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AES NEWSLETTER

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Many thanks to our sponsors for generous contributions.

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Our traditionally strong meetings, with sessions strengthened by invited plenary speakers discussing state-of-the-art topics, would simply not be possible without help from sponsors. Their donations are greatly appreciated.

25th Anniversary American Electrophoresis Society Meeting

We are pleased to announce the 2008 annual AES meeting will be held in Philadelphia, PA. Our 25th anniversary meeting is being held in conjunction with the 100th anniversary American Institute of Chemical Engineers (AIChE) annual meeting. The AES meeting is Topical 3 and consists of 11 sessions running Monday, November 17 through Thursday, November 20. The program is at http://aiche.confex.com/aiche/2008/techprogram/meeting.htm. To register, fill out the registration form at the AIChE website http://www.aiche.org/Conferences/AnnualMeeting/index.aspx. AES will accept abstracts for submissions to the Topical 3 Poster Session with late-breaking results until October 1. We have several awards available for outstanding poster presentations. If interested in making a late submission, please send an email to smurthy@coe.neu.edu and jonthan.posner@asu.edu. AES, with financial support of our sponsors GE Life Sciences and Bio-Rad Labs, is pleased to support travel expenses of eight students and young scientists. Applications for travel awards can be made at www.che.msstate.edu/research/MDERL/application.php. See page 3 announcement for details. Dr. Ian Blair will be leading an afternoon tour of the Proteomics Core Facility at the University of Pennsylvania on Tuesday, November 18th. Tickets can be purchased when you submit your AIChE registration. Please attend an evening with AES colleagues and friends at the annual AES banquet being held at Maggiano's Little Italy restaurant on Wednesday, November 19th. Tickets are $50.00 and can be purchased along with your AIChE Registration. We look forward to seeing you at this year's meeting.

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Challenges in High Resolution Multi-dimensional Electrophoresis for Proteomics: From the Macro- to Micro-Scale

by John K. Osiri and Steven A. Soper, *Louisiana State University*

Significant efforts are being invested into developing new and innovative technologies directed toward handling large-scale proteomic-based discovery projects for generating new biomarkers that can be used for the diagnosis and prognosis of various diseases. Due to the complexity of most proteomes in terms of the enormous number of different components required to be analyzed, high demands have been placed on the associated technology platforms. As an example, the mammalian serum proteome contains an estimated number of different protein components exceeding 10,550,000.[1] Therefore, top-down or bottom-up proteomics in many cases requires, as the first stage in the processing pipeline, the ability to separate intact proteins using multi-dimensional electrophoresis. The multi-dimensional format is typically adopted because it can generate high peak capacities. Multi-dimensional separations utilize a format in which orthogonal separation mechanisms are used to sequentially sort the components contained within the sample. The work-horse of most multi-dimensional separations for proteomics has been based on two-dimensional electrophoresis using iso-electric focusing (IEF) in the first dimension, which sorts proteins according to their iso-electric points, and sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), which sorts the proteins according to differences in their molecular weights. In most cases, this separation is performed in a macro-scale version (~22 cm length gels) due to its relatively high peak capacity generated by the high degree of orthogonality between the individual separation dimensions and also the long separation lengths producing high plate numbers. However, microchip electrophoresis platforms are viewed as attractive alternatives to their macro-scale counterparts in spite of their shorter separation lengths.[2,3] One of the attractive aspects of these planar chip formats is the ability to integrate other processing steps onto the chip to reduce operator sample handling.[4] Examples from the literature have demonstrated the ability to integrate several of the proteomic processing steps onto a chip. Foote and co-workers fabricated a microdevice that electrophoretically pre-concentrated fluorescently-labeled proteins prior to SDS micro-capillary gel electrophoresis (μ-CGE) using a porous silica membrane as the pre-concentrator.[5] Dahlin and co-workers fabricated a poly(dimethylsiloxane) microchip in which six-peptide mixtures, dissolved in a physiological salt solution, were desalted, separated, and sprayed into a mass spectrometer for identification via peptide mass fingerprinting.[6] Figeys *et al.* reported a glass microfluidic system in which protein digests were introduced and separated in individual channels and sequentially forwarded to a micro-scale electro-spray ionization mass spectrometer.[7] Researchers have also focused efforts on transitioning multi-dimensional separations to microchips for generating high peak capacities of intact proteins required for many proteomic assays. Work in our group has generated a peak capacity of 2,660 using a polymeric microchip for the multi-dimensional separation of a fetal calf serum (FCS) sample in less than 30 min (see Figure 1).[8] The microchip was fabricated in poly(methyl methacrylate) using hot embossing from a metal master.[9] In this 2D format, co-migrated effluents were injected from an SDS μ-CGE 1st dimension into a micellar electrokinetic capillary chromatography 2nd dimension using SDS as the pseudo-stationary phase. As a comparison, a similar separation of the FCS sample was conducted using a conventional slab gel and IEF/SDS-PAGE. The macro-scale version produced a peak capacity of only 717 and required a ~30 h run time (see Figure 1).

