

PARTICULARS

The E-Newsletter of the American Association for Aerosol Research

SUMMER 2020

In This Issue

- President's Message** | 1
- 38th Annual Meeting Update** | 3
- Farewell Warren Finlay**
(Outgoing AS&T Editor-in-Chief) | 4
- Welcome Jonathan Reid**
(Incoming AS&T Editor-in-Chief) | 5
- Introduction to Representation and Equity Affairs Committee** | 6
- Letter from CSU: Increasing Diversity and Inclusion** | 7
- AS&T Article Highlight** | 10
- Aerosol Scientist Spotlight: Sergey Nizkorodov** | 12
- In Case You Missed It** | 14
- Organizational Members** | 18

Quick Links:

[AAAR Website](#)
[Career Opportunities](#)

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

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

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President's Message

Dear AAAR Members,

I hope that you are well and managing to negotiate work and home life in this unprecedented time. Despite the public health, financial, and societal challenges we are facing, the organization remains strong and we have much to celebrate. Here are some highlights.

Our members are on the scientific front lines! I am so grateful for aerosol scientists and engineers like:

Sima Asadi, Parham Azimi (@parhamazimi_87), Rich Corsi (@CorsiAQ), Suresh Dhaniyala (@SureshDhaniyala), Jose Jimenez (@jljcolorado), Linsey Marr (@linseymarr), Shelly Miller (@ShellyMBoulder), Lidia Morawska, Bill Nazaroff, Jordan Peccia (@jordan_peccia), Kim Prather (@kprather88), Jeff Siegel (@IAQinGWN), Brent Stephens (@stephensbrent), Tony Wexler,

and many others who are not only conducting excellent research to better understand and mitigate COVID-19 transmission but are also communicating and interpreting aerosol science to the world. THANK YOU and keep up the amazing work!

Our journal *Aerosol Science & Technology* is in great hands. After nearly five years as the editor-in-chief of AS&T, **Warren Finlay** is stepping down and **Jonathan Reid** will take up the reins in September 2020. The transition of the editorial office is already underway. A huge thank you to both Warren and **Luba Slabyj**, the AS&T editorial assistant, for their hard work and dedication to the journal over the past five years, to the Publications Committee for recruiting our next editor-in-chief, and to Jonathan for taking on this important role for our society.

The 2020 AAAR Annual Conference planning is going strong. With 600 abstracts submitted, our conference chair **Matti Maricq** and the conference and program committees are busy organizing our virtual conference. While it won't be the same as being together, we will take advantage of online tools and the expertise of our business office, Virtual Inc., to deliver what we anticipate to be an excellent conference. Thank you **Donald Dabdub** and his team and to all working group chairs for processing all these abstracts, and thank you to Matti for pivoting and charging ahead with the virtual conference planning.

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

The new Representation and Equity Affairs committee has hit the ground running. The committee has assembled and begun planning for the upcoming conference and year ahead. They are looking forward to working together with advocates within AAAR for their activities. Please contact the R&EA committee chair, **Lupita Montoya** (lumo3409@colorado.edu) if you would like to be involved in this groundbreaking effort.

Our financial position remains strong. However, in view of the economic uncertainties, we will remain cautious with our budget moving forward. Our award endowment funds are healthy, but we have lost about \$100K in our reserves since February. Thankfully, our business office has been able to recoup all the costs from the hotel and Raleigh, NC Convention Center contracts we signed for the 2020 conference. As part of this negotiation, we will be returning to **Raleigh, NC** for our **2022** conference, **October 3-7**. The **2021 AAAR 39th Annual Conference** is still scheduled for **October 18-22** in **Albuquerque, NM**. There are substantial costs associated with organizing and hosting a large, virtual conference, but we are working closely with our business office to balance costs and functionality for the online platform and to keep the registration fees at a reasonable level. Our goal is to provide you with an affordable conference while preventing large financial losses in the AAAR reserves.

I am amazed and grateful for the coordinated contributions of so many people during this time of transition. There are too many people to call out by name, but thank you to the Board of Directors, Conference Chair, Conference Committee, Awards Committee, Bylaws Committee, Development Committee, Early Career Committee, Education Committee, Endowment Committee, Finance Committee, Internet Committee, Long-Range Planning Committee, Membership Committee, Newsletter Committee, Program Committee, Publications Committee, Representation and Equity Affairs Committee, our Organizational Members and Sponsors, and the AAAR Business Office for your dedication to AAAR and all the things we do. If you are interested in getting involved in one of the committees in the future, let our VP-Elect Akua Asa-Awuku (asaawuku@umd.edu) know—she'll be recruiting for the committees next spring and would be glad to have some names ready to go!

