportation will be provided from the Crowne Plaza St. Paul Riverfront to the landing. Vessel boarding will commence at 6:30 p.m., and departure will be at 7:00 p.m. The return to Harriett Island is scheduled for 10:00 p.m. Buses will transport you back to the Crowne Plaza St. Paul Riverfront.

A full buffet dinner and dancing will be offered on board. The cost per person is $60. Please note that this charge is NOT included in the IAC conference registration fee. On the registration form inserted in this brochure, indicate the number of reservations you would like for this event and include fee in your payment.

We look forward to welcoming you to a unique evening aboard a genuine Mississippi riverboat.

International Dinner

International attendees are invited to participate in an off-site International Dinner. This gathering is intended to bring together attendees who may not normally have a chance to socialize outside of the general meeting. The dinner will be attended by members of the AAAR Membership Committee and will be held on Monday, September 11, 2006 at 8:00pm. The price of approximately $25 will be paid by each individual at the restaurant. Please indicate your interest in attending on the registration form. No money will be collected at the time of registration.

25th Anniversary of AAAR: Celebration Lecture, Sheldon K. Friedlander

This informative talk will describe how aerosol science and engineering is an "enabling discipline" – and describe the various areas in which aerosol scientists have made contributions. Starting with an historical perspective, the talk will provide the exciting opportunities for aerosol scientists in the future.

The talk will be followed by recognition of the activities of the AAAR the last 25 years. The contribution of international societies and the growth of the IARA will also be recognized.

Award Presentations

The IARA member associations, including AAAR and GAeF, will present their annual awards throughout the conference. Please check your final program for award presentations and times. The following international awards will also be presented.

Fuchs Award
The Fuchs Memorial Award is presented by AAAR, GAeF and JAAST. It recognizes outstanding original research contributions to the field of aerosol science and technology. It is considered the highest honor for researchers in the field. Presented every four years at the IAC, the award memorializes late Professor Nikolai Albertovich Fuchs, the great Russian scientist who is regarded by many as the "father of aerosol science." Deadline for receipt of nominations for this award was April 1, 2006, and additional details may be viewed at www.iara.org. The chair of the Fuchs Award Committee is Dr. John Seinfeld (Seinfeld@caltech.edu). The winner of the award will make a presentation highlighting key features of his/her work. A reception will immediately follow.

International Aerosol Fellow Award
The International Aerosol Fellow Award is presented by the IARA. The biennial award recognizes outstanding contributions to aerosol science and technology through research, technical development, education, and/or service. Every four years, presentation of the biennial award occurs at the IAC. Deadline for receipt of

Important Information (continued)

nominations of this award is May 1, 2006. Additional details may be viewed at www.iara.org. The chair of the IAF Committee is Professor Helmuth Horvath (Helmuth.Horvath@univie.ac).

Fissan-Pui-TSI Award
The Fissan-Pui-TSI Award will be granted by the International Aerosol Research Assembly (IARA) to recognize international collaboration in the field of aerosol science and technology between researchers/engineers residing on at least two different continents. The award may be shared between two or more collaborating individuals or teams. Deadline for receipt of nominations for this award was May 1, 2006. Additional details may be viewed at www.iara.org. The chair of the Fissan-Pui-TSI Award Committee is Kaarle Hameri (kaarle.hameri@helsinki.fi)

Endowment of the Fissan-Pui-TSI Award Fund was initially made possible through a $75,000 donation from TSI Incorporated, to honor more than 30 years of collaboration between Fissan and Pui in the field of aerosol science and technology. Future contributions may be made by any individual, society or corporate entity to the endowed fund.

Americans with Disabilities Act (ADA) Accommodations

The IAC will use its best efforts to provide reasonable accommodations for attendees with disabilities. Please contact Ann Mitchell, amitchell@ahint.com, if you have special needs.

Tours and Activities

Register for all tours by indicating your choice(s) on the IAC registration form.

Pre-conference Excursion September 6-9, 2006

Boundary Waters Canoe Area Wilderness Trip
The Boundary Waters Canoe Area Wilderness (BWCAW) in northern Minnesota is a federally protected wilderness area and one of National Geographic's 50 places of a lifetime. Straddling Minnesota's border with Canada, the BWCAW is over 1 million acres in size, contains hundreds of small lakes and over 1,200 miles of canoe routes. Boundary Waters veteran Professor Heinz Fissan states, "I never before and thereafter experienced nature like on the trip to the Boundary Waters 34 years ago."

Join us for a fully outfitted three-day, three-night wilderness canoe camping trip. Everything required other than personal belongings will be supplied. The cost is U.S. $325. More detailed information can be found at www.aaar.org. Cancellations after August 10, 2006, will incur a fee of $75.

Technical Tours

Tuesday, September 12, 2006

There is no charge for the Technical Tours. Complimentary shuttle buses are being provided by the tour hosts. Buses will depart the Crowne Plaza St. Paul Riverfront at 4:00 p.m. and will return by 6:30 p.m. unless otherwise noted. Loading of buses begins at 3:40 p.m. on Tuesday, September 12.

Please note all technical tours and the reception at TSI will require advanced registration.

University of Minnesota Particle Technology Laboratory, Minneapolis, MN
The tour will include three world-renowned centers relating to particle research: the Particle Technology Laboratory, Center for Diesel and Renewable Fuel Research, and the High Temperature and Plasma Laboratory, all located within the Department of Mechanical Engineering at the University of Minnesota. Refreshments will be provided.

Donaldson Company, Bloomington, MN
The Donaldson Company is the leading worldwide provider of filtration systems and replacement parts. The facilities toured will include the Diesel Emissions Laboratory, Analytical Chemistry Laboratory, the Media Laboratory where new materials are produced and tested, and the Donaldson product display room. Refreshments will be provided.

MSP Corporation, Shoreview, MN
MSP welcomes you to tour the facilities where products from its Aerosol Sampling, Pharmaceutical, and Semiconductor Divisions are developed and manufactured. Refreshments will be served. (Departure from MSP Corporation will be at 5:30 p.m.)

3M Company, St. Paul, MN
This tour will visit the Occupational Health and Environmental Safety Laboratories at 3M Company. The tour will include demonstration of 3M's state-of-the-art respirator face-fit testing equipment. A poster session related to Industrial Hygiene, Drug Delivery, and Air Filtration will be provided during the refreshments. (Departure from 3M will be at 5:30 p.m.)

TSI Tour and Open House, Shoreview, MN
TSI welcomes all IAC attendees to its newly renovated facility for an open house and reception. Guided tours start at 4:30 p.m. and will be followed by a reception. The reception will end at approximately 9:30 p.m.

TSI is located in Shoreview, Minn., approximately 10 minutes from downtown St. Paul. Complimentary shuttle bus service will be provided to and from TSI. Scheduled departures between TSI and St. Paul will begin at 6:00 p.m. for those participating in other tours or with other engagements. Unless you also plan to participate in the TSI facilities tour, there is no need to register for the TSI open house reception. Please join TSI for an evening of fun and networking with friends and colleagues.

Social Tours

Tuesday, September 12, 2006
Buses will depart at 4:00 p.m. returning by 6:30 p.m. unless otherwise noted. All social tours cost $20 per person and require a 40 person minimum sign up. Each tour includes the cost of transportation to and from the site and admission.

St. Paul Highlights Tour
The tour will give you an in-depth look at St. Paul, Minnesota's charming historic capital city. Magnificent Art Deco and Victorian reminders of the past nestle next to sleek skyscrapers, giving this capital city an Old World charm.

Important Information (continued)

Transportation

Minneapolis-St. Paul International Airport
Drive time: 15 minutes

Transportation to and from the Minneapolis-St. Paul International Airport
Super Shuttle – The charge is $12 per person each way.
Taxi – The approximate fare is $25 each way.
Bus – City Bus #54 drops passengers off two blocks from the Crowne Plaza St. Paul Riverfront; the maximum charge is $2 each way.

Rental Car
Continental Airline groups and meeting attendees may take advantage of special negotiated rates with Avis and Budget Car Rental. Make sure you mention the discount code when making your reservation.
Avis – 800-331-1600 Discount Code: D086707
Budget – 800-527-0700 Discount Code: T702000

Driving Directions from the Airport
Go east on Highway 5 leaving the airport. Follow Highway 5 to downtown St. Paul. (Highway 5 turns into West 7th Street.) Turn right onto Kellogg Boulevard. Follow Kellogg Boulevard to Wabasha. Turn left onto Wabasha to access hotel parking ramp.

