



# American Association for Aerosol Research

## PARTICULARS

Winter 2011

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## Letter from the Editor

Sherry Hunt, U.S. EPA

Welcome scientists to the latest update from AAAR. When I was invited to be part of the Particulars team two years ago, I started to think about scientific communication, and the purpose and goals of this newsletter. I think the communication of science is one of the most fun and challenging parts of our jobs. Without good communication, we cannot build on the work of others and we struggle to convince people that our own work deserves attention.

Luckily, scientists are a fun group of people to communicate with. I see this newsletter as an opportunity to communicate within our field, and I'm hopeful that it will provide other AAAR members with interesting science tidbits for further investigation and conversation. You'll also find research results and impacts, and some updates on policy that results from this work.

This is also a forum for keeping members up to date on the latest in our association, which is why we include messages from the President, the Meeting Chair and other important announcements. In order to continue as a member within AAAR, many of our younger members either need to figure out how to get a job or how to get funding for their fabulous research ideas. We're trying to address both with new stories on careers and funding tips. Throughout the year, we will continue to add new features to the Particulars. Let us know if you like them.

Looking back through the Particulars Archives, I really enjoyed the Limerick Contest that was held by past editor Mike Hannigan back in 2005. Although I don't consider myself a good judge of poetry, I do love to collect insights and ideas from the many experts and creative people in our field. Consequently, I'm asking AAAR members to join me in imagining what the future might bring in terms of questions or advances in aerosol science.

***You can participate by sending me (in 300 words or less) your ideas about the Future of Aerosol Science before February 15, 2012.*** Why would you do this? This is your chance to influence the future

by communicating your ideas to the huge audience of this newsletter. This is your chance to change the world by planting seeds in young scientists. This is your chance to have your winning vision of the future printed in the next issue of the Particulars.

Some of you may recall that Mike offered the winner of the Limerick Contest a chance to share a beer with him at a future AAAR meeting. In an effort to demonstrate the class in our field, I am offering the winner, a chance to drink a glass of wine with AAAR's resident wine and web expert, Donald Dabdub (provided he returns my call to confirm this.) In addition, you will have the opportunity to share your ideas with the world and keep them preserved in the Particulars archive for at least as long as this organization maintains its web contract.

By the way, I'm very thankful to both of my co-editors Tom Peters and Kathy Erickson, as well as Deanna, for listening to all of my ideas and trying to help me put at least some of them into action.

I hope to hear from you.

Regards,  
Sherri Hunt  
Hunt.sherri@epa.gov

## President's Message

**William W. Nazaroff**

AAAR is a strong association with a bright future. Among its major assets: (a) the aerosol research remains interesting, challenging, and important; (b) AAAR is well structured and in a sound financial state; and (c) many AAAR members actively and skillfully serve the association.

Aerosol science and technology is richly complex and highly relevant. Important phenomena occur across a broad range of scales. Dominant aspects of the underlying science are well understood. However, application of these principles to salient aerosol issues remains challenging both in fundamental aerosol science and also for application across diverse arenas. Nucleation, phase partitioning, and light scattering are basic phenomena where advances are still occurring at a steady rate. Technological achievements, especially related to instrumentation and information management have opened vast new vistas. In the atmospheric environment, we've seen game changing advances in our understanding of ultrafine particles, of semivolatile organics as components of airborne particulate matter, and of the many roles played by airborne particles influencing climate. It is an exciting time to be an aerosol scientist.

AAAR's early leaders created an outstanding organizational structure. One strong feature: responsibilities are broadly distributed and clearly defined. Many are needed to serve and yet none of the jobs are too difficult to execute. Multiyear appointments for committee membership and for elected office serve us well. With overlapping terms and gradually increasing responsibilities, new leaders can learn by observing. The system promotes a good balance between continuity and stability on the one hand and flexibility and adaptability on the other. Association Headquarters, which provides our management and support staff, also has served AAAR well.

Last summer, one of my responsibilities as Vice President was to prepare a slate of nominees - 19 in all - to rotate onto AAAR's standing committees. I consulted with committee chairs and with other senior colleagues to help identify younger members of AAAR who have shown early signs of developing into future leaders. Many excellent nominations were put forward - more even than the large number of openings. Among those I asked to serve, a very high proportion said "yes."

