PARTICULARS

The E-Newsletter of the American Association for Aerosol Research

SPRING 2017

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As always, we'd love any feedback or suggestions you may have for ***Particulars***.

Simply email **info@aaar.org** with the subject line ***'Particulars'***

Jeff Pierce, *Editor*

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President's Message

Dear Colleagues,

Ahh spring is in the air. In fact, in Pittsburgh, it seemed like there was not much winter with temperatures in February reaching the low 70s! Great for bike riding.

I'd like to take this opportunity to update you all on the progress and direction of AAAR. Our membership is dedicated to our core mission, and your efforts have led to a number of accomplishments over the past year:

- Passing an amendment to the bylaws to formalize the administrative structure of the endowment;
- Creation of a new early career registration category for the meeting (we had 90 early career registrants for the meeting last fall in Portland); and
- Development of online education materials, including release of videos of interviews with notable aerosol scientists on our new website and taping of several tutorials.

Financially we are very sound. Part of that strength derives from adhering to our investment policy. (You can download the full investment policy and our 990 forms on the members' only page and of the AAAR website). The investment policy articulates a goal "to maintain investments greater than one year of operating expenses." These resources are maintained in a long-term reserve fund whose purpose "is to provide financial stability and cash flow to support the mission of AAAR." The strength of our finances has allowed us to invest in some new initiatives including the meeting app and a new registration category for our Early Career members. We look forward to continuing these programs.

As we look forward to the upcoming year, I again encourage members to nominate their colleagues for a AAAR Award, including the relatively new Aerosol Science & Technology Outstanding Publication Award. Your efforts will ensure that your Association recognizes the amazing accomplishments of our members.

The call for abstracts is now open for the 36th Annual Conference, October 16-20, 2017 at the Raleigh Convention Center in Raleigh NC. **Nicole Riemer**, our conference chair, has organized an outstanding set of special symposia and plenary speakers (please see her letter in this issue of the Particulars). It should be a great meeting, as usual, with first-rate science and plenty of opportunities to interact with colleagues.

I hope to see you in Raleigh! ●

Allen Robinson, *AAAR President*

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36th AAAR

ANNUAL CONFERENCE

OCTOBER 16–20, 2017

RALEIGH CONVENTION CENTER

RALEIGH, NORTH CAROLINA

2017 Annual Conference Update

By Nicole Riemer, *2017 Conference Chair*

It is my great pleasure to update you on our plans for the 36th AAAR Annual Conference to be held October 16-20 at the Raleigh Convention Center in Raleigh, North Carolina. We expect the conference to provide an outstanding venue for sharing our latest aerosol science and technology research, while networking and re-connecting with colleagues.

The 2017 Conference will feature a full slate of tutorials on Monday on a wide range of aerosol science topics including the popular "Hands-on Aerosol Instrumentation Design and Measurement" tutorial. An exciting array of plenary talks, special symposia, poster sessions, platform presentations, and special events will take place from Tuesday morning through Friday noon. As is the AAAR tradition, each of these days will start with an 8 a.m. plenary lecture. Our outstanding lineup of plenary speakers for 2017 includes **Andrea Ferro** (Clarkson University), **Markus Kraft** (University of Cambridge), **Joel Thornton** (University of Washington), and **Vicki Grassian** (UC San Diego/ Scripps Institution of Oceanography).

The exhibit area, open Tuesday through Thursday, will provide opportunities to engage with and learn from leading companies offering instrumentation and services in aerosol science and technology. On Wednesday morning at 6:30 a.m. we will have a 5K group run/walk. On Thursday afternoon, we have arranged for technical tours to the Environmental Protection Agency laboratories. You can sign up for these events when registering for the conference.