Super Shuttle Information
Super Shuttle is available for transportation from the airport to the hotel. IAC attendees pay a special rate of $12 one-way or $22 roundtrip to or from the Minneapolis-St. Paul International Airport and downtown St. Paul hotels. Please provide discount code: VT6P4. Online reservations are also available and can be made in advance at www.supershuttle.com. This offer is for IAC attendees only and is only valid September 8-15, 2006. Please visit www.aaar.org for more information.

Lindbergh Terminal (Main Terminal)
After collecting your luggage, follow the signs to Hotel Shuttles and Scheduled Vans in ground transportation. There is a Super Shuttle guest service desk near the center of the shuttle area in the Lindbergh Terminal. Please check in with the Super Shuttle agent.

Humphrey Terminal
In the Humphrey Terminal Super Shuttle is located in the ground transportation area across from the terminal on street level. From baggage claim use the courtesy phone to contact the dispatcher who will give further directions. Note: Super Shuttle does not stop automatically at the Humphrey Terminal. Please call for transportation upon arrival.

Reservations must be made for all attendees using Super Shuttle to return to the airport. Please call 1-800-730-9267 for departing service only.

While in St. Paul you will explore Rice Park, Ordway Center for the Performing Arts, Landmark Center, Children's Museum, Mickey's Diner, The Fitzgerald Theater, Minnesota History Center, and the Minnesota State Capitol, considered one of the most beautiful capitol buildings in the United States. You will see the magnificent Cathedral of St. Paul, the fourth largest cathedral in the United States with seating for 3,000 people. Built in the Classical Renaissance style of architecture, the Cathedral dome is modeled after St. Peter's Basilica in Rome.

You will be transported along Summit Avenue, one of the longest stretches of virtually uninterrupted Victorian architecture in the United States. This monumental boulevard of homes, churches, synagogues, and schools attracts tourists and natives alike who stroll past its architectural curiosities and landmarks. Streets like Summit Avenue were not uncommon in the 19th century, but in most American cities, these thoroughfares have completely lost their character to progress, except in St. Paul. Some homes to note along Summit Avenue are the James J. Hill House, the home of F. Scott Fitzgerald, and the Governor's Mansion.

Mall of America®
Mall of America® is one of the most visited tourist destinations in the world. The MOA is the largest fully-enclosed mall in the nation hosting more visitors annually than Disney World and the Grand Canyon combined. With 520 stores, 50 restaurants, the largest indoor family theme park in the country, a 1.2 million gallon aquarium and other exciting attractions, the MOA offers something for every taste and interest. The MOA consists of four "avenues" placed in a square around the theme park centerpiece. At the "intersection" for each of the avenues you will find one of the four anchor stores: Bloomingdale's, Macy's, Nordstrom's, and Sears. If a shopper spent 10 minutes at every store, it would take him/her more than 86 hours to complete the visit to the MOA. A bus returning to the hotel will depart the MOA at 8:30 p.m.

A Hospitality Room will be available on Monday morning followed by hosted transportation for spouses/guests interested in shopping at the MOA.

Meeting Location and Accommodations

Crowne Plaza St. Paul Riverfront
11 East Kellogg Blvd. • St. Paul, MN 55101
Telephone: 651-292-1900 • Guest Fax: 651-605-0189

Located in the heart of downtown St. Paul, the Crowne Plaza St. Paul Riverfront is minutes away from the Science Museum of Minnesota, the Ordway Theater, and the Xcel Energy Center. It is also home to the Twin Cities' only revolving restaurant, the Carousel, located 22 floors above the river.

A block of rooms has been set aside for attendees of the IAC. Make your reservations directly with the Crowne Plaza St. Paul Riverfront by calling 651-292-1900 or 877-227-6963. Be sure to mention the AAAR conference to receive the group rate. Reservations must be made by Friday, August 11, 2006. After August 11, reservations will be taken on a room-and-rate availability basis.

The rate for a standard single/double occupancy room is $144 plus applicable tax which is currently 13 percent.

All reservations require a one-night deposit plus tax payable by a major credit card (the deposit is refundable up to 24-hours in advance of your reservation date). All room type accommodations and other special requests may not be available. If this is the case, the next available room type will be assigned.

Points of Interest
As the capital city of Minnesota, St. Paul is well known for its combination of rich history and modern appeal. Overlooking the Mississippi River, the city has something to offer everyone from historical buildings and fascinating museums to fine dining, must-see attractions, and places to relax.

You'll see how interesting history can be as you tour this charming city. Choose from Historic Cave Tours in St. Paul and Stillwater, the Gangster Tour, Mill City Mob Tour, River and Roots Tour, and Twin Town Tacky Tour to name a few. Be sure to visit the capitol building and Landmark Center as well.

The Science Museum of Minnesota will host the IAC Fuchs Award Reception on Thursday, September 14. You'll enjoy hands-on exhibits, breathtaking giant screen films in one of the world's only convertible dome movie theaters, a state-of-the-art 3D cinema, a science-themed miniature golf course, and more.

Important Information (continued)

St. Paul is the perfect place to shop. Antique stores and boutiques abound and the Mall of America is just minutes away. An eclectic mix of restaurants guarantees there will be something to satisfy every taste. Interested in the great outdoors? St. Paul is well known for its many parks and outdoor recreation, including more than 160 parks, three 18-hole golf courses and bike paths. St. Paul's famous Como Park hosts the Marjorie McNeely Conservatory, a half-acre glass-domed breathtaking botanical garden. The nearby Minnesota Landscape Arboretum encompasses 1,000 acres of rolling hills featuring specialty garden and plant collections.

The St. Paul skyways keep you connected to all of the downtown attractions. Regardless of the weather, these enclosed walkways will take you wherever you need to go.

For more information on the sights to see in St. Paul, visit www.aaar.org or www.visitstpaul.com.

Special Meeting Air Fare
Continental Airlines has been designated as the official carrier for the attendees of the 2006 IAC. Continental Airlines is offering special rates, which allow 2 to 15 percent discounts on published round-trip air fares. An additional 3 percent discount applies to published fares booked online at www.continental.com. Applicable restrictions may apply.

To take advantage of these rates, contact Continental Airlines at 800-468-7022. Outside of the U.S., please call your local Continental Airlines Reservation Office. Please provide the Z Code: ZSCF and Agreement Code: 3J6FMP when making your reservation.

Registration

Instructions
IAC offers a discounted registration fee if you register by Thursday, June 15, 2006. Registration forms, including complete payment, must be received by this date to qualify for the early registration discount. Pre-registration ensures timely processing of your registration and helps avoid lengthy on-site lines. The pre-registration fees are considerably lower than on-site due to the increased costs for on-site registration including equipment, staff, and set-up. Please remember both attendees and presenters are required to pay registration fees.

Registration forms received after Friday, August 11, 2006, will not be processed. All registrations received after this date will be taken to the meeting and processed as on-site registrants. The on-site registration fee will be applied.

Spouse/Guest Registration
A registration fee of $125 will include the following social activities for spouses, other family members, and accompanying persons:

Welcome Reception
Exhibitors' Reception
TSI Open House Reception
Fuchs Reception *(including an all-day pass to the Minnesota Science Museum)*

How to Register

Web
Register on the Web at www.aaar.org. Payment must be made by credit card only. Please note registrations submitted online are not considered complete until the payment has been processed.

Fax
Please complete the registration form, including name and address. Credit card payment must be included to process your registration. Fax completed registration form to Registration Manager, 856-439-0525.

Mail
Please complete the registration form, including complete name and address information. Mail the form along with payment via check (U.S. funds), credit card, or wire transfer information to:
AAAR Registration Manager
15000 Commerce Parkway, Suite C
Mt. Laurel, NJ 08054 USA

NO REGISTRATIONS ACCEPTED VIA TELEPHONE.

Student Registration
Full-time students 18 years of age or older can attend the 2006 IAC for a significantly reduced rate, if the registration is received by Friday, August 11, 2006, and accompanied by a copy of a current class schedule (spring or fall) or an official notification from the university indicating full-time enrollment. These documents should be faxed to AAAR Registration Manager, at 856-439-0525. Registration includes 2007 membership for U.S. students and is optional for international students. NOTE: Post-docs are not eligible to register as students.

Payment
Acceptable payment forms include: checks made payable to AAAR (drawn on a U.S. bank in U.S. dollars), VISA, MasterCard, and American Express. Wire transfers will be accepted for payment, please contact Deanna Bright – dbright@ahint.com for transfer information. If paying by wire transfer, please note that you must include an additional $25 to cover all bank fees. In addition, the name of the bank that is sending the transfer must accompany the registration form. Registration forms without accompanying full payment will be returned for completion. Registration will not be processed without payment.

DO NOT SEND HOTEL DEPOSITS WITH REGISTRATION MATERIAL.