Please keep reading to find out more about the conference, journal, equity affairs, and more in this issue of Particulars. As always, please feel free to contact me (aferro@clarkson.edu) with your ideas and concerns. ●

Sincerely,



Andrea R. Ferro
AAAR President

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

Introduction to Representation
and Equity Affairs Committee | 6

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)



38th Annual Meeting Update

As you all know, the 2020 AAAR Annual Conference will be **virtual** for the first time ever owing to the COVID-19 pandemic. I want to assure you that I am just as committed to this new format as I was to organizing the in-person conference. In fact I am very much looking forward to trying this new way of communicating science, and I hope that you will join the conference to participate in this exciting experiment. Given the circumstances, we have modified our original program to highlight the role of aerosol science in COVID-19 and other infectious diseases. We have added a special symposium on this topic, and we are looking into ways to use the virtual platform to reach and help educate the broader public audience on best practices to mitigate the spread of COVID-19 and protect our health.

Lest you get the impression that the conference will be dominated by COVID-19, we received nearly 600 abstracts by the July 6 deadline! It confirms the supportive and close knit culture of AAAR, and tremendous loyalty of AAAR members, and I thank you all for your dedication to the traditions of AAAR. With so many abstracts submitted, there will be a broad array of aerosol topics, including four other special symposia, to pique everyone's interest.

We are still working on the details of the virtual platform but I can share the following. The technical sessions will be spread out over five days, much like the international conference. The days themselves will be shorter, recognizing the difficulty of maintaining concentration for hours in front of a computer. Tutorials are still actively planned, likely the week prior to the conference. The virtual conference will host most of the activities we are accustomed to, including plenary talks, platform sessions, poster sessions, art competition, job seekers, networking opportunities, and so on. So, please join this event; *I hope to see you virtually in October!* ●

Matti Maricq
2020 Conference

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

Chair Farewell Warren Finlay

(Outgoing AS&T Editor-in-Chief)

Please join us in *extending our thanks and appreciation* to Aerosol Science & Technology's outgoing Editor-in-Chief, University of Alberta Distinguished Professor **Warren Finlay**, for his outstanding service to the journal. Warren was honored to succeed Peter McMurry as AST's Editor-in-Chief in 2016 and has since then striven to uphold the tradition of excellence established by all three of AST's preceding Editors-in-Chief. Among Warren's initiatives during his tenure as EIC were the introduction of an annual Editors' choice list of most notable AST articles; the production of a number of video vignettes featuring some of these notable papers; the creation of annual AST Outstanding Reviewer awards; the implementation of marketing strategies such as regular eblasts to AST's readership advertising monthly-issue tables of contents and most-downloaded papers; and a Twitter feed announcing new articles as they are posted online. Most recently, Warren has been very pleased with the enthusiastic response to a number of specially invited, rapidly published and timely COVID-19-related editorials. One of these editorials, Asadi et al.'s "The Coronavirus Pandemic and Aerosols: Does COVID-19 Transmit via Expiratory Particles?," has now become AST's most read article of all time, with 50,000 views and 30 citations since its publication on April 3rd.



Warren would like to express his warm thanks to AST's contributing authors, reviewers and readers for their continued support of the journal, as well as his special thanks to his editorial assistant, **Luba Slabyj**, to the past and present members of AST's Editorial Advisory Board and, above all, to the following team of talented Editors without whose tireless work his efforts would not have been possible: current Editors **Yannis Drossinos**, **Jingkun Jiang**, **Pramod Kulkarni**, **Matti Maricq**, **Hans Moosmüller**, **Jason Olfert**, **Kihong Park**, **Tiina Reponen**, **Nicole Riemer**, **Jim Smith**, **Mark Swihart**, and **Jing Wang** and also past Editors **Thomas Kirchstetter**, **Spyros Pandis**, **Ilona Riipinen**, **Jian Wang**, and **Paul Ziemann**.

Warren will hand over his Editor-in-Chief duties to the University of Bristol's **Jonathan Reid** on September 1st. Jonathan brings to the journal a wealth of experience in aerosol research that will allow AST to continue as one of the best journals in the field.

Deepest thanks, Warren, for all your excellent work on AST's behalf! ●

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

Introduction to Representation
and Equity Affairs Committee | 6

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

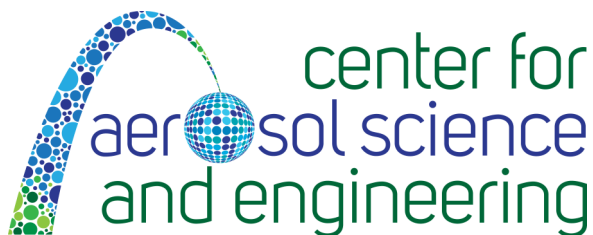
Welcome Jonathan Reid

(Incoming AS&T Editor-in-Chief)