AAAR's mission is to "promote and communicate technical advances in the field of aerosol research." During my term as president, I will focus on further strengthening AAAR's already excellent core elements for communicating technical advances. Primary vehicles for these are our conferences and our journal.

In October 2011, we met in Orlando for AAAR's 30th Annual Conference. A highlight for me was Chris Sorenson's outstanding Friedlander Plenary Lecture on fractal aggregates ("I love the smell of physics in the morning..."). Thanks to Lynn Russell for her excellent achievements as conference chair. We're

anticipating another great conference in Minneapolis, 8-12 October 2012, with Sergey Nizkorodov as chair.

Under the auspices of the International Aerosol Research Assembly (IARA), an international aerosol conference (IAC) is convened every fourth year. It has become customary to rotate the venue between Europe, Asia and North America. AAAR last hosted the IAC in St. Paul in 2006. We are currently working on a proposal to IARA to host the International Aerosol Conference in St. Louis in 2018 under the leadership of Pratim Biswas. In late October 2011, Ann Mitchell (AAAR's conference manager) and I met with Pratim to visit America's Center, the proposed site, in downtown St. Louis. Overall, I was favorably impressed with all major aspects of this site and city as a venue for IAC 2018. For the quality of the conference facilities and the city setting, I'm confident that the experience of attending IAC 2018 in St. Louis will be judged to be as good or better than the best of our current annual conference sites.

In other conference-related developments, we recently added a feature to the conference web site that allows presenters to post PDF copies of a poster or of their platform-presentation visuals for open viewing after the conference. Tyler Beck championed the initiative when he was on the AAAR Board; Donald Dabdub, who also manages the conference abstract submission system, implemented it. Check out the site here: [http://aaarabstracts.com/2011/list\\_of\\_uploaded.php](http://aaarabstracts.com/2011/list_of_uploaded.php). Authors have uploaded approximately 80 files from presentations at the 2011 annual conference. Donald reported that during a recent 10-day period, there were 341 unique visitors to the site.

Some concerns have been expressed recently about photographic or video recording in the conference technical sessions. In October 2011, the Board approved (again, as it happens) a "no recording" policy for conferences. We'll do a better job in the future of publicizing that ban. The primary purpose is to have the conference be a venue where people share as openly as possible their latest research results, even while that work is still in progress, without worrying that their findings will be used by others before they have had a chance to put them in final form.

Our journal, *Aerosol Science and Technology* is doing very well with Pete McMurry continuing his distinguished service as Editor-in-Chief. AAAR is in the strong position of owning the journal content, which we make freely available one year after publication. We have a good working relationship with Taylor & Francis (T&F) with whom we contract to publish the journal. As I write in early December 2011, we are in the late stages of negotiating the terms of a new publishing contract with T&F to continue publishing AS&T. One change to anticipate: the default subscription will provide for electronic-only access beginning in 2013. There will be a cost savings, which we intend to pass on to members through lower annual membership fees. An option will be available to receive print copies of the journal for the same subscription fee that we currently pay. However, journal mailings will be reduced in frequency from monthly to quarterly.

In closing, I want to express thanks for their service to the outgoing officers and board members: Paul Ziemann (past president), Gil Sem (president), Lupita Montoya (secretary), Tyler Beck (director), Neil Donahue (director), and Mark Hoover (director). On behalf of the entire board, I congratulate and welcome the new officers and board members: Barbara Wyslouzil (vice-president elect), Lynn Russell (treasurer elect), Scot Martin (director), Faye McNeill (director), and Jacky Rosati (director). It has been my experience that serving AAAR is highly rewarding. Thank you for the opportunity to serve as your president this year.