Confirmation of Registration
Once your completed registration is submitted, you will receive an e-mail confirming receipt of your registration. Official confirmations will be sent beginning in June. If you do not receive your confirmation by August 30, 2006, contact the AAAR registration office at 856-439-9080 (extension 4207).

Cancellations/Refunds
To cancel your registration and receive a refund, a written request must be received on or before August 10, 2006. Cancellation requests received by this date will receive a refund less a $75 processing fee. Requests will be processed after the meeting. All requests received after August 10, 2006, will forfeit 100 percent of monies paid. Registrations and tutorials are non-transferable.

Plenary Lectures

The Conference Committee is proud to have five distinguished speakers for the plenary sessions. Each speaker will offer a stimulating and insightful presentation on topics of current and emerging interest to aerosol scientists.

Monday, September 11, 2006
8:00 a.m. – 9:15 a.m.
Assembling Materials and Devices From Nanoscale Building Blocks
Richard W. Siegel

The past decade has seen an explosive growth worldwide in the physical, chemical, and biological synthesis and study of a wide range of nanoscale building blocks with unique properties. The aerosol research community has made significant contributions to this growth. Great strides are now being made worldwide in our ability to assemble these nanoscale building blocks to create advanced materials and devices with novel properties and functionalities. The novel properties of nanostructures are derived from their confined sizes and their very large surface-to-volume ratios. The former gives rise to unique size-dependent properties in the nanoscale (1-100 nm) regime, while the latter gives rise to the ability of nanoscale additions to conventional material matrices to dramatically change the host material's properties. A perspective of this important research area will be presented based upon specific examples from our work in the Center for Directed Assembly of Nanostructures supported by the Nanoscale Science and Engineering Initiative of the National Science Foundation. Examples will be given of directed assembly of nanoparticles, nanotubes, and hybrid structures containing these and biomolecules, to make new materials and devices that possess enhanced mechanical, electrical, optical, and bioactive properties, and multifunctional combinations thereof. The opportunities and challenges facing the worldwide research community in moving forward in this area will be considered.

Biography: Richard W. Siegel is the Robert W. Hunt Professor of Materials Science and Engineering and founding Director of the Nanotechnology Center at Rensselaer Polytechnic Institute. He is also founding director of the National Science Foundation Nanoscale Science and Engineering Center for Directed Assembly of Nanostructures. He graduated from Williams College in 1958 with an AB degree in physics and received an MS degree in physics in 1960 and a PhD degree in metallurgy in 1965 from the University of Illinois in Urbana. Dr. Siegel has been a visiting professor in Germany, Israel, India, Switzerland, and Japan and has been active in local, national, and international professional organizations. He is currently a member of the Nanotechnology Technical Advisory Group of the U.S. President's Council of Advisors on Science and Technology. Dr. Siegel chaired the World Technology Evaluation Center worldwide study on nanostructure science and technology during 1996-1998 that led to the U.S. National Nanotechnology Initiative in 2001. He was also past chairman (1992-1996) of the International Committee on Nanostructured Materials. Dr. Siegel has authored more than 240 publications and several patents (10 issued, 8 pending) in the areas of defects in metals, diffusion, and nanostructured metal, ceramic, composite, and biomaterials. He has presented more than 450 invited lectures around the world and has also edited 10 books on these subjects. He is an Honorary Member of the Materials Research Societies of India and Japan, and a 1994 recipient of an Alexander von Humboldt Foundation Senior Research Award in Germany. In 2001, he was named a RIKEN Eminent Scientist in Japan. Dr. Siegel also received a 2003 Deutsche Bank Prize "Pioneer of Nanotechnology – Nanomaterials" in Germany.

Tuesday, September 12, 2006
8:00 a.m. – 9:15 a.m.
Reinventing the Wheel: New Vistas for Aerosol Measurement
Richard C. Flagan

The core aerosol measurement methods, inertial separation, condensational particle detection, and electrical mobility measurements all have their roots in the 19th century, but only entered common usage in the mid- to late-20th century.

Electronic detection of light scattering enabled further advances: instruments that provided real-time assessments of aerosol concentrations and particle size distributions. The resulting flood of data from these instruments revolutionized aerosol science. Where early investigators examined so-called large ions and Aitken particles in broad classes, the electrical mobility analyzer revealed the multimodal nature of the atmospheric aerosol. Refined cascade impactors displayed the size dependence of the aerosol composition, and with that advance, provided insights into the physical and chemical mechanisms of aerosol particle formation and growth. Manufacturers of aerosol instruments made the improved measurement methods available to the aerosol community at large; no longer were advanced measurement methods limited to those researchers who possessed the resources and skills to build their own.

Standardization reduced differences between measurements, and enabled the atmospheric aerosol to be characterized with rigor that had not previously been possible. Just as the nature of the atmospheric aerosol was revealed, the ideal aerosol measurement was defined, but remained unattainable even while aerosol theory advanced to the limits of available aerosol measurements and beyond.

The dawn of the 21st century brought a new era of invention in aerosol measurement. New generations of instruments expanded routine aerosol measurements into the nanometer size regime, improved resolution of particle size and of the transient nature of the atmospheric aerosol. Near-real-time aerosol chemistry measurements, including determination of the chemical composition of individual aerosol particles, provide new insights into the nature of atmospheric particles; advances in laboratory-based analytical chemistry enhanced specificity in chemical species identification. Combined with advances in statistical data analysis, trajectory modeling, and related simulation methods, these have enhanced the links between sources and the atmospheric aerosol. Long duration measurements of ultra-fine atmospheric particle size distributions that have been enabled by computer-controlled instrumentation have shown that homogeneous nucleation in the atmosphere is not a rare event that can occur only in remote, and very clean environments; instead it has been seen virtually everywhere people have looked for it.

Still, major challenges remain. Aerosol measurements remain the purvue of specialists. Instruments are expensive and required detailed

knowledge to operate. While research-level instrumentation has undergone successive revolutionary developments, routine monitoring of the atmospheric aerosol has remained constrained by legal mandates. First PM10, and, more recently, PM2.5 measurements have become the norm. Sampling networks have provided datasets that facilitated epidemiological studies of the health consequences of atmospheric aerosols, especially fine particles. Observations of aggravated respiratory problems in children who live near freeways where diesel trucks emit large numbers of particles in the low nanometer size range suggest that better data are needed. While legal definitions of air pollution problems are required by regulators, rigorous understanding of the health consequences requires much more. At the same time, epidemiological investigations demand measurements that can be widely deployed and continuously operated without fail; gaps in datasets due to instrument malfunction can seriously jeopardize efforts to unravel health consequences. To meet these needs, aerosol instrumentation must not only be made much more reliable than present laboratory tools, it must also be much less expensive to purchase and operate.

Occupational exposure measurements within the emerging nanotechnology industries face similar challenges. Mass measurements do not adequately assess potential threats of particles can translocate across cell membranes in the lungs to enter the circulatory system and other tissues, or into olfactory neurons through which they may migrate to the olfactory cortex. Differential mobility analyzers can characterize the aerosol, but cannot follow a worker to assess integral exposures.

New approaches that will enable these advances are on the horizon. Radical approaches to aerosol measurement are being developed in laboratories around the world. A number of developments push the limits on resolution of aerosol particle size and chemical composition; aerosol mass spectrometry and condensation-enhanced particle sampling schemes are rapidly expanding our chemical understanding of the atmospheric aerosol. Others are addressing the challenges I have identified above. For example, new particle size analyzers may enable measurements of aerosol nanoparticles to be deployed into the extended networks required by epidemiologists. New sampling methods should facilitate improved chemical and biological characterization of atmospheric particles. By replacing operationally defined metrics, direct measurements promise to reduce the ambiguity in key atmospheric and exposure parameters. This presentation seeks to highlight a number of ongoing developments in aerosol measurement technology, to place those in context with the historical methods that have fostered the development of aerosol science to its present state, and to explore the evolving challenges to the aerosol measurement community.

Biography: Richard C. Flagan is the Irma and Ross McCollum-William H. Corcoran Professor of Chemical Engineering and professor of environmental science and engineering, in the Division of Chemistry and Chemical Engineering, California Institute of Technology, Pasadena. He received his B.S.E., mechanical engineering, University of Michigan, 1969; S.M. and PhD, from the Massachusetts Institute of Technology, in 1971 and 1973, respectively. His research interests are in control of air pollutants, combustion, and aerosol processes. He is a recipient of numerous awards such as an Honorary Doctorate from Lund University, Sweden; and various awards from aerosol societies such as the David Sinclair Award of the American Association for Aerosol Research (1993); Japan Society for the Promotion of Science Fellow (1992); Marion Smoluchowski Award for Aerosol Research presented by the Gesellschaft für Aerosolforschung (1990). He has published extensively and has more than 200 refereed journal publications.

