AES Newsletter

August 2015
Volume 20, Issue 2

Everything is Awesome...

when you join us at the AES and SciX conferences this fall!

Inside this issue:

Many thanks to our supporters and friends for their generous contributions.

Our traditionally strong meetings would simply not be possible without help from our supporters. Their donations are greatly appreciated.

Send news for the web page www.aesociety.org to our **Webmaster**

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Send news for the newsletter to one of our **Co-Editors:**

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FACSS PRESENTS SCIX2015 THE GREAT SCIENTIFIC EXCHANGE

Sept. 27-Oct. 02 | Rhode Island Convention Center Providence, RI

OVERVIEW

- **Technical program** topics include Microfluidics and Electrophoresis for Bioanalytical Applications, Bioanalytical Dielectrophoresis, Biopolymers in Electric Fields, and Microfluidic Electrophoresis Modes for Mass Spectrometric Analysis
- **AES Mid Career Award** in recognition of Adam Woolley
- **Poster session** with student awards

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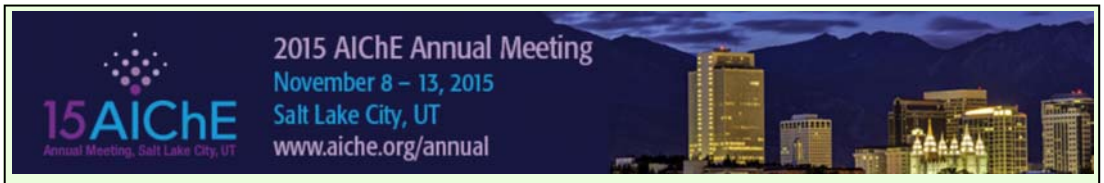
IMPORTANT DEADLINE

- **September 4** - Advance registration deadline

ORGANIZERS

Edgar Goluch, Department of Chemical Engineering, Northeastern University
Ryan Kelly, Pacific Northwest National Laboratory



OVERVIEW

- **Technical program** - 7 oral sessions and a poster session with student awards
- **Lunch with Leaders, Member Banquet, Informal Networking Social, Video Contest, Exhibitor Presentations (NEW!)**
- **AES Plenary and Award Sessions**

More on pages 3-5

IMPORTANT DEADLINES

- **September 28** - Early bird registration deadline
- **October 19** - Late breaking poster submission deadline

ORGANIZERS

Nathan Swami, Electrical & Computer Engineering, University of Virginia, USA
Michael Pycraft Hughes, Department of Biomedical Engineering, University of Surrey, UK

FACSS PRESENTS SCIX2015 THE GREAT SCIENTIFIC EXCHANGE

Sept. 27-Oct. 02 | Rhode Island Convention Center Providence, RI

For the sixth year, the AES Electrophoresis Society is co-organizing sessions with The Federation of Analytical Chemistry and Spectroscopy Societies (FACSS). We invite you to join us in Providence, Rhode Island for a program that includes an exciting mix of technical presentations student/postdoc posters, and a plenary award session. **See the complete preliminary program** at: www.scixconference.org/program/preliminary-program.

Technical Program at a Glance

Wednesday, September 30, 2015

9:15 am—10:55 am **Microfluidics and Electrophoresis for Bioanalytical Applications**
organized by Adam Woolley and Vishal Sahore, Brigham Young University

1:20 pm—3:00 pm **Microfluidic Electrophoresis Modes for Mass Spectrometric Analysis**
organized by Bryan Fonslow, Scripps Research Institute

3:50 pm—5:30 pm **Biopolymers in Electric Fields**
organized by Jason Dwyer, University of Rhode Island

Thursday, October 1, 2015

8:30 am—9:00 am **AES Mid-Career Symposium honoring Adam Woolley**
Organized by Ryan Kelly, Pacific Northwest National Laboratory

9:15 am—10:55 am **Bioanalytical Dielectrophoresis**
organized by Ning Wu, Colorado School of Mines and Hui Zhao, U. Nevada, Las Vegas

2014 AES Mid-Career Award

Please join us for a special symposium in honor of Adam Woolley, Professor of Chemistry and Biochemistry at Brigham Young University, who is the recipient of the 2015 AES Mid-Career Award.