AAAR welcomes the new AS&T Editor-in-Chief **Dr. Jonathan Reid**! Jonathan is Professor of Physical Chemistry at the University of Bristol, UK. After studying for undergraduate and postgraduate degrees at the University of Oxford and a period as a post-doctoral researcher at the University of Colorado, US, he established a research team at the University of Birmingham, UK, and later the University of Bristol. His research has focused on developing new experimental tools to study microphysical processes on individual aerosol particles held in optical and electrodynamic traps. In his team, these tools are now used to study problems in formulation science and droplet drying, atmospheric aerosols, drug delivery to the lungs and biological aerosol. He has held EPSRC Advanced and Leadership Fellowships, and is the current president of the UK and Ireland Aerosol Society. He is director of the new EPSRC Centre for Doctoral Training in Aerosol Science, a UK-wide initiative spanning 7 universities and supported by ~50 industrial and public sector partners. The Centre aims to train 80 PhD students in aerosol science (2019-2027) and supports research across the aerosol science landscape.

The journal will be in good hands! ●



WASHINGTON UNIVERSITY IN ST. LOUIS

CORE FACULTY

Richard Axelbaum	Randall Martin
Pratim Biswas	Elijah Thimsen
Rajan Chakrabarty	Jay Turner
Rudy Husar	Jian Wang (Director)
Benjamin Kumber	Brent Williams

Center for Aerosol Science and Engineering
(CASE)

Washington University in St. Louis

aerosols.wustl.edu

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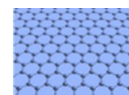
Climate &
Environment



Health



Medicine



Advanced
Materials



Energy



Agriculture



Commodity
Powders

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee | 6**

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

Introduction to Representation and Equity Affairs Committee

Dear AAAR members,

It is my pleasure to introduce the new ad hoc committee on Representation and Equity Affairs and to lead our efforts toward true representation and equity in Aerosol Science. The need for both have never been more evident and urgent, and our committee is eager to start this important work. Just like many years ago when I worked with our leaders to establish the Young Investigators, now called Early Career Committee, I see this new initiative as fundamental for the survival of our scientific community. It is reassuring to see that those prior efforts have yielded great fruit and we now have a vibrant and growing community of aerosol scientists.

It is also with sadness that I make this announcement because it coincides with terrible events in our larger society. The formation of this committee barely preceded the coronavirus pandemic and the riots in response to the deaths of **Breonna Taylor**, **Ahmaud Arbery** and **George Floyd**. Interestingly, these two events are at the very core of why this new committee exists, in the first place. The evidence emerging about inequities in health outcomes in communities of color in the US has been of personal and professional interest to me for many years. It is unfortunate that it has taken the pandemic to bring this awareness to the general public. It may be finally understandable to others why some scientists from black and brown communities, like me, feel the need to study and mitigate these inequities, sometimes to our own career detriment. The underrepresentation of Black, Latino, and Native Americans in STEM, including Aerosol Science, has clear and negative consequences, not only on innovation, but on the very wellbeing of our communities. This has become painfully evident during the COVID-19 pandemic in the US.

Similarly, the terrible actions that led to Mr. Floyd's death have analogs in higher education, where the experience of underrepresented minorities (URM) differ significantly from the experience of others. The goals of our committee are to improve representation in the aerosol community, to bring attention to the inequities in our field, and to empower the aerosol community to address them. We will also initiate outreach education efforts to outside communities. We intend to use evidence-based approaches, like scholarly work from pertinent fields, as well as training for our community to do this work. I believe AAAR can be an effective example of support for diversity and representation.

I have been a member of AAAR for almost three decades, when I joined as a Stanford graduate student hoping "to change the world" with science. As a woman of color and first generation college graduate, I have experienced a lot of challenges in my career as a scientist and academic,

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

yet AAAR has always provided a safe haven for me. I have a lot of faith in this community, both in the quality of the science we produce and the humanity we possess. I invite you to support our efforts and to welcome our inaugural committee:

Lupita D. Montoya, *Chair*

University of Colorado

Herek Clack

University of Michigan

Sean Garrick

University of Illinois

Cesunica (Sunni) Ivey

University of California

Arantza Eiguren-Fernández, *Board Liaison*

Aerosol Dynamics Inc. •

An Open Letter from the AAAR Colorado State University Chapter on Increasing Diversity and Inclusion

Dear AAAR Leadership,

We, the CSU AAAR student/early-career chapter, are writing to ask the AAAR leadership to directly address and commit to working on improvements for racial diversity, equity, and inclusion within AAAR. As we are sure the AAAR leadership is acutely aware, 2020 has become a time for reckoning with racial prejudice, biases, and discrepancies in STEM fields, and in particular with Black scientists. Trending topics such as #BlackInTheVory highlights countless ugly, painful, and often unforgivable incidents between Black scientists and colleagues of other races, with both overt racism and microaggressions making the workplace unsafe and unwelcoming for many of our Black colleagues. These issues extend beyond the Black community to other minority communities in STEM, such as non-Black racial minorities, immigrants, and LGBTQ+ communities.

