



# Beneath the AVS Surface

Members Source for Materials, Interfaces, and Processing News & Information



January 2012 Issue

**In Memorium**  
[Remembering AVS Electronic Services Assistant Steve Barker](#)

**Publications Highlights:**  
[Editorial for the First Springer Biointerphases Volume](#)

[Spacial Atomic Layer Depositions Assembly Line Debut](#)

[Patterning Under Pressure: Researchers Test a New Way to Manufacture Nanoscale Metal Patterns without the Need for a Vacuum](#)

**Nothing Matters**  
[Check Out AVS Connects Online Buyer's Guide](#)

**Membership Highlights:**  
[Call for 2012 Award Nominations](#)

[Changes to ASSD Student Awards](#)

[Message from 2011 Outgoing ASSD Chair](#)

**Conference Reports:**  
[ICMCTF Proceedings Available Online](#)

[NC Research Triangle Area MRS/ASM/AVS 2011 Symposium](#)

[EIPBN 2012](#)

[Forward to a Friend](#)

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## In Memorium

**Remembering AVS Electronic Services Assistant Steve Barker**  
*By Yvonne Towse, AVS Managing Director*

AVS suffered a terrible loss on January 11, 2012--Steve Barker, AVS Electronic Services Assistant (59), passed away suddenly and unexpectedly, leaving the AVS staff and community shocked and devastated. Steve began working for AVS on April 18, 2001.



*Steve Barker  
1952-2012*

*AVS Will Remember Your*  
♥ *infectious smile and laughter*  
♥ *jovial character* ♥ *positive can-do attitude* ♥ *love for family, friends, dessert trays, the NY Yankees, and AVS.*

When we hired him we knew he wasn't your typical IT guy; he had suffered an injury in his last position that left him unable to perform the required duties and he decided to reinvent himself by finding a new career. He took the initiative to step outside his comfort zone and try something new, take on more, do better, work to develop new skills.

In the years that followed, Steve became a vital and integral part of the AVS team and he was one of the most hard working dedicated people we have ever known. Steve provided tremendous support to Keith Mitchell in managing the AVS website and supporting the IT systems for the AVS New York, California, and North Carolina offices. He managed all division and chapter elections, provided a very high level of support to our chapters, groups, and divisions in maintaining their websites, was our resident Adobe and Access expert, and provided endless support to all AVS staff and to me in my capacity as Managing Director. He was always ready, willing, and able to assist with any given task.

Steve took so much pride in his career and he started each day bursting with excitement and enthusiasm about the new projects coming his way. His positive, upbeat, can-do attitude was highly infectious and he was a beacon of light to all of us. He had a youthful exuberance and excitement whether it be over a new task, a staff meeting, the Symposium, or any new opportunity AVS afforded him. He would never say no to a tasty treat (especially macaroni and cheese, lobster ravioli, or carrot cake) and he adored his NY Yankees! We have many wonderful memories and Steve stories that will keep us smiling in the years ahead.



## Special Alert Regarding 2012 Membership

Please remember to [renew](#) your membership for 2012 as the grace period ends on February 1. Please do not lose your membership benefits.

Click here for the [online renewal form](#).



## Upcoming Events

### Florida Chapter Meeting

March 5-6, 2012  
Orlando, Florida  
[Website](#)

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### ICMCTF 2012

April 23-27, 2012  
San Diego, CA  
[Website](#)

### PEC 2012

June 3-6, 2012  
Dallas, TX  
[Website](#)

### AVS 59

Oct. 28-Nov. 2, 2012  
Tampa, FL  
[Website](#)

[Event Calendar](#)  
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AVS is not your typical office--we have a very small staff, we know each other very well, and we are truly a family. We have a strong tie that binds us from our many years together, sharing the joys, heartbreaks, and stories of our lives on a daily basis and Steve was well known, well-loved and appreciated by all.

Although we will continue to grieve for Steve in the days ahead we will also remember how blessed we were to have had him in our lives even if too briefly. Sadly, he left us much too soon but we must take this opportunity to look at his life and the kind of person he was and to follow the example he set- to look at each day with a fresh, positive outlook, to find our inner joy and try to reflect it in all we do each day. Steve was an amazing person with a huge zest for life and the biggest smile we have ever seen. He was a gift and the kind of person everyone should have on their staff and in their lives. Just seeing him every day motivated us and made us happy.

Steve, we thank you for 11 wonderful years in the AVS family filled with success, smiles, love, and laughter-it was an honor, a pleasure, and a privilege to work with you ... the memories will last forever, you will always live on in our hearts and we will never forget you.

We welcome you to review (and post messages and photos on) [Steve's AVS Memorial Website](#).