Adam will give a presentation entitled *Microchip Electrophoresis: A Mid-Career Method?*

This recognition is given for exceptional contributions to the field of electrophoresis, microfluidics, and related areas by an individual who is currently in the middle of his or her career. **Congratulations Adam!**

Thanks to Our 2015 SciX Co-Organizers!!

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2015 AES ANNUAL MEETING IN SALT LAKE CITY

WELCOME FROM THE ORGANIZERS

Any city named after an ionic solution is surely in need of an electrokinetics conference… and so it has come to pass! This Fall, Salt Lake City, UT will host the 2015 meeting of the AES Electrophoresis Society, held once again in conjunction with the annual meeting of the AIChE.

The meeting, running 9th-11th November, features a packed program from the broad sphere of electrophoresis and related phenomena. Meet the big names in the field, catch up with colleagues and make new connections, in sessions ranging in topic from molecules to cells, DC to AC, electrode design to theoretical modeling. This is the big chance in 2015 to keep up with all that's happening in the electrophoresis community, in the Crossroads of the West!

Our plenary speakers again represent the diversity of our discipline, both in science and geography, with talks from Amy Herr, UC, Berkeley (Proteomics); Antonio Ramos, University Sevilla (AC Eletrokinetics); Sue Lunte, University of Kansas (Electrophoresis); and L. James Lee, Ohio State University (Electroporation).

We will also have a comprehensive social program including Lunch with Leaders (allowing the next generation of AES leaders to learn from the current generation in a convivial setting), the AES Banquet, and the chance to participate in setting the AES's direction with the annual Board Meeting.

So whether your interest is in CE or DEP, MS or PFGE, make a date with the AES at SLC!

Thanks to Our 2015 AES Annual Meeting Co-Chairs!!

Nathan Swami
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nswami@virginia.edu

Michael Pycraft Hughes
Professor
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University of Surrey, UK
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AES Members Receive Discounted Registration for the 2015 Annual Meeting!

Watch your email for a promo code to apply the member discount during your registration.

New members can obtain the promo code upon joining AES.

Visit the AES website for more information and detailed registration instructions.

AES Workshops at the 2015 Annual Meeting

An exciting slate of pre-conference workshops are under development, to be held immediately prior to the conference on Sunday, November 8. Please stay tuned, more details are coming soon!

TECHNICAL PROGRAM AND AES EVENTS AT A GLANCE

All sessions will be held at the Salt Palace Convention Center, Ballroom E.
https://aiche.confex.com/aiche/2015/webprogram/Symposium3824.html.

Monday, November 9, 2015

9:00 am—10:00 am	**Electrokinetics for Protein Separation and Analysis**
10:15 am—11:00 am	**Electroporation and Electrophysiology**
11:30 am—12:30 pm	**Lunch with Leaders**
1:00 pm—3:00 pm	**Electrokinetics for Cellular Separation and Analysis**
3:15 pm - 5:00 pm	**Electrokinetics for Sample Preparation**
6:00 pm - 7:30 pm	**Poster Session and Award Presentations**

Tuesday, November 10, 2015

8:30 am—11:00 am	**Electrokinetics in Non-polar Media**
11:15 am—12:30 pm	**AES Business Meeting**
1:00 pm—3:00 pm	**Electrokinetics and Microfluidics for Biomolecular Analysis**
3:15 pm-5:00 pm	**Plenary Session: AES Electrophoresis Society**
6:00 pm—9:00 pm	**Society Banquet**

Wednesday, November 11, 2015

9:00 am-11:00 am	**Electrokinetics: Advancing the Fundamentals**
1:00 pm-3:00 pm	**Soft Matter Electrokinetics: Particles, Drops and Bubbles**
3:15 pm-5:45 pm	**Award Session of the AES Electrophoresis Society**
6:00 pm-7:00 pm	**Informal Networking Gathering**

DON'T MISS TUESDAY'S AES PLENARY SESSION!