AAAR prides itself on providing a community of inclusion, as has been passionately stated by several members at annual meetings. Now is the time for our community to step forward and for AAAR to openly commit to creating a strategic plan for making our community diverse, equitable, and inclusive for everyone. We hope that this letter is one of many that the board is receiving at this time. We provide our suggestions here:

- We request more Black, Brown, Indigenous, Asian/Pacific Islander, as well as Middle Eastern and North African (MENA)

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(*Outgoing AS&T Editor-in-Chief*) | 4

Welcome Jonathan Reid
(*Incoming AS&T Editor-in-Chief*) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

scientist plenary speakers during the AAAR annual meetings. CSU AAAR board members **Drs. Anna Hodshire** and **Kelsey Bilsbak** have been attending since 2015. During that time, no Black or Latinx plenary speakers presented, while by our calculations ~72% of speakers were white and ~64% of speakers were male. Thus, gender equity among plenary speakers is improving (but could continue to improve) but racial equity seems stalled. We feel strongly that the voices of scientists from racial minorities groups who have not had the same opportunities as their White colleagues must have their voices amplified. While we also see importance in increasing broad membership of scientists from racial minority groups, it is also important to represent these voices in AAAR leadership.

- We request a strong statement from the board on race and equality. Currently, AAAR does not have a clear statement about diversity, equity, and inclusion on their website, although many members of the community have passionately stated their concern about these issues. There are many resources and models that AAAR may consider, such as the Embrace Pledge (<https://embracedifference.ert.eu/>), the ideas espoused in “A Call to Action for an Anti-Racist Science Community from Geoscientists of Color: Listen, Act, Lead” (<https://notimeforsilence.org/>), and others.
- We request that the committee include sessions, workshops, plenaries, and/or similar on racial diversity at the annual AAAR meetings. CSU AAAR chapter faculty advisor **Dr. Jeffrey Pierce** notes that at the 2019 Atmospheric Aerosols working group, members discussed having such special sessions and recommended this to the board. Hopefully, these are sessions currently in the works. The AAAR board may consider looking to models such as the GRC power hour as a starting place for these types of sessions.
- We suggest that a dedicated diversity, equity, and inclusivity social event be organized all future AAAR annual meetings. This will encourage members of the community to come together to discuss these topics and strategies for working towards them on a continuing basis. On a local level, we will commit to using a portion of our annual chapter funds for a dedicated diversity, equity, and inclusivity social event for our chapter members at CSU.
- We suggest that AAAR begin to work on ways to include undergraduates from underrepresented communities at the annual AAAR meeting. There are many models for this as well, including mentorship programs or scholarship programs that fund students to attend. One option could be looking to non-student AAAR members to donate a small amount of money per year to help support undergraduate attendance at the annual meeting. Graduate students or postdocs could also volunteer to travel around with some of the undergraduate students for part of the conference week. These types of programs are critical to increasing the number of racial minorities that are applying to graduate school. It is crucial, however, that if

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:
AAAR Website
Career Opportunities

these programs are taking place, that these undergraduates are able to interact with and see people from similar backgrounds presenting their science and that they feel wholly welcomed and included in the community.

- We encourage the AAAR leadership to reach out to various AAAR student/early-career chapters across America to ask them to commit to joining in these efforts. This may look like each chapter drafting their own diversity and inclusion statements, the creation of a broad model that chapters may adopt as their own, or some other possibility. These diversity and inclusion statements can be publicly included in a new section of the AAAR website devoted to these topics.

We appreciate the AAAR leadership taking time to consider and read through our letter, and would be happy to help facilitate some of these programs and to engage in further conversation. Although this letter is coming from the student/early-career chapter, the signatures below include other CSU AAAR members at the faculty and staff level and CSU AAAR alumni who also agree with and support our statements. ●

Sincerely,

The CSU AAAR chapter

CSU AAAR Board Members:

Ali Akherati **Kelsey Bilsback**

Anna Hodshire **Katelyn O'Dell**

CSU AAAR Faculty Advisor:

Jeffrey Pierce

CSU AAAR chapter members, alumni, and AAAR-affiliated faculty/staff:

Jeremy Auerbach	Delphine Farmer	Kathryn Moore
Katherine Benedict	Lauren Garofalo	Alex Naegele
Erin Boedicker	Leah Grant	Samuel O'Donnell
Jennie Bukowski	Jenny Hand	Matson Pothier
Gina Burd	Shantanu Jathar	Emily Ramnarine
Michael Cheeseman	Julieta Juncosa	Sagar Rathod
Jeff Collett	Jack Kodros	Mj Riches
Chelsea Corr	I-Ting Ku	Zitely Tzompa Sosa
Paul DeMott	Michael Link	John Volckens
Ashley Evanoski-Cole	James Mattila	

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

Introduction to Representation
and Equity Affairs Committee | 6

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

AS&T Article Highlight

By Kerry E. Kelly

“Comparison of three essential sub-micrometer aerosol measurements: Mass, size and shape”

Qi Yao, Akua Asa-Awuku, Christopher D. Zangmeister,
James G. Radney (2020), *Aerosol Science and Technology*,
Published online May 29, 2020.