Wednesday, September 13, 2006
8:00 a.m. – 9:15 a.m.
Indoor Aerosols: Do We Need More Data or More Science?
Lidia Morawska

To state that indoor aerosol is different from outdoor aerosol is not a discovery. With the many sources specific to indoor environment and the myriad of factors, as well as physical and chemical processes affecting this environment, the differences are unavoidable. Yet, at times there is very little difference between the characteristics of indoor and outdoor particles: for example for naturally ventilated buildings penetration of particles of all sizes with significance to human heath is almost 100 percent. To develop a complete quantitative understanding of particles in indoor environment, consideration needs to be given to the emissions from indoor sources and penetration of particles from outdoor; the type and operation of the ventilation and filtration system; building characteristics and its operation; and last but not least complex particle dynamic and physico chemistry of the processes occurring indoors.

While outdoor aerosols have been studied for decades, scientific interest in indoor aerosols followed much later and in consequence, there is still less data, knowledge, and quantitative tools available for various types of indoor environments. In general, the assessment and comparison of results from different studies is complicated by large differences in their design, including duration, number of houses investigated, instrumentation used, and thus the measured parameters including particle size ranges. Among other gaps in knowledge, there have been relatively few studies reporting particle number concentration and the scatter of the reported results for size-classified particles is substantial. There is a need to explain and quantify the role of different mechanisms contributing to particle concentration levels and size distribution characteristics in mechanically ventilated large buildings. While there is some data available on indoor source emission factors, the data is still very limited and the variation in emission factors between the same types of sources is substantial; thus predictions through modeling of the level of increase in individual indoor environments is not very reliable. There are a number of existing mathematical models; however, discussion continues about improvements in terms of better model validation, accuracy, input requirements, and also a need for the development of new simulation tools capable of progressing with the new advances in the multi-disciplinary and complex field of indoor environments.

Nevertheless, despite these deficiencies a clearer picture of indoor particles, their concentration levels, trends in the concentrations and the factors affecting them, is emerging. In particular, there is a good understanding of the effect of the outdoor particle characteristics on those encountered indoors for naturally ventilated buildings, and on the relative contributions from the most significant indoor sources to

the indoor particle concentrations. There is an understanding that the short term impact of indoor sources, particularly combustion sources is even stronger on particle number, than on particle mass, and the resulting concentrations can increase by a few orders of magnitude. There is also an increasing understanding on the production of particles through chemical reactions involving vapors and gases, through processes such as reactions between ozone and various terpenes in indoor environments, which have been shown to result in a significant increase in the number and mass concentrations of sub-micrometer particles.

The presentation reviews the state of knowledge regarding the abovementioned and other key aspects of indoor aerosols and outlines the needs and likely future directions of research and applications in this field.

Biography: Lidia Morawska is a professor at the School of Physical and Chemical Sciences, Queensland University of Technology (QUT) in Brisbane, Australia, and the director of the International Laboratory for Air Quality and Health (ILAQH) at QUT, which is a Collaborating Centre of the World Health Organization. She conducts fundamental and applied research in the interdisciplinary field of air quality and its impact on human health and the environment, with a specific focus on science of airborne particulate matter. Dr. Morawska is a physicist and received her doctorate at the Jagiellonian University, Krakow, Poland, for research on radon and its progeny. Prior to joining QUT, she spent several years in Canada conducting research first at McMaster University in Hamilton as a Fellow of the International Atomic Energy Agency, and later at the University of Toronto.

Dr. Morawska is an author of over 150 journal papers, book chapters, and conference papers. She has also been involved at the executive level with a number of relevant national and international professional bodies and has been acting as an advisor to the World Health Organization. She is the immediate past president of the International Society of Indoor Air Quality and Climate.

Thursday, September 14, 2006
8:00 a.m. – 9:15 a.m.
Health Effects of Ambient Particulate Matter
Bret Brunekreef

The health effects of ambient particulate matter (PM) have been subjected to intense research in the last decades. Epidemiological studies have suggested that adverse effects on health occur both after short-term and long-term exposures. The lecture will provide an overview of epidemiologic research methods and findings.

Effects of short-term exposure have been investigated in time series studies, which take advantage of day-to-day or hour-to-hour variations in ambient PM concentrations caused by meteorological phenomena and/or temporal variations in sources e.g. rush hour traffic. The PM 'input' data in such studies are usually derived from routine monitoring stations. As a result, they are constrained to what is monitored (usually regulated metrics such as PM10 or PM2.5, particles smaller than 10 or 2.5 Ìm), and to where it is monitored (often urban background sites). The health 'output' data are also often derived from routinely collecting registries such as death registries or hospital admissions registries. Sometimes, studies are performed among specially selected subjects such as panels of asthma patients, or patients suffering from cardiovascular disease. As the use of data that have been collected already requires relatively few resources, hundreds of time series studies have been published. The collective evidence suggests that effects on mortality and hospital admissions occur at low levels of exposure, i.e. below current air quality guidelines and standards. Much attention has been paid to potential biases such as confounding by weather variables, gaseous air pollution components, and preferential publication of positive findings. Another issue that has been scrutinized is the extent of 'mortality displacement,' i.e. assessment of by how many days or months death is being advanced by exposure to short-term increases in PM pollution. Other biases such as those related to measurement error and to the use of single days to characterize exposure have received less attention.

Effects of long-term exposure have been investigated in a small number of cohort studies. In cohort studies, carefully characterized groups of subjects living in areas with differences in PM exposure are being followed for periods of years to decades. The PM 'input' data again are usually routinely collected data, although there are a few examples of studies with dedicated PM monitoring. The health 'output' data consist of survival of cohort members or development of clinical or sub-clinical disease. Because cohort members are carefully characterized with respect to potential confounding variables such as smoking, diet, occupation etc., cohort studies offer unique opportunities to single out PM effects. To date, only two or three cohort studies exist in the world that have been specifically designed to study long term effects of air pollution including PM. Other studies were started for different reasons, but have been taken advantage of by adding exposure assessment to ambient PM to it. The main cohort studies published to-date suggest that effects on mortality and disease development occur at PM levels below current guidelines and standards, and that the loss of life expectancy associated with PM exposure may be substantial. In view of this, the data from two major U.S. cohort studies (the Harvard Six Cities Study and the American Cancer Society II Study) have been extensively re-analyzed by a team of independent researchers. This re-analysis has generally supported the original findings, but has also found that effects seem to occur primarily in subjects with only high school education or less. Also, the re-analysis suggested that PM effects were not easily distinguishable from effects of some of the gaseous components in ambient air. European cohort studies have focused on within-city contrasts in traffic-related air pollution mixtures, and have shown associations between these mixtures (characterized by nitrogen oxides or soot measurements) and survival.

Epidemiology is a largely observational science, for the obvious reason that experiments on humans can only be performed to a very limited extent. The causality of associations observed in epidemiological studies therefore needs to be addressed carefully. Elements contributing to a causal interpretation include repetition of findings under various circumstances, explanation of differences in findings by plausible differences in exposure to 'effect modifiers,' plausible exclusion of alternative explanations by confounding variables or selection, and support from experimental studies in animals. In view

of the complexity of ambient PM it has been difficult to recreate ambient PM exposures in the laboratory. The use of particle concentrators has provided researchers with a unique tool to study PM effects in the laboratory without artifacts generated by PM collection and re-suspension. Evidence is now emerging from long-term PM concentrator studies that support findings from epidemiology.

The results from the PM cohort studies have now been used in worldwide and European health impact assessment exercises, which in turn have been subjected to cost benefit analyses in support of PM policy development. Both in the U.S. and Europe, PM regulations are being updated in 2006. Also, the World Health Organization is preparing Air Quality Guidelines for worldwide application for the first time. At the conference, a brief overview will be given of the most recent decisions and proposals.

Biography: Dr. Bret Brunekreef is professor of environmental epidemiology and director of the Institute for Risk Assessment Sciences at Utrecht University. Since 2000, he has headed the Environmental and Occupational Health Division of the newly formed Institute for Risk Assessment Sciences (IRAS) at the Utrecht University. Recently, the Institute for Risk Assessment Sciences has absorbed the Department of Food Safety and Veterinary Public Health. Dr. Brunekreef became director of IRAS as of January 1, 2005.

On several occasions, Dr. Brunekreef served as advisor on national and internati¬onal panels in the field of environmental health, including the Dutch National Health Council, of which he is a member, WHO and the U.S. EPA. Dr. Brunekreef is co-author of more than 200 peer reviewed journal articles in the field of environmental epidemiology and exposure assessment.