Amy Herr

Lester John and Lynne Dewar Lloyd Distinguished Professor of Bioengineering

University of California, Berkeley

(Proteomics)

Antonio Ramos

Professor of Electromagnetism

Faculty of Physics

University of Seville

(AC Electrokinetics)

Sue Lunte

Ralph N. Adams Distinguished Professor of Chemistry

The University of Kansas

(Microchip Electrophoresis)

James Lee

Helen C. Kurtz Chair in Chemical & Biomolecular Engineering

The Ohio State University

(Micro/nanofluidic Electroporation)

Hsueh-Chia Chang

Bayer Professor of Chemical & Biomolecular Engineering

University of Notre Dame

(Nanofluidics for microRNA analysis)

PLEASE JOIN US FOR WEDNESDAY'S AES AWARD SESSION

Recognizing the Contributions of Prof. Cornelius F. Ivory

Cornelius F. Ivory earned his BS in Chemical Engineering at the University of Notre Dame in 1974 and his PhD at Princeton University in 1980 followed by a year as a USRA Visiting Scientist in the Bioseparations group at NASA's Marshall Space Flight Center. After starting his academic career at the University of Notre Dame, in 1987 he found his home in the School of Chemical Engineering and Bioengineering at Washington State University, where his research group develops multidimensional separation platforms using microfluidic/nanofluidic labchips.

Last year he became the inaugural Paul M. Hohenschuh Distinguished Professor of Chemical Engineering in the Voiland School of Chemical Engineering and Bioengineering, and continues to serve as Associate Director of the NIH Predoctoral Training Program in Protein Biotechnology at Washington State University, and as Senior Fellow in the Biomedical Engineering Center at the University of New Mexico. He has served as National Program Chair for the American Chemical Society (3 years) and as Councilor for the American Electrophoresis Society (8 years) as well as organizing various symposia and/or sessions for those societies and others, organizing and/or serving on various proposal review panels, editorial boards and technical workshops. Dr. Ivory has more than 90 refereed publications, 200 oral presentations at technical meetings, 10 patents awarded and several more patent applications pending.

During his 30-odd years full-time in academia, he has divided his time roughly as follows: 40% teaching undergraduate and graduate core and elective courses, 50% research and 10% administration. Virtually all of his research has been funded by external grants and performed by graduate students and post-docs. Currently he is funded as PI by grants from NSF, NIH, DOD and through the Washington State Life Science Discovery Fund.

Two New Opportunities from AES and *Biomicrofluidics*

AES is pleased to announce that we will be teaming with the *Biomicrofluidics* journal to offer two exciting new opportunities for AES members participating in this year's Annual Meeting.

Special Issue of *Biomicrofluidics*. The *Biomicrofluidics* journal will publish a Special Issue centered on this year's annual meeting at Salt Lake City, Utah. This issue will be guest-edited by meeting organizers: Nathan Swami and Mike Hughes. Manuscript submissions for Fast Track Communications, Research Articles, Reviews and Perspectives are due by **Monday, January 5, 2016**. Contributions will be made available online immediately after acceptance, and will be scheduled for publication in a Special Issue in May 2016. All manuscripts will undergo the usual peer review process handled by the guest editors and session chairs of the meeting, in accordance with standard editorial procedures of the *Biomicrofluidics* journal.

Art in Science Award. The *Biomicrofluidics* journal invites submissions of images and/or vides towards an "Art in Science" award by **October 15**, for award announcements during the AES Electrophoresis Society Annual Meeting. This event is designed to teach/inform members of the scientific community about an electrically-driven technique or method. The image or video can be artistic but should contain enough information so that the technique is reproducible by a person with general scientific knowledge and access to the appropriate equipment.

Check your email for additional details and submission instructions coming soon!

Technology Focus

Highlighting new technologies of potentially broad interest to AES members.

With GelApp, Say Goodbye to Band Size Estimations!

by Samuel Gan

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Training interns and new staff in molecular biology is no easy task. There are often queries on whether the protein or PCR product is of the right band size. Many standards exist for both nucleic acid and protein electrophoresis, and it is not always easy to remember the marker sizes corresponding to each band. These issues motivated us to develop a mobile app that takes advantage of the smartphones most of us carry with us to deliver convenient and accurate size analysis of gel electrophoresis images.