<https://doi.org/10.1080/02786826.2020.1763248>

The ability to accurately measure aerosol physical and morphological properties, namely size, effective density and shape, in the submicron range has important implications for understanding aerosol interactions with climate, aerosol fate and transport, combustion particle formation and aging, and the health effects of aerosols. These properties can be measured with an aerodynamic aerosol classifier (AAC) for aerodynamic diameter, D_{ae} , differential mobility analyzer (DMA) for mobility diameter, D_m and aerosol particle mass analyzer (APM) for mass, m . In principle, any combination of two measurements yields the third measurement. These measurements also allow for the derivation of the particle effective density (ρ_{eff}) and dynamic shape factor (χ), as illustrated in Figure 1 of the article.

This study performed multiple combinations of tandem measurements (AAC-DMA, AAC-APM and DMA-APM) to determine m , effective density (ρ_{eff}) and effective shape factor (χ_{eff}) for solid, nearly spherical ammonium sulfate particles. Using all three instruments, the investigators also determined the dynamic shape factor (χ) and particle density (ρ_p) for an aged black carbon mimic, with substantially different characteristics, a condensed agglomerate comprising ≈ 30 nm spherical monomers.

The results indicated that the mass and size values determined by these three configurations vary by up to 10% causing the effective density to vary by up to 18%. More importantly, nonphysical values were sometimes found for the AAC-APM combination. Additional errors can occur, especially when utilizing an AAC and assuming a dynamic shape factor (χ). Atmospheric conditions (temperature and pressure) are also important because they affect the gas viscosity, mean free path and Cunningham slip correction factor and consequently affect D_m and D_{ae} . However atmospheric conditions are less important contributors to error than assumptions about the dynamic shape factor. They also found uncertainties in the effective dynamic shape factor often greater than 10% when utilizing a paired combination of instruments, although using all three instruments avoids these uncertainties. The authors conclude that understanding the differences associated with the three different methods is needed to harmonize methods, improve data agreement and enable quantitative comparability between studies.

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay

(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid

(Incoming AS&T Editor-in-Chief) | 5

Introduction to Representation
and Equity Affairs Committee | 6

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

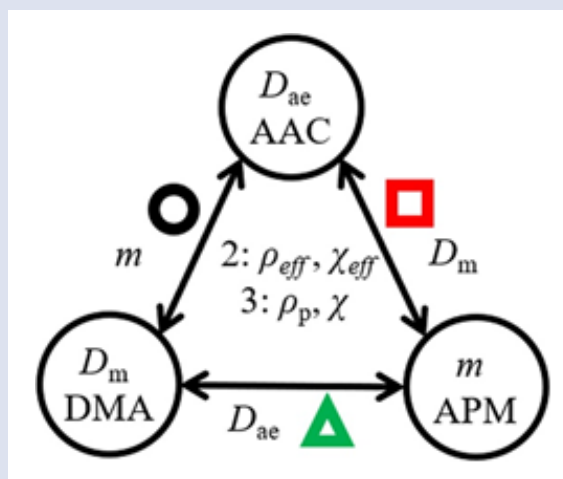


Figure 1.

Illustration of the instruments evaluated in this study and the corresponding measured values – mobility diameter (D_m), aerodynamic diameter (D_{ae}) and particle mass (m) – the tandem measurement pairs (connected by lines) and the corresponding derived values. Pairwise combination allows for determination of effective density (ρ_{eff}) and effective dynamic shape factor (χ_{eff}). The combination of all three measurements allows for the quantitative determination of the dynamic shape factor (χ) and particle density (ρ_p). The circle (black), square (red) and triangle (green) are used throughout the manuscript to denote the corresponding measurement results. ●

SAVE THE DATE

AAAR Annual Conference



October 18-22, 2021

Albuquerque Convention Center
Albuquerque, NM



continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

Introduction to Representation
and Equity Affairs Committee | 6

Letter from CSU: Increasing
Diversity and Inclusion | 7

AS&T Article Highlight | 10

Aerosol Scientist Spotlight:
Sergey Nizkorodov | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

Aerosol Scientist in the Spotlight

By Ben Murphy



Dr. Sergey Nizkorodov

Department Vice Chair and Professor of Chemistry
University of California Irvine

Co-Director, Atmospheric Integrated Research
UCI (AirUCI) Institute

Research Website:

<https://www.chem.uci.edu/people/sergey-nizkorodov>

1. How did you get involved in the aerosol science community?

Aerosols were not on my mind in graduate school because I was doing my PhD research on photodissociation of gaseous ions. During my postdoctoral appointments, first at CU Boulder with **David Nesbitt**, and then at Caltech/JPL with **Paul Wennberg**, **Mitchio Okumura** and **Stanley Sander**, my research interests shifted towards atmospheric chemistry and kinetics. I ended up going to a Gordon Research Conference on Atmospheric Chemistry in 2001, and there was a session on "Tropospheric Aerosols" with **Yinon Rudich** and **Pete McMurry** talking about organic aerosols and diesel particulate emissions. I was so fascinated by these presentations and by the engaging discussions after the lectures that I decided to do something risky: I wrote my faculty job research proposal about aerosols even though I have never worked with them before. I was fortunate to get a position in the Chemistry Department at the University of California, Irvine (UCI) in 2002. My first AAAR experience was the 2003 AAAR conference in Anaheim, CA, and I was blown away by how vibrant and accepting the AAAR research community was. I started coming nearly every year. Over time, I got involved into helping run this wonderful association, first by participating in working groups, and then through service on committees and the board of directors. Now, AAAR is without question my main professional association. I am always looking forward to coming to AAAR meetings, and try to bring my entire research group with me every year.

2. Which people or programs in our field have been the most influential to you and your path?

People who influenced me the most at UCI were **Barbara Finlayson-Pitts** and her late husband **James Pitts Jr.** who both supported me in various ways from the start, helped me navigate through the academic life, and pushed me to excel in my research and education work. I was entrusted with teaching atmospheric chemistry to UCI graduate students, and in the process, I learned a tremendous amount from book they co-authored: "Chemistry of the Upper and Lower Atmosphere: Theory, Experiments, and Applications". Two other people were important to my success in getting tenured at UCI: **Donald Blake**

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(*Outgoing AS&T Editor-in-Chief*) | 4

Welcome Jonathan Reid
(*Incoming AS&T Editor-in-Chief*) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

and **F. Sherwood Rowland**. It was a fantastic group of colleagues back then, and it is even better now! In recent years, **Annmarie Carlton**, **Celia Faiola**, **Manabu Shiraiwa** and **James Smith** joined the department, and it is a real pleasure to work with such a wonderful group! **Alex Laskin** and **Julia Laskin**, previously at PNNL and now at Purdue University, have been the most wonderful collaborators outside UCI for more than a decade. **Paul Ziemann**, who was presiding over AAAR from 2009-2010, was a critical person in terms of throwing me right in the middle of the AAAR action. For some reason (still unknown to me) he decided that I would make a good chair for a AAAR meeting. Paul gave me a call and convinced me that I could do it. Working on the 2011 AAAR meeting in Minneapolis was a truly eye-opening experience. I never realized there were so many moving parts in preparing a meeting. I now have an even stronger appreciation for the AAAR conference chairs than before that fateful phone call from Paul Ziemann.

3. We are now several months into a life-changing global-scale pandemic response. What aspects of this experience have stressed you the most professionally? Have you found solutions? Are there aspects that have affected you positively?

I am truly fortunate to be able to continue working during the pandemic, and working even harder than I normally do has been essential for keeping my spirits up. Having to work from home does have its benefits because it forces you to deviate from your normal routine and start exploring aspects of your life and work that you previously neglected. For example, I now have more time to read research literature, learn new educational tools, and read more books. Another way to get motivated is to get inspiration from some of our predecessors who had to do science under much harder circumstances than we experience now. A classic example we all know about is Nikolai Fuchs, one of the pioneers of aerosol science, who was arrested for political reasons during the most productive time in his science career, and had to do research while being detained for eight years. This has not stopped him from writing the most influential monograph in aerosol research later in life. My mentor James Pitts Jr. used to always say: "Keep moving so they can't draw a bead on you!" and this phrase is especially applicable under the current circumstances!

4. As the next President of AAAR, where do you see the association headed? Are you expecting any heightened or brand new challenges?

I am pleased that our Association is as strong as it has ever been, and I am privileged to help lead it into the future. It was very exciting to participate earlier this year in updating the strategic plan for AAAR for the next five years. Our Association stands on four strong pillars of excellence: improving member Engagement, promoting research Innovation, fostering Education and maintaining professional Integrity. Some of the critical tasks awaiting our Association in the next five years

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

include figuring out the future publishing format for our journal *Aerosol Science & Technology*, increasing the level of diversity of our members, and remaining at the forefront of aerosol science and technology. The pandemic will certainly have an effect on the way we run things, with a virtual conference this year, and likely increased reliance on online education and communication tools in the years to follow. The biggest challenge I expect is yet unknown effect on science funding in this country, but I remain that optimistic we will overcome this challenge.