Friday, September 15, 2006
8:00 a.m. – 9:15 a.m.
Primary Versus Secondary and Biogenic Versus Anthropogenic Organic Aerosol: Grand Challenges in Atmospheric Aerosol Research
Urs Baltensperger

Organic aerosol is either emitted as primary aerosol or formed in the atmosphere as secondary aerosol from gaseous precursors. In both cases, biogenic as well as anthropogenic sources contribute to the overall aerosol loading. Recent developments have substantially improved our understanding in this respect. As an example, carbon-14 analysis is able to distinguish fossil from biogenic carbon. Combined with a discrimination of the water soluble and water insoluble fractions this method offers a great potential in tackling the above challenges. Concerning secondary organic aerosol, the polymerization (or rather oligomerization) processes recently found in simulation chamber experiments have triggered extensive research all over the world. As a result of this oligomerization, larger molecules with a lower vapor pressure are formed. This results in higher yields of secondary organic aerosol, with different chemical and physical features. This in turn may induce substantial changes in the health and climate impact of the atmospheric aerosol. New and innovative interdisciplinary research has a great potential in further improving our knowledge in this exciting field of research.

Biography: Urs Baltensperger is currently head of the Laboratory of Atmospheric Chemistry, Paul Scherrer Institut in Switzerland and a lecturer at ETH Zurich. He studied chemistry at the University of Zurich. Since his PhD thesis, he has been interested in aerosol research, focusing on physical and chemical aerosol characterization, heterogeneous chemistry, and aerosol effects on climate. He is chairman of the Scientific Advisory Group for Aerosol of the Global Atmosphere Watch program of the World Meteorological Organization (WMO), and president of the Commission for Atmospheric Chemistry and Physics of the Swiss Academy of Natural Sciences. He received the Professor Dr. Vilho Vaisala Award of WMO in 2003. He is author or co-author of more than 130 peer-reviewed papers and has supervised about 20 PhD theses.

IAC Tutorials

Sunday, September 10, 2006

First Session: 8:00 a.m. – 9:40 a.m.

1. Introduction to Aerosol Mechanics I

Dr. William C. Hinds, UCLA, School of Public Health, Center for Occupational and Environmental Health, Department of Environmental Health Science, Los Angeles, CA

Abstract: These two courses form a sequence that covers basic aerosol mechanics (particle motion) at an introductory level. Topics include: Stokes law, settling velocity, slip correction, aerodynamic diameter, non-spherical particles, acceleration, relaxation time, stopping distance, impaction, isokinetic sampling, diffusion, and coagulation. The course covers theory and applications and is suitable for those new to the field and for others who want to brush up on the basics.

William Hinds is a professor of environmental health sciences at the UCLA School of Public Health. He received a bachelor's degree in mechanical engineering from Cornell University and a doctorate in environmental health from Harvard University.

2. Aerosol Thermodynamics

Dr. Simon Clegg, School of Environmental Sciences, University of East Anglia, Norwich, U.K.

Abstract: The equilibrium thermodynamic properties of the mixture of acids, salts, and organic compounds present in the atmosphere largely control gas/aerosol equilibrium and the water uptake of soluble aerosol components in response to temperature and relative humidity changes. This course will cover the following fundamentals: the water uptake of different soluble components of aerosols, including organic compounds; the precipitation of solid phases and metastable equilibria; the Phase Rule; Henry's law; the Kelvin effect; and activity coefficients and deviations from ideal solution behavior. There will be some discussion of predictive methods for thermodynamic properties (notably vapor pressures) of atmospheric organic compounds, activity coefficient models for the liquid phase, and the types and sources of data that can be used in these models.

The printed materials for the tutorial will include recommended reading from text books and key papers. Prospective attendees may contact the speaker (s.clegg@uea.ac.uk) regarding their particular interests but should be aware that the tutorial handout is likely to be finalized one to two months prior to the meeting.

Simon Clegg has been a member of faculty at the University of East Anglia since 1998 and has published widely on thermodynamic data and models applied to atmospheric aerosols and other natural waters such as brines. He is the co-developer, with Tony Wexler of U.C. Davis, of the Aerosol Inorganics Model (AIM, ww.uea.ac.uk/~e770/aim.html).

3. Air Pollution Exposure Assessment: Implications for Particulate Matter Epidemiology

Dr. Jeremy A. Sarnat, Department of Environmental and Occupational Health, Rollins School of Public Health of Emory University, Atlanta, GA

Abstract: Most epidemiologic studies examining the health effects from exposure to ambient particulate matter have used measurements from central site monitors as surrogates of corresponding personal exposures. The validity of this practice and its potential for introducing exposure misclassification bias into the observed epidemiologic results has been widely debated. In 1998 the National Research Council recommended that further research be conducted to characterize personal exposures to PM2.5, including its relationship to ambient PM2.5 and other multi-pollutant exposures. To address these issues, several panel studies were designed and conducted that characterized actual multi-pollutant personal exposures throughout the United States and Europe. This tutorial reviews the major results from these exposure studies and summarizes the collective findings for their impact on interpreting particulate matter epidemiologic studies. Directions for future exposure assessment and epidemiology research, including characterizing personal exposures to chemically- and size-resolved PM2.5, will also be discussed.

Jeremy Sarnat is an assistant professor at the Rollins School of Public Health of Emory University specializing in characterizing personal exposure to criteria air

pollutants. He received his master's degree in environmental risk assessment and doctorate in environmental exposure assessment from Harvard University.

4. Aerosol Characterization using Plasma Spectrochemistry

Drs. Martin M. Shafer and James J. Schauer, Environmental Chemistry and Technology Program, University of Wisconsin-Madison, Madison, WI

Abstract: Detailed elemental and chemical speciation analysis of aerosol particulate matter (PM) can provide valuable information on PM sources, transformations, and climate forcing. Certain PM sources may best be resolved using trace metal signatures, and elemental fingerprints can supplement and enhance molecular maker analysis of PM for source apportionment modeling. In the search for toxicologically relevant components of PM, health studies are increasingly demanding more comprehensive characterization schemes. It is also clear that total metal analysis is at best a poor surrogate for the bioavailable component, and analytical techniques that address the labile component or specific chemical species are needed.

However, traditional analytical techniques (XRF, PIXIE, INAA) that have been widely applied in the past to determine the elemental composition of PM do not have the required sensitivity and accuracy to quantify the full suite of trace elements in the microgram masses of samples typical of many fine particle collections. This state of affairs is exacerbated by the current trend toward even smaller sample sizes that is being driven by (1) particle size-resolved sampling; (2) personal sampler collections; and (3) fine temporal scale (1-4 hr) sampling.

Inductively-Coupled Plasma Mass Spectrometry (ICP-MS) is emerging as a powerful tool for the determination of the elemental composition and chemical speciation of atmospheric aerosols. In addition to exhibiting extreme sensitivity and high signal to noise, the technique offers other unique capabilities including: high precision, extremely wide dynamic range, a large element menu, and elemental isotopic capability. These features significantly advance the state-of-the art (making it the method of choice for most applications) over traditional aerosol analysis techniques. However, full realization of these advantages is contingent upon several key factors as prerequisites:

1. Full integration of clean techniques into collection/processing/analysis methods;
2. Application of efficient, unbiased, and precise solubilization methods; and
3. Minimization of polyatomic interferences in the ICP-MS analysis.

This tutorial will address each of these three areas in detail, providing practical solutions and recommendations for a variety of real-world applications. It will be stressed that ultra-trace ICP-MS analysis cannot be performed in isolation, but must be part of a complete package of contamination and interference control. The importance and practical implementation of method blanks and use of standard reference materials in protocol validation will be covered. Metrics of ICP-MS performance will be compared with those from more traditional methods as specifically relates to ambient aerosol characterization.

Contamination control strategies for specific steps (substrate preparation, field sampling, post-collection processing, and ICP-MS analysis) of the overall method will be discussed. Lack of suitable solubilization methods for the complete suite of elements comprising atmospheric particulate matter has been a barrier to the use of solution nebulization techniques, including ICP-MS, for the analysis of aerosols. Concerns have included extraction efficiency, volatilization losses, contamination, and issues of dilution and sensitivity. This short course will detail digestion protocols that our research group (and others) have developed to effectively address these issues. Microwave-based methods will be emphasized. Various "selective" dissolution approaches for aerosols will also be covered – focusing on methods that target the labile metals/components. A host of interference control approaches for ICP-MS analysis will be discussed, including: (1) the use of high efficiency desolvating nebulizers; (2) collision/reaction cell ICP-MS; and (3) high mass resolution ICP-MS.