Electrophoresis has been used to separate biomolecules like nucleic acids and proteins for many decades. Although sophisticated image analysis can be performed, the majority of routine size estimates are still performed by comparing band sizes of unknown samples to known standards by eye. Even today, many scientific publications report roughly estimated band sizes obtained in this way. While better quantification methods exist (e.g., plotting displacement of the standards on a log-scale and interpolating to determine unknown band sizes), they can be laborious and inconvenient depending on the kind of information needed. Availability of improved and easy to use sizing methods can help in many areas, including detection insertions and deletions in genes.

Leveraging on the imaging and computational capabilities of smartphones, we have sought to create a proof-of-concept app — GelApp [1] — that functions as a mobile gel documentation device. GelApp is a free Android and iOS mobile application that automatically detects and quantifies gel electrophoresis bands for “on-the-go” gel documentation, with the goal of facilitating quantitative biological research by providing more accurate band sizes. Through novel implementation of Gabor filters, better isolation of faint bands from noisy background features can be achieved than is possible using conventional image analysis methods (Fig. 1).

Once the bands in a marker standard are isolated, they can be plotted on a logarithmic scale so that the sample band sizes can be calculated more accurately (Fig. 2). Combined, these features help increase the reproducibility, productivity, and accuracy of gel electrophoresis analysis using a convenient instrument that every scientist already carries in his or her pocket.

The plot function takes the $\log_{10}$ of the marker band molecular weight (in bp or kDa) as the Y-axis and the distance of the bands from "edw" (in pixels) as the X-axis. A linear fit to these data generates an equation from which the sample band molecular weights can be determined. The calculated values can then be displayed next to the band on the final gel image.

As proof-of-value, we have published a scientific paper using figures generated from GelApp in the journal *Electrophoresis* [2]. Video and user guides to help users become familiar with the advanced image processing methodology of Gabor filtering, and show how the app can be used to generate publication-quality images. For smoothest operation, we recommend that images for GelApp be stored on DropBox so that they can be accessible on both iOS and Android platforms.

Mobile apps are making an increasing impact on biomedical research [3] and promise to revolutionize it further. This incredible potential has led us to develop GelApp, as well as other tools including DNAApp [4], DNA2app, and Psychvey (all freely available). We hope mobile-device analysis will become the new norm for routine laboratory characterization, replacing ubiquitous “eyeball” methods.

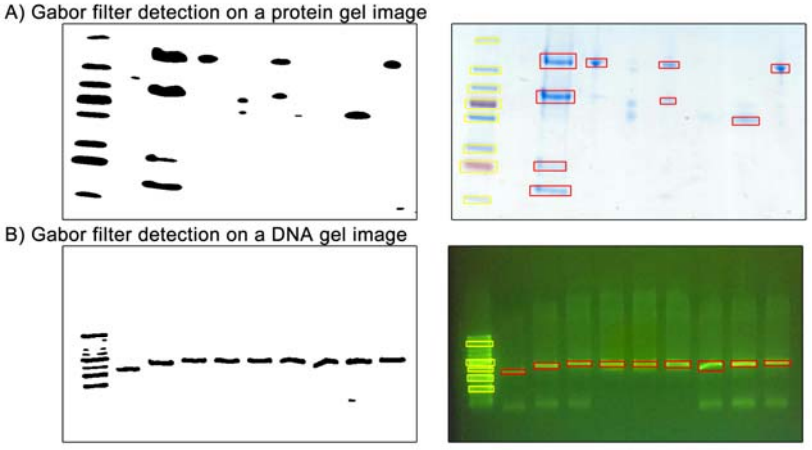


Fig. 1. GelApp applies Gabor filtering and detection for isolation of bands in (A) protein and (B) DNA gel images.