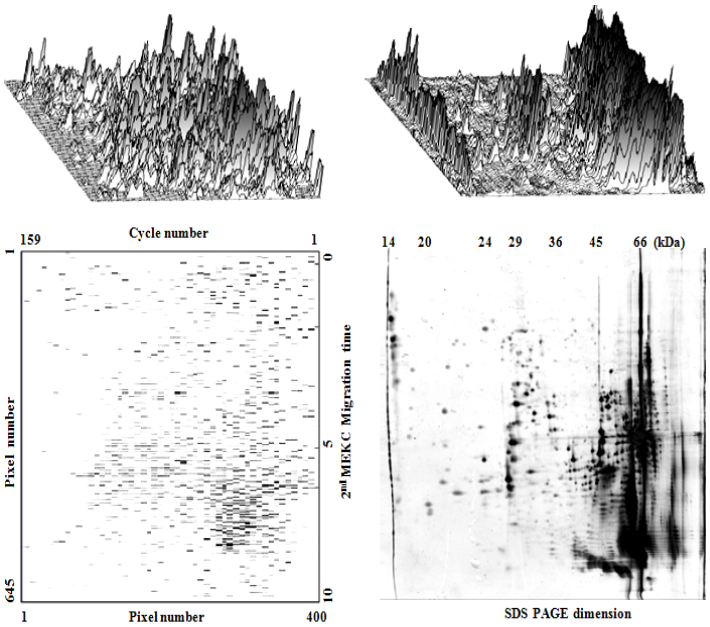

Figure 1. *Left:* Microchip 2D separation of the FCS proteins. 2D SDS μ-CGE × MEKC was performed at 300 V/cm and 400 V/cm, respectively. A 10 s separation time in the 1st dimension was allowed prior to performing serial 10 s MEKC cycles. A total of 159 MEKC cycles was required using a 1 s transfer time from the 1st to the 2nd dimension. The bottom panel shows a 2D map of the image displayed from the 3D landscape view (see top panel). The proteins were labeled with a fluorescent dye that covalently targeted the thiol group of cysteine amino acid residues. *Right:* Conventional 2D slab gel profile of the FCS proteins (bottom panel) and the corresponding 3D landscape view (top panel). The proteins were stained with Ag for visualization.

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Review of the 2007 Meeting of the American Electrophoresis Meeting by David Garfin

Abstract: Presentations at the 2007 meeting of the American Electrophoresis Society dealt with many aspects of this key separation technology. In total there were three plenary speakers, two invited talks, 85 technical talks, and 14 posters in a five day meeting. The three plenary speakers presented their work with each of them discussing somewhat different multiplexed proteomics approaches. The invited speakers discussed ways to improve resolution and shorten running times in proteomic and genomic separations. And the proteomics technical talks described applications of 1D and 2D gel electrophoresis, capillary electrophoresis, and micro-scale platforms. This report is limited to a small number of those presentations that dealt directly with proteomics. (Note that a review of microdevice presentations will appear in the *Journal of Capillary Electrophoresis* Minerick, A., V. Ugaz, S. Murthy, & J. Posner, "Review of Electrophoresis and BioMEMS in 2007: American Electrophoresis Society 24th Annual Meeting," *in press*, 2008.)