We will have five symposia designed to bridge multiple areas and promote cross-disciplinary interaction on the following topics:

- **There Must be Something in the Water: Cloud, Fog and Aerosol Aqueous Chemistry for Aerosol Production**
- **Passive Mitigation Strategies to Reduce Exposure to Near-Road Air Pollution**
- **Linking Aerosol Oxidative Potential with Chemical Composition and Biological Endpoints**
- **Extraterrestrial Aerosols: From Mars to Titan and Beyond**
- **Regional and Global Air Quality and Climate Modeling**

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As you may recall, AAAR has instituted an abstract submission fee. Each AAAR member will receive a code for one free abstract submission. Codes are transferable, so they can be gifted or traded. Additional submissions will cost $50 each. This abstract fee is intended to enhance the quality of the conference by reducing the number of no-shows. Submit your abstracts soon, at:

http://www.AAARabstracts.com/2017!

The abstract deadline is April 28

The conference venue, the Raleigh Convention Center, is located near downtown, close to many excellent restaurants. Raleigh is also home to several acclaimed parks and a vibrant museum scene, including the Museum of Natural Sciences, the North Carolina Museum of Art, and the North Carolina Museum of History. A conference block of reduced rate rooms has been secured at the Marriott Raleigh City Center and the Sheraton Raleigh Hotel. Getting from the convention center to downtown and around is easy with the R-LINE (**http://www.godowntownraleigh.com/get-around/r-line**), a free circulator bus service.

We are excited about Raleigh as a new location for our Annual Conference because of its unique location with close proximity to the **Environmental Protection Agency**, the **Research Triangle**, and several universities. However, as many of you know, the choice of this location became controversial after the North Carolina legislature passed House Bill 2 (HB2), which requires that people use public restrooms based upon their gender at birth. The contracts with the Convention Center in Raleigh were already in place when HB2 was passed. After extensive discussion amongst the AAAR Executive Committee and the AAAR Board, the Board voted to remain in Raleigh for 2017, for reasons laid out in a recent President's message (**http://aaar.org/news/president-s-message**). An important factor in support of this decision was the position taken by the city of Raleigh and the Raleigh Convention Center to value diversity and inclusion, and to welcome all people to their city.

This will be an outstanding conference at a great location that you certainly don't want to miss. **We look forward to welcoming you in Raleigh in October at the 36th Annual Conference of the American Association for Aerosol Research!** ●

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AS&T Article Highlight

By Jason D. Surratt

Identification and quantification of oxidized organic aerosol compounds using derivatization, liquid chromatography, and chemical ionization mass spectrometry

April P. Ranney and Paul J. Ziemann

Aerosol Science and Technology, 51:3, 342-353, DOI:10.1080/02786826.2016.1271108

Chemical characterization of oxidized organic compounds found within secondary organic aerosol (SOA) particles poses many analytical challenges. For example, commonly applied real-time techniques, such as aerosol mass spectrometry, can quantify the bulk organic aerosol mass loadings but have difficulty in identifying individual compounds owing to their harsh operating conditions. Due to the strengths and weaknesses of individual analytical techniques, chemical characterization aimed at understanding the detailed chemical transformations of semivolatile or low-volatility oxidized organic products leading to SOA formation requires a combination of offline and online methods. Derivatization reactions have been commonly applied in past studies to convert oxidized organics found within SOA into more volatile derivatives that can be separated and detected by gas chromatography/mass spectrometry (GC/MS) methods. Not only do derivatization reactions make SOA more amendable to GC/MS analyses, it also serves as a method to "tag" organic molecules for specific functional groups. This tagging approach reveals the exact functional groups present, and thus, greatly aiding in structural identification of individual molecules found within SOA. For prior GC/MS studies, trimethylsilylation, ethylation, and oxime formation have been used as derivatization reactions to detect hydroxyl (OH), carboxyl (COOH), and carbonyl (C=O) functional groups, respectively. One of the challenges with GC/MS with prior derivatization is that this method is operated at high temperatures, which can lead to the decomposition of certain SOA constituents, such as oligomers and other high-molecular weight products, leading to the misinterpretation of the SOA formation mechanism or source.