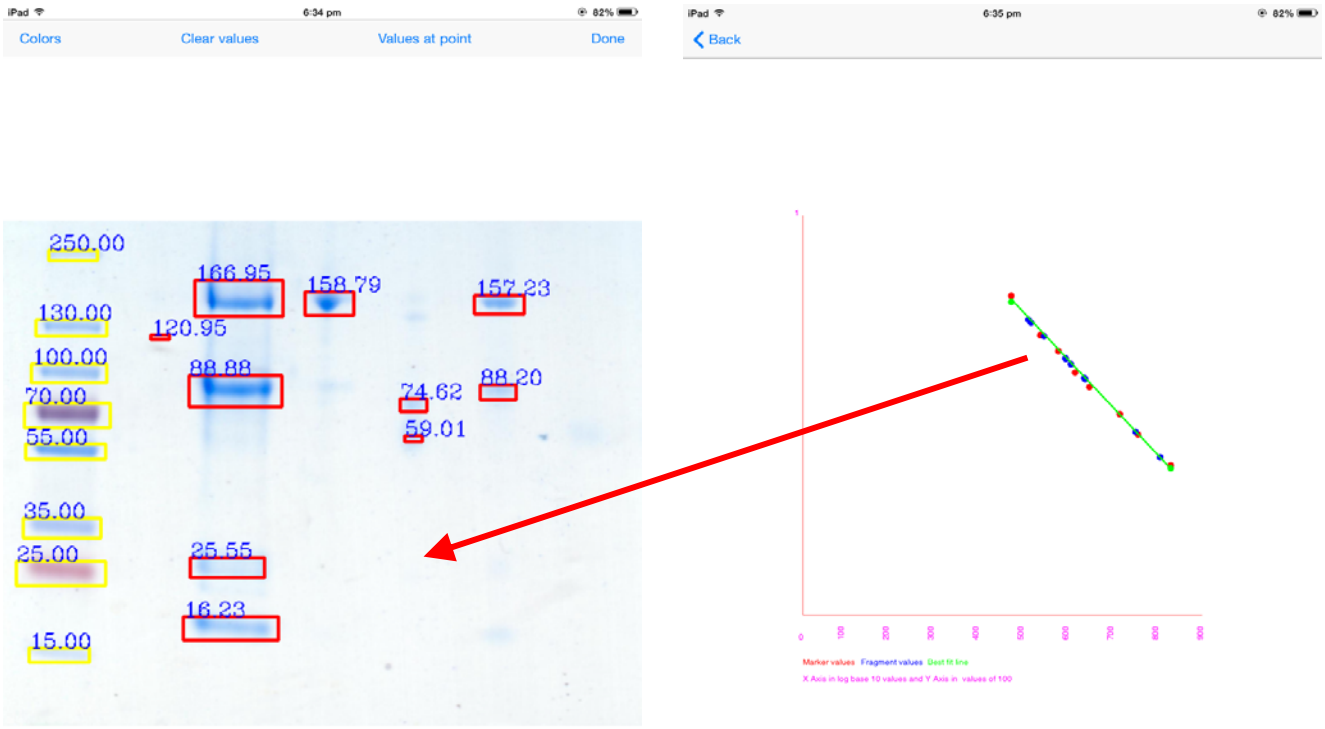


Fig. 2. GelApp uses known standards in a gel image to enable convenient sizing of unknown sample bands.

Availability

GelApp for Android and iOS are available on the Google Play Store and Apple App Store free as 'GelApp'. More details on the app can be found at www.facebook.com/APDLab; www.bii.a-star.edu.sg/research/trd/apd.php.

The GelApp user guide is available at http://tinyurl.com/GelApp, and a video tutorial is also available on the Google Play Store.

References

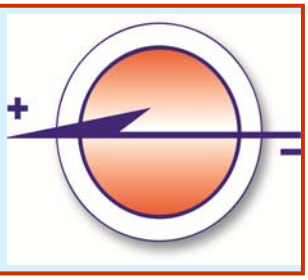
[1] J.-Z. Sim, P.-V. Nguyen, H. K. Lee, and S. K.-E. Gan, "GelApp: Mobile gel electrophoresis analyser," *Nature Methods*, Apr. 2015.

[2] W.-L. Ling, W.-H. Lua, and S. K.-E. Gan, "Fast reversible single-step method for enhanced band contrast of polyacrylamide gels for automated detection," *Electrophoresis*, 36 (2015): 1224-1227.

[3] "Use of Smartphone Apps for Biomedical Research - BioSpectrum Asia," 01-Jun-2015. [Online]. Available at http://www.biospectrumasia.com/biospectrum/opinion/220592/use-smartphone-apps-biomedical-research. [Accessed: 01-Jun-2015].

[4] P.-V. Nguyen, C. S. Verma, and S. K.-E. Gan, "DNAApp: a mobile application for sequencing data analysis," *Bioinformatics*, 30 (2014): 3270–3271.