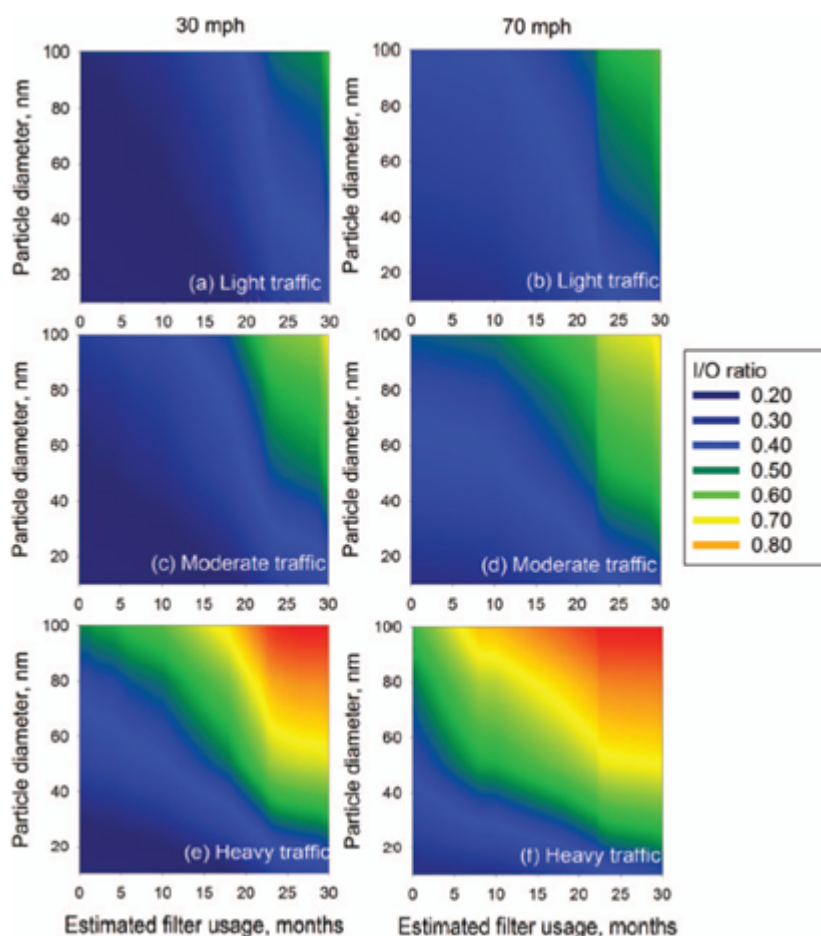
## Aerosols in the Spotlight

Effect of Vehicle Cabin Filter Efficiency on Ultrafine Particle Concentration Ratios Measure In-Cabin and On-Roadway

According to the United States Census Bureau survey, in 2003, Americans spent on average more than 100 hours a year commuting to work. There is also increasing evidence that vehicle generated particulates could cause negative health effects. Considering this, an important question comes to mind: how effective are cabin air filters in protecting drivers and passengers? A group from UCLA recently investigated the efficiency of commercially used cabin air filters.

In this collaborative study with Tianjin University, Professor Yifang Zhu from UCLA and colleagues measured filtration efficiency for a variety of different filters and driving speeds. They also looked at filter loading as a function of traffic density and filter age, as well as the effect of ventilation fans and

recirculation of cabin air. The group found that different filters have significant variations in filtration efficiency, and as expected filter efficiency was a strong function of particle size with a minimum efficiency near 300nm (~20%). Additionally, as driving speed increased, filtration efficiency decreased due to the reduced residence time of air in the filter. Filter loading significantly increased in-cabin to on-roadway (I/O) ratios for ultrafine particles when a ventilation fan was used and recirculation was not used. However filter loading did not affect I/O ratios if both recirculation and the ventilation fan were used.



Modeled In-cabin/On-roadway (I/O) ratios for three traffic conditions and two driving speeds. Light traffic: (a), (b); moderate traffic: (c), (d); heavy traffic: (e), (f), 30 mph: (a), (c), (e); 70 mph: (b), (d), (f)

## Member Minute: Chris Hogan

*Chris Hogan was honored with the Friedlander Award this fall. We asked him to share his thoughts on AAAR and what this award means to him.*

Aerosol science is a truly unique field. In most undergraduate programs, there is little to no exposure aerosol science itself. Nonetheless, those completing undergraduate degrees in physics, chemistry, and all branches of engineering are well equipped to pursue graduate studies focusing on a problem in aerosol science, be it the study of atmospheric aerosols, aerosol based synthesis processes, or the fundamental physics and chemistry of particles in the gas-phase. Like aerosol science itself, AAAR is a truly outstanding organization; I am not aware of any other national level science organization whose membership matches AAAR's depth and breadth in knowledge base across multiple disciplines, yet maintains its focus on a clearly defined topic. I am honored to be the recipient of the 2011 Sheldon K. Friedlander Award, and more so honored simply to be a part of AAAR. It is pleasure to "grow-up" as a scientist and researcher with AAAR, and I hope to continue to do so for years to come.