The tutorial will conclude with a discussion of several advanced applications of ICP-MS in the context of aerosol

characterization. These will include chemical speciation analysis (oxidation state speciation, HPLC-ICP-MS), high precision isotope ratio analysis and applications, and direct solids/particle analysis using laser-ablation-ICP-MS.

Second Session: 10:00 a.m. – 11:40 a.m.

5. Introduction to Aerosol Mechanics II

Dr. William C. Hinds, UCLA, School of Public Health, Center for Occupational and Environmental Health, Department of Environmental Health Science, Los Angeles, CA

Abstract: These two courses form a sequence that covers basic aerosol mechanics (particle motion) at an introductory level. Topics include: Stokes law, settling velocity, slip correction, aerodynamic diameter, non-spherical particles, acceleration, relaxation time, stopping distance, impaction, isokinetic sampling, diffusion, and coagulation. The course covers theory and applications and is suitable for those new to the field and for others who want to brush up on the basics.

William Hinds is a professor of environmental health sciences at the UCLA School of Public Health. He received a bachelor's degree in mechanical engineering from Cornell University and a doctorate in environmental health from Harvard University.

6. Atmospheric Nucleation

Dr. Markku Kulmala, University of Helsinki, Department of Physical Sciences, Helsinki, Finland

Abstract: In order to be able to better understand the health and climatic effects of atmospheric aerosols, the formation and growth processes of atmospheric aerosols should also be better understood. Nucleation, the formation of ultrafine particles detected at a few nm, and subsequent growth to ~100 nm in 1-2 days, has been observed frequently all around the world, particularly in the continental boundary layer. Such observations span from Arctic and Antarctic areas, over the remote boreal forest, and urban and suburban areas in Scandinavia, to industrialized agricultural regions in Europe and North America, to coastal environments around Europe, and to Asian and American megacities. Our recent overview summarized the formation and growth properties from a global point of view, quantifying especially the formation and growth rates of nucleation events where available. It has been proposed and also observed that atmospheric new particle formation depends on the sulfuric acid concentration. On the other hand some observations support the idea that atmospheric ions are participating in new particle formation. In this tutorial, different atmospheric nucleation mechanisms - including barrierless (kinetic), binary, ternary and ion induced nucleation as well as recently proposed cluster activation mechanisms - are explained and compared with atmospheric observations and laboratory experiments.

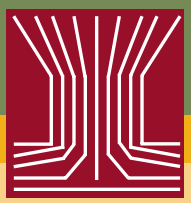
Markku Kulmala is an academy professor and professor in physics at University of Helsinki, Finland. He acts also as a director of the Division of Atmospheric Sciences in the Department of Physical Sciences in Helsinki. He received master's and doctorate degrees in physics from the University of Helsinki.

7. Human Aerosol Exposure: Toward a Mechanistic Understanding

Dr. William W Nazaroff, Department of Civil and Environmental Engineering, University of California, Berkeley, CA

Abstract: This tutorial explores the relationships between particle sources and human inhalation exposure. The tools and techniques are those of the physical sciences and engineering, stressing causal connections. The lecture draws on key chemical and physical knowledge from atmospheric aerosol science. Focusing on human exposure as the outcome of concern leads to an emphasis on the proximity between sources and receptors. Most exposure occurs while people are in enclosed spaces, so issues that influence indoor aerosols enter strongly into this lecture.

William Nazaroff is professor of environmental engineering and chair of the Energy and Resources Group at UC Berkeley. His research group studies indoor air pollutant chemistry and physics. They also develop and apply methods for assessing human exposure to air pollutants from major exposure sources, such as motor vehicles, power plants, and cigarettes. Dr. Nazaroff earned a PhD in environmental engineering science at Caltech (1989).



IAC Tutorials

8. Basics of Light Absorbing Carbon
Dr. Tami C. Bond, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, Urbana, IL

Abstract: Although carbon particles contain thousands of compounds, one type of carbon is routinely separated in modeling and analysis: the kind that appears black because it absorbs light strongly. What makes this compound so special? This tutorial will briefly discuss flame formation and important sources of light-absorbing carbon. Carbon that absorbs light weakly will also be covered. I will review factors that affect absorption and scattering by these particles, including changes that occur during the time between emission and removal. This discussion leads to an overview of the role of black particles in the Earth's radiative balance. Finally, I will review common measurement methods, with particular emphasis on how light absorption can aid in or confound interpretation.

Tami Bond earned bachelor's and master's degrees in the combustion side of mechanical engineering before her interdisciplinary PhD from the University of Washington (atmospheric sciences, mechanical engineering and civil engineering). She was a NOAA Climate and Global Change Post-doctoral Fellow and is now an assistant professor at the University of Illinois. Most of her research involves measuring and estimating emissions for climate applications. She still likes to burn things.

Third Session: 1:00 p.m. – 2:40 p.m.

9. Aerosol Sampling and Transport
Dr. John E. Brockmann, Principal Member, Technical Staff, Sandia National Laboratories, Albuquerque, NM

Abstract: It is desirable that the sampled aerosol be representative of the aerosol in its original environment. Sampling and transport can alter the ambient aerosol distribution. This tutorial will provide the tools to evaluate aerosol sampling and transport systems. The mechanisms that enrich or deplete particle concentration will be identified and discussed, and correlations from the literature will be given.

Dr. Brockmann received his PhD in mechanical engineering from the University of Minnesota in 1981 and works at Sandia National Laboratories. His areas of research include nuclear aerosols, microcontamination, particle sampling and transport, and instrumentation.

10. Measurements of Aerosol Radiative Properties
Dr. John A. Ogren, Physical Scientist, NOAA Earth System Research Laboratory, Boulder, CO

Abstract: This tutorial will cover the methods used for measurement of aerosol radiative properties, with an emphasis on in-situ measurements of aerosol light scattering, absorption, and extinction coefficients. Approaches for determining the dependence of these properties on particle size, wavelength, and relative humidity will be described, along with an overview of the results from their application in NOAA's long-term aerosol monitoring program.

Dr. Ogren received his PhD in 1983 from the University of Washington. He leads NOAA's long-term aerosol monitoring program, which emphasizes the radiative properties of aerosols.

11. Biokinetics and Toxicology of Nanoparticles
Dr. Günter Oberdörster, Professor of Toxicology, University of Rochester, Department of Environmental Medicine, Rochester, NY

Abstract: The rapidly developing field of nanotechnology holds many promises and benefits for developments in structural engineering, electronics, optics, consumer products, alternative energies, soil and water remediation and nanomedicine. However, engineered nanoparticles (NP, <100 nm) are also likely to result in human exposure through inhalation, ingestion, skin uptake, and injection of engineered nanomaterials. Information about safety and potential hazards is urgently needed. The new field of nanotoxicology, which can be defined as safety evaluation of engineered nanostructures and nanodevices, addresses this need by identifying NP-cell interactions through specific in vivo and in vitro tests. When inhaled, certain sizes of NP are efficiently deposited by diffusional mechanisms in all regions of the respiratory tract. The small particle size facilitates uptake into cells, transcytosis across epithelial and endothelial cells into the blood and lymph circulation to reach potentially sensitive target sites such as bone marrow, lymph nodes, spleen, and

heart. Access to the central nervous system and ganglia via translocation along axons and dendrites of neurons has also been observed. NP penetrating the skin distribute via uptake into lymphatic channels. Endocytosis, and biokinetics are largely dependent on NP surface chemistry (coating) and in vivo surface modifications. The greater surface area per mass compared to larger-sized particles of the same chemical structure renders NP more active biologically. This activity includes a potential for inflammatory and pro-oxidant, but also anti-oxidant, activity. Evidence of mitochondrial distribution and oxidative stress response following NP endocytosis points to a need for basic research about their interactions with subcellular structures. Considerations for assessing safety of engineered NP include careful selections of appropriate and relevant doses/concentrations, the likelihood of increased effects in a compromised organism, and the development of new specific tests. This should be balanced with the benefits of possible desirable effects in medical and other applications. An interdisciplinary team approach (e.g., toxicology, materials science, medicine, molecular biology, and bioinformatics, to name a few) is mandatory for nanotoxicology research to arrive at an appropriate risk assessment.

Dr. Oberdörster received a DVM in veterinary medicine and PhD in pharmacology from the University of Giessen, Germany.

12. Secondary Aerosol Formation

Dr. Paul J. Ziemann, Air Pollution Research Center and Department of Environmental Sciences, University of California, Riverside, CA

Abstract: Secondary aerosol is an important component of atmospheric fine particles that generally consists of organics, sulfates, and nitrates. The processes that lead to the formation of this material are often complex, and can involve gas- and particle-phase chemistry, nucleation, and gas-particle partitioning. In this course, I will discuss the major chemical reactions and partitioning processes involved in the formation of secondary organic and inorganic aerosol (with a strong emphasis on organic aerosol) using examples from laboratory and field studies.