*Dr. Samuel Gan is Assistant Principal Investigator at the Bioinformatics Institute, Agency for Science, Technology, and Research (A*STAR); and Adjunct Researcher, p53 Laboratory, A*STAR, Singapore*



Membership Focus

What does the AES offer its members: An opportunity to serve.

by Cornelius F. Ivory

P*aul M. Hohenschuh Distinguished Professor of Chemical Engineering in the Voiland School of Chemical Engineering and Bioengineering, Washington State University, Pullman, WA,* cfivory@wsu.edu

We live in a world where the demands on our time can be overwhelming. Beyond our families and jobs, which are already 24/7, the value of paying dues to an organization that wants you to travel to a meeting, sit through talks, and possibly give one yourself may not be apparent. What is the value in doing this? Below I outline the reasons we provide this society for electrophoresis

Students. As an university educator, the answer is clear to me: the AES meetings provide a chance for my lab group, including me, to present our work to an audience that has the background to appreciate what we do. This year, I'll bring a graduate student who will give a poster. She's not ready to give an oral paper yet but, since there is a formal competition, she'll get feedback on her poster presentation that will prepare her for her first oral presentation, maybe as soon as next year.

Exhibitors. At past AES meetings, I had the opportunity to fiddle with demo equipment. While I did buy a LabSmith microfluidics platform at the 2011 meeting in Minneapolis, and I always ogle the gadgetry at the exhibits; exhibiting at AES is more about contact than it is about that (N+1)th sale. The face-to-face interaction between AES members and exhibitors lets members know what resources are available and what's coming in the near future; it lets members describe their immediate and anticipated needs and then write them into future proposals. It also lets vendors know what new ideas are emerging in the field of electrokinetics and how their products can compliment them.

This year at the 2015 Annual AES meeting in Salt Lake City, Utah, the meeting organizers, Nathan Swami and Michael P. Hughes have set aside one hour lunch reception slots for exhibitors to afford them an opportunity to present their products to the meeting attendees in an informal setting. Interested exhibitors should contact the meeting organizers (nswami@virginia.edu).

Junior Faculty. AES has a long history of launching new faculty forward in their careers. AES offers tenure-track faculty the opportunity to present their best work to an audience of their peers, an audience that is grounded in the fundamentals of theory and practice. It is likely that someone in the room has reviewed your manuscript; possible that they have reviewed your proposal, and will see it again. You have the opportunity to present your work in greater detail, address questions at length, and show your audience the depth of your thinking. It is likely that you will meet some of the people who will affect your career.

Among the junior faculty who present at our meetings, we try to identify those who are ready and willing to organize whole AES sessions. When you run a session, you have extraordinary visibility, especially among the 5-7 speakers you selected. You may have a plenary speaker in your session or invited speakers; there might be money for registration or travel to the meeting. Perhaps one of them will write a letter for your promotion package.

Companies. AES provides companies access to talent at all stages of education. Meetings are a chance to preview, talk to, interview, and recruit, students, post docs, scientists, etc., who have the skillset(s) your company needs. The community of AES researchers train problem solvers who are steeped in the fundamentals, who are articulate, and who are familiar with the latest technology.

AES also provides training opportunities including short courses, hands-on workshops, or invited papers that your engineers/scientists need to attend or to present. As an AES member, you have direct access to AES officers, our business meeting, and our meeting Banquet. Take a look at the program grid. Tell us how we can serve you.

Mid-career Faculty. When you run a session, you have extraordinary visibility. When you run an entire meeting, not only does this amplify your visibility, but you can also leave your mark on the field. Is there an emerging area that we need to include in our program? One that we have overlooked? One that is important to our members? As symposium chair, you have some flexibility in the session topics and chairs, member volunteers to help out or even take the reins, as well as experienced meeting organizers who've been through the hoops. Seem intimidating? Talk to some of our members who have done it and subsequently moved forward in their careers.

Senior Faculty. Bring your students to the meeting; give a paper; run a session; chair an entire symposium that defines the future of the field. If you've done all this, you may already be an AES officer or councilor. If you are not, consider serving: another chance to make your mark (start at the business meeting; see our program grid for times).

AES broadly provides opportunities to program or to serve in the broader AIChE organization, or SciX, or one of the other organizations that the AES will co-program with in the future.