5. What future directions are you particularly excited about pursuing?

I remain as excited as ever about research in general and aerosol chemistry research in particular. I am especially excited about photochemical processes occurring in and on aerosol particles. Photochemistry does not stop when molecules latch onto aerosol particles, and photochemistry in particulate matter turns out to be uniquely different from photochemistry of isolated molecules. There is a lot to do in this area for aspiring scientists, from laboratory experiments to modeling the effect of photochemistry on air pollution. ●

In Case You Missed It

By Gabriel Isaacman-Van Wertz

As the novel coronavirus, SARS-CoV-2, has swept through the country and the world, our community finds itself called upon to understand its spread. Almost overnight, the news filled with discussions of aerosol and droplet transport, filter efficiency, and particle size distributions. At the same time, the shutdown implemented to combat the pandemic has been a nationwide and worldwide perturbation experiment, providing new opportunities to understand anthropogenic impacts on air quality. In this issue, we highlight just some of the ways that our community has stepped up to offer our expertise, our tools, and our time. These stories are just the tip of the iceberg – the amount of work this community is doing to understand and mitigate the coronavirus is enormous and there is not enough room to list all of it.

Speaking out on airborne transmission and the importance of wearing masks

If you have been reading the news recently, you probably came across the name of **Linsey Marr**, Professor of Civil and Environmental Engineering at Virginia Tech. Her research

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

has focused on the transmission of viruses by aerosols and droplets, and how well they survive while suspended in the atmosphere. Drawing on this expertise, she has been busy answering questions for newspapers, public radio, and magazines. A major focus of her outreach has been to highlight the possible airborne transmission of SARS-CoV-2, which the World Health Organization has, up until recently, not recognized based on a narrow definition. She and other researchers in our community—**Lidia Morawska**, **Kim Prather**, **Shelly Miller**, and **Jose Jimenez**, to name just a few—are working to bring attention to this possibility through social media, public interviews, and scientific literature. Given the evidence for airborne transmission, many researchers have also been warning against relying only on social distancing, and advocating for the importance of wearing masks. Thankfully, airborne transmission is starting to be recognized, thanks in large part to a letter published by Drs. Morawska and Donald Milton in the journal *Clinical Infectious Diseases*, co-signed by many members of this community.

Read more on Twitter:

[@linseymarr](#)

[@ShellyMBoulder](#)

[@jljcolorado](#)

[@j_g_allen](#)

[@Don_Milton](#)

Read the letter signed by 239 scientists to the WHO, including many from this community:

<https://academic.oup.com/cid/article/doi/10.1093/cid/ciaa939/5867798>

Read more in the media:

<https://www.nytimes.com/2020/04/28/health/coronavirus-hospital-aerosols.html>

<https://www.nytimes.com/2020/07/04/health/239-experts-with-one-big-claim-the-coronavirus-is-airborne.html>

<https://www.the-scientist.com/news-opinion/the-covid-19-coronavirus-may-travel-in-aerosols-67380>

<https://www.washingtonpost.com/opinions/2020/05/26/key-stopping-covid-19-addressing-airborne-transmission/>

<https://www.theatlantic.com/ideas/archive/2020/05/how-will-we-ever-be-safe-inside/611953/>

Read more in the literature:

Joseph Allen and Linsey Marr. Re-thinking the Potential for Airborne Transmission of SARS-CoV-2. *Indoor Air*, in press, 2020. doi: 10.1111/ina.12697

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

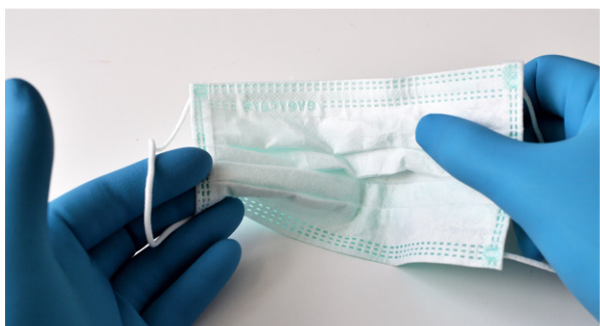
In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)



Lidia Motrawska, et al. How can airborne transmission of COVID-19 indoors be minimised? *Environment International*, in press, 2020. doi: 10.1016/j.envint.2020.105832

Stephanie J. Dancer, et al. Putting a balance on the aerosolization debate around SARS-CoV-2. *Journal of Hospital Infection*, in press, 2020. doi: 10.1016/j.jhin.2020.05.014.

Lidia Morawska and Junji Cao. Airborne transmission of SARS-CoV-2: The world should face the reality. *Environment International*, 139, 2020. doi: 10.1016/j.envint.2020.105730

Kimberly Prather, et al. Reducing transmission of SARS-CoV-2. *Science*, in press, 2020. doi: 10.1126/science.abc6197

Jeremy Howard, et al., Face Masks Against COVID-19: An Evidence Review. Preprints, 2020, 2020040203 doi: 10.20944/preprints202004.0203.v1.