Ranney and **Ziemann** carefully describe in this highlighted article an approach for characterizing the molecular composition of complex organic aerosol mixtures by employing derivatization methods they have used previously with spectrophotometry to quantify the bulk composition of OH, C=O, COOH, and ester groups in oxidized organic aerosol. Although the derivatization methods, which are highlighted in the figure below, are more time consuming to apply (especially when compared to online/real-time analytical methods), the authors have previously characterized them for interferences, derivatization efficiency, and effects of neighboring functional groups on absorbance, all of which can affect the accuracy of quantification. Notably, each of the derivatization methods

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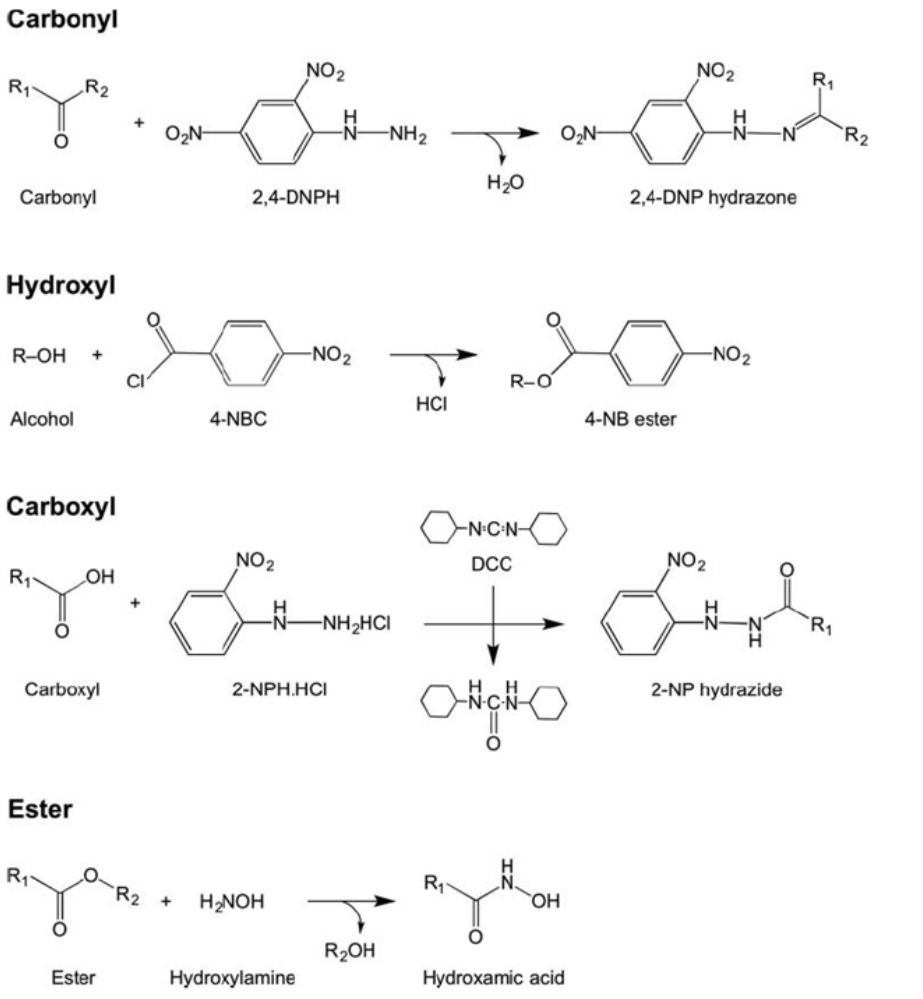
applied in this study were modified to be compatible with liquid chromatography (LC), which was used to fractionate organics for quantification of individual compounds based on UV absorbance. LC is a promising approach as it is less "harsh" to organic molecules compared to GC/MS methods. Interestingly, the authors analyzed fractionated compounds from LC using a chemical ionization-ion trap mass spectrometer equipped with a thermal desorption probe for sample introduction. These methods were systematically evaluated using monofunctional and difunctional compounds similar to those present in SOA in order to assess the linearity of the response for quantification, detection limits, and the ability to obtain mass spectra that contain molecular ions and characteristic fragmentation patterns that can be used for compound identification. The results presented from this systematic evaluation of the method are highly promising for future studies aimed at unraveling the detailed chemical mechanisms leading to SOA formation. Importantly, the authors note that perturbations to the original SOA composition are mostly likely to occur with their method either when peroxides are present or during C=O derivatization. The conditions used for COOH, OH, and ester derivatizaion are mild enough that neither decomposition nor formation of oligomers should be significant, thus preserving the original SOA composition during their method application. ●



Derivatization reactions that could be used in detailed SOA chemical characterization efforts that are used to tag specific functional groups.