# Aerosols in Policy Headlines

## Farm Dust Regulation Prevention

Kristi Noem (R-S.D.) introduced the "Farm Dust Regulation Prevention Act of 2011" in a move to curb regulatory action on EPA's new, non-existent dust rule. The Act would bar EPA from regulating rural dust that Noem said is unavoidable and largely harmless. Although the EPA states that they have no plans to regulate farm dust, Noem says that no statements from EPA officials can give the "certainty" of a piece of legislation, which would prevent EPA officials from changing their minds in the future. Critics say that the broad wording of the act could limit regulation of mining operations and other rural activities with more serious air pollution concerns than farms. On November 2, the bill passed the Energy & Power subcommittee of the House Energy & Commerce Committee.

## NIOSH Tackles Nano in Current Intelligence Bulletins

In communications coined current intelligence bulletins (CIBs), NIOSH has proposed recommended exposure limits (RELs) for two nanomaterials in the workplace. For titanium dioxide (NIOSH 2011), they published RELs of 1.5 mg m<sup>-3</sup> for fine TiO<sub>2</sub> and 0.3 mg m<sup>-3</sup> for ultrafine (including engineered nanoscale) TiO<sub>2</sub> measured as 10-hr time weighted average concentrations to prevent persistent pulmonary inflammation and lung tumors. NIOSH has also drafted a CIB that is available for public comment for carbon nanotubes and nanofibers in the workplace to prevent excess risk of pulmonary inflammation and fibrosis (NIOSH 2010). In this CIB, they propose a REL of 7 μg m<sup>-3</sup> (8-hour time-weighted average workshift exposure during a 40-hour work week) for carbon nanotubes and nanofibers as measured as elemental carbon by NIOSH Method 5040.

NIOSH (2010). "Draft Current Intelligence Bulletin: Occupational Exposure to Carbon Nanotubes and Nanofibers.

[http://www.cdc.gov/niosh/docket/review/docket161A/pdfs/carbonNanotubeCIB\\_PublicReviewOfDraft.pdf](http://www.cdc.gov/niosh/docket/review/docket161A/pdfs/carbonNanotubeCIB_PublicReviewOfDraft.pdf)

NIOSH (2011). "Current Intelligence Bulletin 63: Occupational Exposure to Titanium Dioxide.

<http://www.cdc.gov/niosh/docs/2011-160/pdfs/2011-160.pdf>

# In Case You Missed It

## Aerosol Measurements in the 1-nm Range

McMurry et al. introduce a special issue in Aerosol Science and Technology on the development of instruments to measure aerosols in the 1 nm range. They use the term nano-CN in this issue to describe particles smaller than 3 nm in size - the size where particles "are borne and begin their growth toward larger sizes." Articles in this issue describe the convergence of mass spectrometers, ion mobility spectrometers, and condensation particle counters to characterize nano-CN. (McMurry et al. 2011)

## Aerosol Measurement: Principles, Techniques, and Applications in Press

The third edition of a now classic textbook is in press. This book provides a comprehensive compilation of the latest aerosol measurement methods. The new editors have done an excellent job of updating the book while maintaining the high quality established in earlier versions. This version is a worthy tribute to a founding editor Dr. Paul Baron, an active aerosol scientist for over 30 years and good friend to many in AAAR. (Kulkarni et al. 2011)

## The Clean Air Act and Health

Jonathan Samet, Professor of Preventative Medicine at UCLA and chair of the Clean Air Scientific Advisory Board, describes the challenges faced by lowering National Ambient Air Quality Standards for criteria pollutants. Key decisions will be made in the process of lowering NAAQS for particulate matter and ozone in the near future. In the process, the Environmental Protection Agency's Administrator must weigh the public health burden against the uncertainty of the scientific evidence regarding the benefits from lowering concentrations. Samet describes that regulation of multiple pollutants may be a more effective strategy rather than one pollutant at a time for inhaled pollutants, such as traffic-related pollution. (Samet 2011)