From: *Expert Reviews in Proteomics*, 5: (3) 385-387, 2008.

For a full reprint of Dave's article, email reprints@expert-reviews.com or go to the Expert Reviews in Proteomics website: www.expert-reviews.com/toc/epr/5/3.

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Travel Grant Announcement

This year, thanks to generous contributions of sponsors Bio-Rad Laboratories and GE Healthcare, the AES will provide *eight* travel grants in the amount of $500 each.

The awards will be:

- Merit-based - A statement of worthiness will be required from applicants for travel awards. The people requesting travel money must be AES members.
- Prioritized - The awards will be made in the order of: Students, Post Docs and Faculty Members. Funding will be restricted to one person per research specialization /group.

Statements need to be received by September 15 to the meeting organizers (see front page for email addresses). The travel grants will be awarded by October 1.

Poster Award Announcement

The board unanimously approved awards for best student posters at the AES Poster Session in the amounts of:

First Place: $200

Second Place: $100

Third Place: $50

Honorable Mention: $25

Deadline for late-breaking abstracts is October 1. Please send abstracts to the meeting organizers (see front page for email addresses). Judging will take place Tuesday 11/18/08 at the AES Poster Reception. A panel of 3 judges will be selected from the AES board. This year the winners will be announced at the start of the Wednesday morning session, not at the end of the poster session.

Membership Invitation

Please join the AES! Only $75 for the remainder of this year plus all of 2009! Contact Matt Hoelter at matt-aes@tds.net or fill out the registration form on our website www.aesociety.org

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Election Announcement:
Vice President and two Councilors are needed!

A Changing of the guard is scheduled at the November 08 meeting. Our distinguished President, David Garfin, will pass the gavel to the current Vice President, Victor Ugaz, and the position of Vice President will open up. To ensure continuity, Dave will stay on the council as Past-President, replacing Nancy Kendrick. In addition, the 2-year terms of two councilors, Neil Ivory and Steven Soper, have come to an end.

What the Councilor positions entail: The 3-year position of AES Councilor doesn't take a lot of time but nevertheless is quite important to the Society. The Council includes the President, Past President, Secretary, Treasurer, six Councilors, and three non-voting members (Executive Director, Webmaster and Newsletter Editor). The council meets formally in person at the annual meeting, and throughout the year by email and telephone conference. Important issues are discussed by the Council as they arise. After full consideration a vote is taken and a course of action implemented. It's also an opportunity to interact with a dynamic and intellectual group. Contact David Garfin, President (degarfin@sonic.net), by email if you wish to nominate a member or run yourself for AES Council. Please attach a biographical sketch to the message suitable for an email ballot along with a photo

What the Vice President position entails: The Vice President serves as President Elect and automatically becomes President after 2 years. Although it is customary for current or former councilors to run for the position of Vice President it's not mandatory. If you are interested in running for VP, don't hesitate to contact David Garfin (degarfin@sonic.net) with a statement of goals for the society as well as a biographical sketch suitable for an email ballot plus a photo.

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Many thanks to our President, David Garfin, and Councilors Neil Ivory and Steven Soper, whose terms expire in November. They've done a terrific job!

Members in the News: **AES's 2008 Meeting co-chair, *Jonathan Posner*, wins 2008 NSF Career Award!** His group is studying the nonlinear dynamics of electrophoretic deposition of colloidal crystal films to create novel, electrophoretic separation media for DNA and proteins. See: www.fulton.asu.edu/fulton/news/page.php?sid=444. **Longtime AES member *Marcia Goldfarb* featured in ACS Press Release!** Her article in *J Proteome Research* provides insights into early consumption of cows' milk and Type 1 Diabetes. See: www.aesociety.org/pubs/diabetes.php.