Testing face mask materials and how to decontaminate them

The national shortage of personal protective equipment has led to all sorts of improvisation, particularly in the use of face masks. As health care workers have been forced to use masks in non-recommended ways and individuals have relied on homemade masks to keep themselves safe in their communities, everyone wants to know how well their masks are working. With expertise in measuring particles and filtration efficiency, many members of our community have put their instrumentation to work trying to answer these questions. Thanks to hard work from aerosol scientists across the country—Virginia Tech, Missouri University of Science and Tech, Georgia Tech, University of Chicago, the list goes on—we know that high-thread-count cotton is one of the better options for homemade masks. Other members of the community have been working to understand how to decontaminate high-efficiency masks like N95s without sacrificing their efficacy. Studies have found that spraying them with liquid disinfectants can lower filter efficiency, but disinfection with hydrogen peroxide vapor retains filter efficiency. While that might not be an option for many people, researchers in Taiwan used a rice cooker to decontaminate with dry heat, and found it does not reduce filter efficiency (though efficacy could be reduced if there is damage to the material that alters the fit).

If you want to get involved, here's a quick how-to guide for mask testing from Linsey Marr:

<https://docs.google.com/document/d/1eFkaliSLbbFzLwOgnTLr3CTfdN3KrVxAbZbJLS86-4o/edit>

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

Read more in the media:

<https://pwp.gatech.edu/rapid-response/face-mask-fabric-test/>

<https://news.mst.edu/2020/04/environmental-engineers-study-fabrics-materials-for-face-covers/>

<https://www.nytimes.com/article/coronavirus-home-made-mask-material-DIY-face-mask-ppe.html>

<https://www.the-scientist.com/news-opinion/n95-respirators-can-be-decontaminated-from-sars-cov-2-67437>

Read more in the literature:

Final Report for the Bioquell Hydrogen Peroxide Vapor (HPV) Decontamination for Reuse of N95 Respirators, <https://www.fda.gov/media/136386/download>

Abhiteja Konda, et al. Aerosol Filtration Efficiency of Common Fabrics Used in Respiratory Cloth Masks, *ACS Nano*, 14(5), 2020. doi: 10.1021/acsnano.0c03252

Tzu-Hsien Lin, et al. Filter quality of electret masks in filtering 14.6–594 nm aerosol particles: Effects of five decontamination methods. *PLoS One*, 12(10), 2017. doi:10.1371/journal.pone.0186217

Understanding impacts on air pollution

As businesses across the country all but shut down in March, the world embarked on an unprecedented air quality experiment. Traffic volumes and air traffic dropped, and fossil fuel consumption alongside them. Manufacturing slowed and factories reduced operations. These changes are expected to have huge effects on emissions of anthropogenic pollutants. However, the chemistry of the atmosphere is complex, and reductions in emissions are not always easy to directly translate into improvements in air quality. Now, several months into the shutdown, many researchers are exploring air quality data to understand actual impacts of curtailing human activities. Emissions of NO_x, a by-product of combustion, have dropped by more than half, reducing daytime levels of ozone, which is formed through NO_x-related chemistry. However, due to the complex relationships between atmospheric components, there have been unexpected outcomes as well. For instance, in some regions, nighttime ozone levels have increased because NO_x also serves to destroy ozone at night. Similarly, though some regions of China have seen large reductions in particulate matter, it's not clear the US is experiencing the same

continued ►

In This Issue

President's Message | 1

38th Annual Meeting Update | 3

Farewell Warren Finlay
(Outgoing AS&T Editor-in-Chief) | 4

Welcome Jonathan Reid
(Incoming AS&T Editor-in-Chief) | 5

**Introduction to Representation
and Equity Affairs Committee** | 6

**Letter from CSU: Increasing
Diversity and Inclusion** | 7

AS&T Article Highlight | 10

**Aerosol Scientist Spotlight:
Sergey Nizkorodov** | 12

In Case You Missed It | 14

Organizational Members | 18

Quick Links:

[AAAR Website](#)

[Career Opportunities](#)

improvement in air quality. These studies point to the decreasing role of vehicle traffic in US air quality due to their successful regulation, and the increasing complexity of managing regional air quality. The true impact of the shutdown on air quality likely won't be known for years to come, but these early studies provide exciting hints into what we will learn.

Read more:

<https://www.space.com/nasa-satellites-track-fossil-fuel-emissions-from-space-coronavirus.html>

<https://www.sciencedaily.com/releases/2020/05/200511124444.htm>

<https://news.ucr.edu/articles/2020/03/31/shutdown-brought-bluer-skies-more-nighttime-ozone-inland-empire>

<https://www.npr.org/sections/health-shots/2020/05/19/854760999/traffic-is-way-down-due-to-lockdowns-but-air-pollution-not-so-much> •

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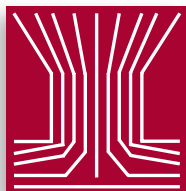


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