## Organic Aerosol Formation Downwind from the Deepwater Horizon Oil Spill

A team of atmospheric researchers extensively characterized a plume of gasses and aerosols over the Deepwater Horizon oil spill. The variety of organic compounds released from different parts of the oil slick created a unique environment to study secondary organic aerosol formed by semivolatile organic



compounds separately from those formed by intermediate volatility organic compounds. By investigating the resultant complex plume, researchers conclude that both semivolatile and intermediate volatility organic compounds are important in SOA formation. Their results help validate theoretical models of SOA formation and have implications for predicting SOA formation in other polluted atmospheres. ([De Gouw et al. 2011](#))

De Gouw, J., A. Middlebrook, C. Warneke, R. Ahmadov, E. Atlas, R. Bahreini, D. Blake, C. Brock, J. Brioude and D. Fahey (2011). "Organic aerosol formation downwind from the Deepwater Horizon oil spill." *Science* 331(6022): 1295.

Kulkarni, P., P. A. Baron and K. Willeke (2011). *Aerosol measurement: principles, techniques, and applications*, Wiley.

McMurry, P. H., M. Kulmala and D. R. Worsnop (2011). "Special Issue on Aerosol Measurements in the 1 nm Range." *Aerosol Science and Technology* 45(4).

Samet, J. M. (2011). "The Clean Air Act and Health-A Clearer View from 2011." *New England Journal of Medicine*.

## Money Matters

We all have great ideas about science, but what we need to someone to enable us to actually do the work. This may seem easy for people who have been at it for a while, but this is likely one of the biggest concerns for the younger generation of aerosol researchers. Getting research funding is a challenge, but here are thoughts on how to improve your odds.

- Get to know your potential funders. The best research proposals show that the author understands the broader goals and priorities of the funding agency. The more you understand this, the better your proposal will be. Talk to project officers and other contacts. Generally these people want to help you, so that they can fund the best science possible.
- Know deadlines and requirements. NSF and NOAA have annual funding cycles, while EPA solicits grants that address targeted research topics that do not typically repeat. Be ready with your idea and plan ahead so that you do not miss opportunities.
- Practice writing and reading. Volunteer to review proposals and papers. Ask your mentors to share copies of funded proposals and ones that didn't make it. Try to think critically and imagine the questions that reviewers will ask. Including the right amount of references and detail indicate your knowledge and preparation to a review panel.

## 2011 Annual Conference

**Lynn Russell, Conference Chair of the 30th Annual Conference**

AAAR turned 30 this year, thank goodness we had over 200 students attending to keep us feeling not a day over 29!

Our 30th Annual Meeting welcomed 793 attendees to the luxurious Rosen Shingle Creek Resort and Spa in Orlando, where we enjoyed sunbaths, swims, and science from 3 to 7 October of 2011. A record number of 805 abstracts were included, with 372 oral presentations and more than 400 posters for a jam-packed week of science. The week started with 14 tutorials ranging from Aerosol Fundamentals to Nanotoxicology, with 337 registered attendees. The conference hosted six special symposia on Nanotoxicology, Microscopy and Other Single-Particle Techniques for Studying Aerosols, Nanoscale Aerosol Physics with New Light Sources, Recent Campaigns in the North American West Coast, Aerosols and Precipitation, and Chemical and Biological Defense Hazard Assessment.

Tuesday morning opened with the AEESP Lecture presented by Lynn Hildemann (Indoor Exposure to Aerosols: the Interplay between Source Type, Room Characteristics, and Proximity), and Wednesday began with Bruce Albrecht who described the development of the Albrecht effect of aerosols on precipitation (Aerosol, Cloud, and Precipitation Interactions: Anthropogenic and Natural Effects). Wayne Cascio began Thursday with investigations of aerosol health effects (Health Disparities and Ambient Air Particle Pollution), and Chris Sorensen (From Single Particles to Aerosol Gels: Thirty Years of Fractal Aggregates) wrapped up the week with the memorable Friedlander Lecture.

Twenty exhibitors provided impressive displays of the latest in aerosol technology. AAAR acknowledges the generous support of our two Supporting Sponsors, Aerodyne Research Inc. and Sunset Laboratory. The Conference was also enriched by the underwriting of student activities and poster awards by TSI Incorporated and the support of special symposia by the National Science Foundation and Environment Canada. On behalf of AAAR, I gratefully acknowledge the Association Headquarters (AH) staff; Working Group Chairs and Conference Committee members; and special symposia conveners and session chairs for their many contributions to a successful week.