Paul Ziemann is an associate professor of Atmospheric Chemistry at the University of California, Riverside. He received a doctorate in chemistry from Penn State University and was a postdoctoral researcher in the Particle Technology Laboratory at the University of Minnesota.

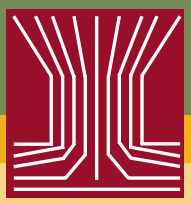
Fourth Session: 3:00 p.m. – 4:40 p.m.

13. Preparation of Nanoparticles and Nanostructured Powders by Spray Method for Their Applications in Nanotechnology

Dr. Kikuo Okuyama, Department of Chemical Engineering, Graduate School of Engineering, Hiroshima University, Higashi-Hiroshima, Japan

Abstract: Recently nanoparticles and nanostructured powders are attracting a great interest in science and engineering as functional materials for use in electronics, biotechnology and so on. Spray methods are promising routes to produce single and multicomponent nanoparticles and nanostructured powders. In this Tutorial, I would like to talk about: 1) General scope of particles preparation by spray pyrolysis and spray drying methods; 2) Preparation of nanoparticles using physical and chemical methods (electrospray pyrolysis, low-pressure expansion method and so on); 3) Dispersing technology for agglomerated nanoparticles; 4) Preparation of ordered porous powders as well as particles composite by spray drying method; 5) and finally, The application of nanoparticles and nanostructured powders in nanotechnology.

Prof. Kikuo Okuyama is the professor in the Department of Chemical Engineering, Graduate School of Engineering at Hiroshima University. He received his BS (1971) and MS (1973) degrees in chemical engineering from Kanazawa University, and he received his doctorate of engineering (1978) in chemical engineering at University of Osaka Prefecture. He is the president of the Japan Association of Aerosol Science and Technology (JAAST), and serves as the editor of the Journal of the Society of Powder Technology Japan, Journal of Nanoparticle Research and Aerosol Science and Technology.



IAC Tutorials

14. Aerosol Technology for Drug Delivery

Dr. Warren Finlay, University of Alberta, Department of Mechanical Engineering, Edmonton, AB, Canada

Abstract: The number of technologies under development for delivering therapeutic aerosols to the respiratory tract has increased dramatically in recent years, yielding a surprisingly large array of aerosol delivery devices and formulations. However, the fundamental principles governing these systems are relatively few, and understanding these principles allows the scientist or engineer to much more easily understand the many competing pharmaceutical aerosol delivery systems. The focus of this tutorial is thus on the underlying mechanics of inhaled pharmaceutical aerosol delivery devices, including existing aqueous systems, dry powder inhalers, propellant driven metered dose inhalers, as well as new systems under development.

Warren Finlay is a professor of mechanical engineering at the University of Alberta, where he holds the distinguished title of Killam Annual Professor. He received bachelor's and master's degrees in electrical engineering from the University of Alberta and a doctorate in mechanical engineering from Stanford University. He is the author of the book Mechanics of Inhaled Pharmaceutical Aerosols, Academic Press, 2001.

15. Instrumentation and Theory of Cloud Condensation Nuclei Measurements

Dr. Athanasios Nenes, Georgia Institute of Technology, Schools of Earth and Atmospheric Sciences and Chemical and Biomolecular Engineering, Atlanta, GA

Abstract: The past few years have seen a significant and growing interest in measuring the potential of aerosols to act as cloud condensation nuclei (CCN). Numerous techniques over the years have been developed for this purpose; they all involve exposing an aerosol sample to a controlled water vapor supersaturation and optically detect the size and concentration of droplets that form. We will review the diverse set of designs and detection approaches, as well as theoretically analyze the methodology embodied by each CCN instrument. Results from laboratory and field experiments will be presented to demonstrate the capabilities of these instruments and highlight their importance for quantitative understanding of aerosol-cloud interactions.

Athanasios Nenes is an assistant professor in the Schools of Earth and Atmospheric Sciences and Chemical and Biomolecular Engineering at the Georgia Institute of Technology. He received a diploma in chemical engineering from the National Technical University of Athens, a master's degree in atmospheric chemistry from the University of Miami, and a doctorate in chemical engineering from the California Institute of Technology.

16. Making Use of Satellite-derived Aerosol Amounts, Distributions, and Properties

Dr. Ralph Kahn, Jet Propulsion Laboratory, Caltech, Pasadena, CA

Abstract: Space-borne instruments are providing increasing amounts of data relating to global aerosol spectral optical depth, horizontal and vertical distribution, and micro-physical properties. The data sets, and many of the underlying techniques, are new. They represent a vast amount of information, potentially useful to the AAAR community. However, there are also issues, some quite subtle, that scientific users must take into consideration. This tutorial will provide one view of the answers to the following four questions: 1.) What satellite-derived aerosol products are available?; 2.) What are their strengths and limitations?; 3.) How are they being used now?; and 4.) How might they be used in conjunction with each other, with sub-orbital measurements, and with models to address cutting edge aerosol questions?

Ralph Kahn is a principal scientist in the Earth and Space Sciences Division at JPL. He is the aerosol scientist for the Multi-angle Imaging SpectroRadiometer (MISR) instrument, which flies aboard the NASA Earth Observing System's Terra satellite. Kahn received his PhD in applied physics from Harvard University.

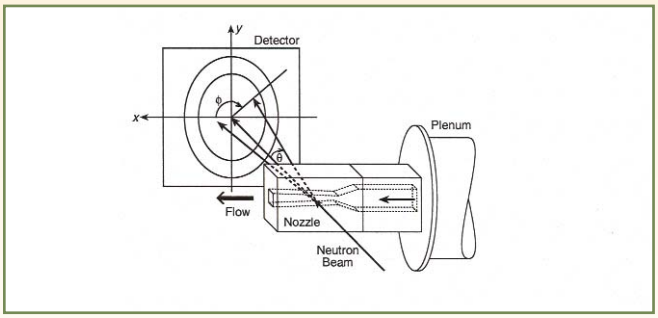
Special Symposia

In addition to several high quality technical sessions, tutorials and plenary lectures, there will be a series of specialty symposia.

Nanoparticle-related Symposia

A series of four symposia will be held in addition to the various technical sessions discussing various aspects of nanoparticle science and technology.

- **Non-invasive Scattering Techniques for Nanoaerosol Characterization: Neutrons, X-Rays, and Light**
  Organizers: Barbara Wyslouzil and Chris Sorensen



Scattering of waves, be they electromagnetic, as light or x-rays, or neutrons, is the primary means by which science has determined the microscopic structure of matter. In aerosol science light scattering has been the primary scattering method used to detect and measure the morphology of the constituent particles. As science and technology delve into the nanometer regime, light scattering becomes insufficient for useful detection and measurement of nanometer-sized particles. Thus new radiation sources and concomitant experimental technologies must be developed if wave scattering probes are to continue to be of great benefit to aerosol studies as they have been in the past. New sources and technologies appropriate for nanoscale aerosol scattering studies are currently being developed. These include synchrotron light sources in the x-ray and VUV wavelength ranges (0.2 to 200nm) and high flux neutron sources. These represent new and growing technologies leading to groundbreaking experimental methods. This symposium will bring together scientists who are either using these new devices or have interest to do so in order to: 1) exchange ideas and thus advance the field and 2) inform and educate other scientists, especially young scientists, of the opportunities, facilities, and methods available in this burgeoning area.

- **Nanoparticle Dosimetry, Toxicology, and Cellular Interactions (Jointly with ISAM)**
  Organizers: Chong S. Kim, Wolfgang Kreyling, and Marianne Geiser

The overall goal of this symposium is to address the importance of emerging nanoparticle technology, particularly related to effects on health. With hundreds of tons of nanomaterials already being made worldwide, potential impact of exposure to these tiny materials on health is enormous and yet is largely unknown. To highlight the impending issues, the symposium will be organized with three sessions: 1) transport and deposition of nanoparticles in the respiratory tract (nanoparticle dosimetry), 2) cellular interactions with nanoparticles and 3) biological responses and toxicological effects. Both in vivo and in vitro experiments, mathematical models and computer simulation studies will be put together such that the symposium may serve as a forum for a broad aspect of nanoparticles in health. The symposium is sponsored jointly with International Society for Aerosols in Medicine and international experts in the featured topics will be invited as a lead speaker.