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In Case You Missed It

By Kristina Wagstrom

Cancer Flavored e-Cigarettes? **Researchers at the Desert Research Institute have found that the rapid heating in e-cigarettes results in the formation of toxic, carcinogenic aldehydes from many of the added flavorings.**

http://www.dri.edu/newsroom/news-releases/5437-hazardous-chemicals-discovered-in-flavored-e-cigarette-vapor

Original Article: **Khlystov, A. and Samburova, V. (2016) "Flavoring Compounds Domainate Toxic Aldehyde Production during E-Cigarette Vaping" Environmental Science and Technology. 50 (23), pp 13080-13085.**

http://pubs.acs.org/doi/abs/10.1021/acs.est.6b05145

Cadmium Flavored e-Cigarettes? **Recent work at the Johns Hopkins Bloomberg School of Public Health has identified cadmium, chromium, lead, manganese, and nickel in the liquid used top brands of e-cigarettes.**

Original Article: **Hess, C.A., et al. (2017) "E-cigarettes as a source of toxic and potentially carcinogenic metals" Environmental Research. 152, pp. 221-225.**

http://www.sciencedirect.com/science/article/pii/S0013935116306995

PAHs Finding Safe Transit. **A study done by researchers at Oregon State University, the Department of Energy's Pacific Northwest National Laboratory, and Peking University is taking a new view of potential pathways for long-range transport of polycyclic aromatic hydrocarbons, potentially quadrupling the estimated global lung cancer risk.**

http://oregonstate.edu/ua/ncs/archives/2017/jan/globe-trotting-pollutants-raise-some-cancer-risks-four-times-higher-predicted

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Original Article: **Shrivastava, M. et al. (2017) "Global log-range transport and lung cancer risk from polycyclic aromatic hydrocarbons shielded by coatings of organic aerosol" Proceedings of the National Academy of Sciences. 114 (6), pp. 1246-1251.**

http://www.pnas.org/content/114/6/1246

Aerosols and Dementia: **A recent study led by researchers at the University of Southern California suggests a potential link between increased risk of dementia and living in areas of elevated particulate matter concentrations based on an 11-year epidemiological study.**

Science Feature Article (27 Jan 2017):

http://science.sciencemag.org/content/355/6323/342

Original Article: **Cacciottolo, M. et al. (2017) "Particulate air pollutants, APOE alleles and their contributions to cognitive impairment in older women and to amyloidogenesis in experimental models" Translational Psychiatry. 7.**

http://www.nature.com/tp/journal/v7/n1/full/tp2016280a.html

Virus Killing Masks: **Researchers at the University of Alberta have developed a virus deactivation treatment that may be able to protect individuals from infection when applied to surgical-type masks.**

http://www.engineering.ualberta.ca/NewsEvents/Engineering%20News/2017/January/ResearcherturnsSARSmaskintoaviruskiller.aspx

Original Article: **Quan, F.S., et al. (2017) "Universal and reusable virus deactivation system for respiratory protection" Scientific Reports. 7.**

http://www.nature.com/articles/srep39956 ●

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Aerosol Scientist Spotlight: Havala Pye

By Jason D. Surratt

1.) Please tell us about your education and experience.

I am a chemical engineer by training and focus on how air quality models can inform our understanding of the atmosphere. I received a B.S. from the University of Florida and my Ph.D. from the California Institute of Technology. In graduate school, I worked with the GEOS-Chem global chemical transport model, and today my main tool is the Community Multiscale Air Quality (CMAQ) model developed at EPA.

2.) What excites you about working at EPA and with CMAQ?

Traditionally, the CMAQ model has focused on predicting ozone. When I arrived at the EPA, the CMAQ team was making rapid progress on making the aerosol treatment just as much of a focus as the ozone chemistry. Being part of the CMAQ team allows me to benefit from all the work others are doing to facilitate use of the model and incorporate new information on land-surface processes, emissions, and meteorology. I also get to see how the science of the model is used to support EPA's mission of protecting human health and the environment.