We look forward to seeing all of you again soon at the Hyatt Regency in Minneapolis from 8 to 12 October in 2012.

## Spotlight

### Student Poster Prize Winners

Each year in the poster competition, we award prizes to students who have done an exemplary job communicating their work. Since we know that not everyone had a chance to interact with those extraordinary students, we invited them to give to highlight their work. Read more from those who responded here.

## Careers in Aerosol Science

### Career Spotlight

#### Rob Caldwell, Engineering Manager, TSI Incorporated

#### What do you do?

Oversee new product research, engineering, and introduction to manufacturing. Supervise engineers with specialties in aerosol science, chemistry, optics, algorithms, etc. Periodically travel to conferences, trade shows, and customer/vendor visits.

#### What do you like about your job?

The variety of high-technology work, the people that I work with, and the customers with whom I interact.

#### How did you end up in this position?

My undergraduate advisor encouraged me to work in the area of aerosol science for my graduate work. This led to an engineering position at TSI and I worked my way up to manager over many years.

#### Advantages and disadvantages to this career choice.

Advantages are that working in industry is fairly stable and that engineers have always been in high demand. Work is interesting and rewarding. Disadvantages compared to academics may be that work is dictated but you have some influence over decisions.

#### Advice to young engineers/scientists.

Pick a career that is interesting on a number of levels such as work, colleagues, customers, technology, or travel overseas. This will keep you interested and motivated as you develop valuable experience.

## Important Announcements

As we quickly approach 2012, we want to remind you that 2012 membership in the American Association for Aerosol Research (AAAR) was included in your registration for the conference held in Orlando. If you attended the conference at the regular, early-bird rate, **you paid \$490 for a full week of exceptional scientific learning**. The remaining \$170 that you paid is for membership. Of that, almost half goes directly to the publisher of "Aerosol Science & Technology" for their services including

printing and mailing of the journal. We know many of you read the journal online, and the Board along with the "AS&T" editor are working with Taylor & Francis to bring you this option in the future.

### **Need a job? Looking to hire?**

AAAR offers a "Career Opportunities" section on their web site. Visit [http://aaar.org/index2.cfm?section=Career\\_Opportunities](http://aaar.org/index2.cfm?section=Career_Opportunities) to see what is available, or for information on how to advertise your open position.

### **Now Available!**

A new book, *Aerosol Science and Technology: History and Reviews*, describes a slice of history in the evolution of aerosol science.

The book is edited by David Ensor, Ph.D., an RTI International distinguished fellow with nearly 40 years' experience in aerosol science and air pollution research, and presents in-depth biographies of four leading international aerosol researchers. It also highlights pivotal research institutions in New York, Minnesota, and Austria.

"Interesting and fun to read, this book goes a long way in bringing to life the scientific tributaries to our science, the wealth of creative ideas, and the people behind them," said Gerhard Kasper, editor, *Journal of Aerosol Science*. "It also shows how far these pioneers of aerosol science went with so little in terms of equipment and technology."

One collection of chapters reflects on the legacy of the Pasadena smog experiment, while another presents a fascinating overview of military applications and nuclear aerosols. Additionally, prominent researchers offer detailed reviews of aerosol measurement, processes, experiments, and technology that changed the face of aerosol science.

This book is the third in a series and is supported by the American Association for Aerosol Research (AAAR) History Working Group, whose goal is to produce archival books from its symposiums on the history of aerosol science to ensure a lasting record. It is based on papers presented at the Third Aerosol History Symposium on September 8 and 9, 2006, in St. Paul, Minn. The book has 21 chapters and covers a range of subjects from biographies, histories of institutions, to reviews of technologies. There were 42 contributing authors to the chapters.

Order yours today - <http://aaar.org/index2.cfm?section=Bookstore>

### **Want to opt out of the hardcopy delivery of the journal?**

While there is no official e-only option for the journal at this time, you can send an email to Deanna Bright ([dbright@ahint.com](mailto:dbright@ahint.com)) to request discontinuation of your print copy delivery. She will remove your name from the monthly list sent to the publisher.

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