- **Nanomaterials and Occupational Health**
  Organizers: Mark D. Hoover, Andrew Maynard, and Chuen-Jinn Tsai

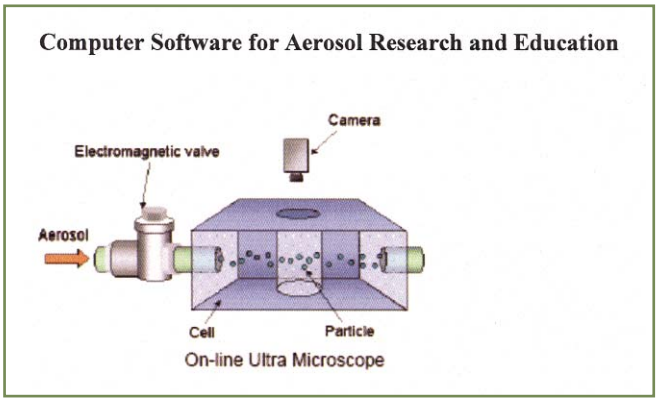
The purpose of the Special Symposium on Nanomaterials and Occupational Health is to highlight research gaps, recent advances, and ongoing occupational health activities in aerosol science and technology related to the toxicity, health effects, exposure assessment, measurement, control, surveillance, risk assessment, risk management, and application of nanomaterials and nanotechnologies. Particular emphasis will be on accomplishments and opportunities for members of the International Aerosol Research Assembly to contribute to the methods validation, information sharing, and partnering aspects of aerosol science and technology for safe nanotechnologies. The format will include invited speakers and poster topics, submitted platform and poster presentations, and discussion sessions. Case studies describing workplace experiences and practices and measured particle characteristics are especially encouraged.

- **Industry Forum on Nanoparticle Science and Technology**
  Organizers: Sheldon Davis and Pratim Biswas

The goal of this symposium is to have a forum to discuss industry needs in nanoparticle science and technology, and how aerosol scientists can contribute to the progress. The forum will be include presentations by representatives from various industrial sectors – such as catalysis, powder production, chemicals production, microelectronics, and others. Presentations will provide a holistic view of the field as seen by industrial researchers. It is planned to organize a panel discussion to promote discussion and encourage audience participation.

Computer Software for Aerosol Research and Education

Organizers: Chang-Yu Wu and Kikuo Okuyama



Computer software is an important tool that provides researchers unforeseen insights into the aerosol system and helps them understand the dynamic behavior of aerosols. It offers possibilities of being used as an educational tool that can help students visualize complex aerosol systems and/or learn how to operate instruments in a virtual environment. Advances in information technology in recent years have greatly diversified the use of computer software in aerosol research and education. The goal of this symposium is to provide a mechanism that catalyzes the development and dissemination of such efforts.

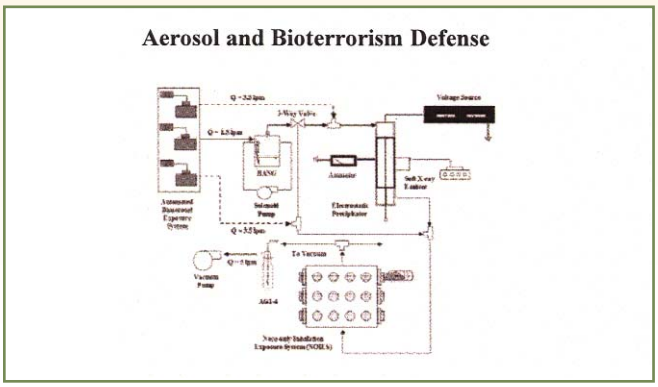
Special Symposia

The symposium will be run in three formats with presentations via platform sessions, poster sessions, and actual demonstration via computer stations. Topics of interest include various types of software and assessment methodologies, such as (but not limited to): Aerosol Mechanics; Virtual Instruments; Data Inversion; Aerosol Dynamics; Simulation Methods; Visualization; Aerosol Chemistry; Lab Preparation; Health/Environmental Risk Assessment, and others. In addition, the plan is to discuss funding opportunities and publication mechanisms in the symposium.

Aerosol and Bioterrorism Defense

Organizers: Sergey Grinshpun and Ed Steubing

The goal of this symposium is to include a series of presentations related to the issues of homeland security and bioterrorism defense. Aerosol science and engineering can make significant contributions in the detection of bioagents and develop technologies for remediation. A series of presentations will discuss novel, real-time methods for detection of bioagents, their characterization and devices for capture and inactivation.



Third Symposium on the History of Aerosol Science

Organizer: David S. Ensor

Friday, September 8 and Saturday, September 9, 2006
8:30 a.m. - 5:00 p.m.

This pre-conference symposium will bring together researchers who will discuss the evolution of the field of aerosol science and engineering. Presenters will provide a historical perspective of the field and describe the work of giants, evolution of the scientific concepts, and instruments. The purpose of the History of Aerosol Science Symposium will be to gather material for the third volume in the *History of Aerosol Science* series. The symposium will include 24 platform papers contributed from a cross-section of the international community. Historical items, such as instruments and books, will be on display during the symposium.

A separate registration fee of $140 is required to attend the symposium. Please register on the enclosed registration form.

Sponsorship Information

There are several opportunities available for sponsorship at the IAC. More than 1,000 attendees from all over the world are expected and would provide significant publicity to the sponsoring organization. Please note some of the items are on a first-come, first-served basis.

For information on specific sponsorship opportunities or advertising, please contact Amy Williams at 856-642-4417, e-mail awilliams@ahint.com or visit the Web site www.aaar.org.

Preliminary Schedule of Events

Friday, September 8	
8:30 a.m. – 5:00 p.m.	History of Aerosol Science
Saturday, September 9	
5:00 p.m. – 9:00 p.m.	Registration
8:30 a.m. – 5:00 p.m.	History of Aerosol Science
8:30 p.m. – 9:30 p.m.	Student Assistant Orientation
Sunday, September 10	
7:00 a.m. – 8:00 p.m.	Registration
8:00 a.m. – 5:20 p.m.	Tutorials 1-16
12:00 p.m. – 5:00 p.m.	Exhibitor/Poster Set-up
6:30 p.m. – 8:30 p.m.	Welcome Reception and Exhibit/Poster Preview
Monday, September 11	
7:00 a.m. – 6:30 p.m.	Registration
8:00 a.m. – 9:15 a.m.	Plenary Session #1
9:00 a.m. – 5:00 p.m.	Exhibits/Posters Open
9:40 a.m. – 5:20 p.m.	Platform Sessions
6:30 p.m. – 8:30 p.m.	Exhibitor Reception
Tuesday, September 12	
7:00 a.m. – 5:30 p.m.	Registration
8:00 a.m. – 9:15 a.m.	Plenary Session #2
9:00 a.m. – 3:30 p.m.	Exhibits/Posters Open
9:15 a.m. – 11:20 a.m.	Continental Breakfast and Poster Session 1
11:20 a.m. – 3:40 p.m.	Platform Sessions
3:40 p.m. – 6:30 p.m.	Industry Tours/Social Tours
Wednesday, September 13	
7:00 a.m. – 5:30 p.m.	Registration
8:00 a.m. – 9:15 a.m.	Plenary Session #3
9:00 a.m. – 5:30 p.m.	Exhibits/Posters Open
9:40 a.m. – 5:20 p.m.	Platform Sessions
6:30 p.m. – 11:00 p.m.	IAC Dinner (Off-site/Ticketed Event)
Thursday, September 14	
7:00 a.m. – 4:00 p.m.	Registration
8:00 a.m. – 9:15 a.m.	Plenary Session #4
9:00 a.m. – 3:00 p.m.	Exhibits/Posters Open
9:15 a.m. – 11:00 a.m.	Continental Breakfast and Poster Session 2
11:20 a.m. – 3:40 p.m.	Platform Sessions
3:00 p.m. – 9:00 p.m.	Exhibits/Posters Move-out
5:30 p.m. – 12:00 a.m.	Fuchs Award and Reception (Off-site Event)
Friday, September 14	
7:00 a.m. – 2:00 p.m.	Registration
8:00 a.m. – 9:15 a.m.	Plenary Session #5
9:40 p.m. – 5:20 p.m.	Platform Sessions

**Schedule is subject to change. Please check your final program at the conference for exact times and locations.*

Special Needs and Requests

Individuals with any special needs such as letters for visas, letters of invitation, or other special requests should contact the AAAR Office at info@aaar.org. As a large number of international attendees are expected, please provide sufficient time (at least two weeks) for the office to get back to you.

KEY DATES

- Early Bird Registration Deadline: **June 25, 2006**
- Hotel Reservation Deadline: **August 8, 2006**

We would like to thank the following sponsors for their generous support of the IAC. (as of 5/1/06)

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