3.) How did you get involved with aerosol research?

I was always interested in how to be a good steward of the environment. Aerosol research is a natural intersection of my interests in fundamental chemical engineering topics (like thermodynamics and kinetics) and in improving public health.

4.) Which people in our field have been most influential to you and your career?

Answering this question succinctly is challenging as there are so many great scientists in our field at all different levels. I appreciate Dr. C.-Y. Wu at the University of Florida for giving me my first research project in the field, Dr. Jean Andino for expanding my opportunities in the field, and Dr. John Seinfeld for serving as my Ph.D. advisor. The entire GEOS-Chem and CMAQ model communities have also been tremendously supportive as have the scientists that are in the field and laboratory collecting data that we can use to evaluate the CMAQ system.

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5.) What is, in your opinion, the most interesting research contribution you've made so far?

My favorite paper that I have lead thus far is my 2013 Environmental Science & Technology paper on secondary organic aerosol from isoprene epoxydiols (IEPOX). IEPOX had only been discovered as an important gas-phase product of isoprene oxidation about 4 years earlier. We were able to take explicit species predicted by the gas-phase mechanism and connect them to aerosol formation in a way that had not been possible before due to limited information. In addition, we could compare the CMAQ model predictions to known isoprene-derived aerosol constituents like 2-methyltetrols. This level of chemical specificity along the path to aerosol formation gave us unprecedented confidence in the ability of our model to properly respond to changing conditions.

6.) What future research questions do you hope to address?

I think we will continue to build a stronger connection between gas-phase chemistry and the resulting aerosol formation processes in models like CMAQ. I am also interested in understanding how aerosols in the atmosphere change with time, both from the past to the present and going forward.

7.) Are there new aerosol research areas/directions that you see as particularly interesting or important?

There is no shortage of interesting and important work in our field. I enjoy getting to learn about new topics in our field such as how aerosols affect clouds and how aerosols are linked to other aspects of our environment through deposition and as an intermediate in the life cycle of many elements. ●

Organizational Members

AAAR would like to thank the companies that support us as Organizational Members:

AERODYNE RESEARCH, Inc.

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Call for Award Nominations

By Charlie Stanier, *Award Committee Chair*

The Awards Committee of the American Association for Aerosol Research (AAAR) invites you to submit nominations for the following prestigious awards.

Annually, AAAR presents five awards to recognize outstanding contributions in the field of aerosol science. All awards will be announced and presented at the AAAR 36th Annual Conference being held on October 16-20, 2017 in Raleigh, North Carolina.

Please visit the pages below for specific requirements for each award. AAAR is committed to inclusive excellence and encourages a diversity in nominations.

The **AS&T Outstanding Publication Award** is awarded annually to one paper published in Aerosol Science and Technology (AS&T) without regard to publication date.

The **Kenneth T. Whitby Award** recognizes outstanding technical contributions to aerosol science and technology by a young scientist.

The **David Sinclair Award** recognizes sustained excellence in aerosol research and technology by an established scientist still active in his/her career.

The **Sheldon K. Friedlander Award** recognizes an outstanding dissertation by an individual who has earned a doctoral degree.

The **Benjamin Y. H. Liu Award** recognizes outstanding contributions to aerosol instrumentation and experimental techniques that have significantly advanced the science and technology of aerosols.

Nominations and supporting documentation for these awards must be **received by June 2, 2017** to the AAAR Headquarters. ***Nominations must be submitted as a single packet with the nomination letter and all supporting documents***. ●

Submit Nominations by June 2, 2017 to:

American Association for Aerosol Research

Email: *(PREFERRED)* **info@aaar.org** with a copy to **Allen Robinson** at **alr@andrew.cmu.edu**

Mail: 11130 Sunrise Valley Drive | Suite 350 Reston, VA 20191 USA

Fax: 703.435.4390

You should receive a confirmation of your submission within five working days.

QUESTIONS? Call 800.485.3106