[return to top](#)

## Publication Highlights

### Editorial from the First Springer Biointerphases Volume

Dear Readers,

I want to thank you for your ongoing interest and your contributions to Biointerphases, which by now is not a "start-up" anymore, but is an established and competitive communication platform for the Biointerface Community. Our Impact Factor--still rising--competes with other established journals, and we are now a recognized publication, as reflected in the increasing number of submissions. Starting with this volume, Biointerphases is published through the SpringerOpen Library ([www.springeropen.com](http://www.springeropen.com)). With our new publishing partner, Biointerphases will be part of a large family of journals and books serving the needs of the biomaterials, biomedical and biophysical communities. Otherwise, nothing has changed: we remain an open access journal dedicated to quantitative interface science; we are owned by the non-for profit professional society AVS; and the same Advisory Board, Co-Editors and Editor which have successfully led the Biointerphases over the last years will continue to serve the journal and its readers. Most importantly, our editorial policy--quality over quantity--will continue to be enforced, and our goal remains to publish papers as fast as possible, i.e. within 45 days.

In the next years I expect an even more rapid growth due to the partnership with Springer, who is committed to strongly promoting Biointerphases as one of the SpringerOpen journals. So please continue to read our journal, and send your comments and best manuscripts to [Biointerphases](#). I ensure you that your work will be seen, read and quoted!

Our new partnership with Springer will be kicked off with an *In Focus* issue on "Nanomedicine", followed later in the year by an *In Focus* issue on "The Future of Biosensors". If you have suggestions for an *In Focus* issue, please let me know so we can consider it.

With my best wishes for a successful and peaceful New Year,  
Michael Grunze, Biointerphases Editor

[return to top](#)

### Spatial Atomic Layer Deposition's Assembly Line Debut

A research boom has landed a relatively new manufacturing technique, called spatial atomic layer deposition (or spatial ALD), a spot on the assembly line.

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Traditional atomic layer deposition allows researchers to put thin coatings of a material onto a substrate's surface with atomic-level control over the thickness of the material layers. "You can follow the topology of a material exactly" with ALD, says Paul Poodt, senior research scientist at TNO (the Netherlands Organization for Applied Scientific Research) and spatial ALD pioneer. The newer technique has the same quality control, but is several times faster, and it can be incorporated more easily into existing manufacturing processes, expanding the technique's usefulness to a wider range of applications.

Spatial ALD's research boom came about a few years ago, Poodt says, as a result of efforts by silicon solar cell companies to reduce the cost of cells by making silicon crystal wafers thinner. "When doing this, you introduce a lot of defects that limit the efficiency of the cell," he says. One way to repair these atomic-level defects is to apply a so-called "passivation layer," a coating of aluminum oxide a few nanometers thick. Traditional ALD gave the best results but was too slow to fit into the rest of the manufacturing process. "There was a definite need for a faster technique," Poodt says. Some companies were designing new production lines with a blank spot for a system that hadn't been invented yet.

Within the space of about a year, between 2007 and 2008, three independent groups of researchers from different institutions came up with the idea for a faster process that would become known as spatial ALD. In traditional ALD, chemical reactions take place on the surface of a material put into a chamber flushed with a reacting gas. Between each step, the chamber must be "purged" with a neutral gas to avoid contamination. Spatial ALD saved time by getting rid of the purge steps: the devices separated reacting gases into different chambers and typically moved the substrate back and forth between them. (As it turns out, a group of Finnish researchers beat all three groups to the patent, having come up with a similar, but forgotten, concept in the late 1970s.) The first few machines - small-scale versions of the method that are being used for development purposes - have been sold to solar cell manufacturers, and there is a high demand for more. Several designs for spatial ALD devices are currently in progress by groups all over the world. Poodt and other leading spatial ALD researchers, from institutions in the Netherlands, Finland, and the United States, discuss some of these recent advances in a review article for the [Jan/Feb 2012 edition of the Journal of Vacuum Science and Technology A](#).

Though his team started by designing machines that could be used by the silicon solar cell industry, Poodt has lately been focusing on using spatial ALD for flexible electronics - "the next killer application [of spatial ALD] after the passivation of silicon crystals." The coating of aluminum oxide that can restore the surface of silicon solar cells can also be used to protect electronics from becoming degraded by water in the atmosphere while allowing them to maintain their flexibility. There are still a number of technical challenges to overcome - for example, making the aluminum oxide form its thin film on a polymer substrate - but Poodt says he hopes the first examples of spatial ALD devices that can be used for flexible electronics can be sold in the market in a few years.

Now that ALD is becoming a faster technique, Poodt says it is being considered for work that it never would have been considered for before. "There are examples where people did not think of ALD in the first place, because it is very slow," he says. He believes there will likely be even more uses for the method in the future - "uses researchers haven't imagined yet."

**Article: ["Spatial atomic layer deposition: A route towards further industrialization of atomic layer deposition," J. Vac. Sci. Technol. A 30 \(1\), Jan/Feb, 2012](#)**

▣ [return to top](#)

### **Patterning Under Pressure: Researchers Test a New Way to Manufacture Nanoscale Metal Patterns without the Need for a Vacuum**

Computers, cell phones, and many other electronic devices are made possible by tiny chips inscribed with nanoscale circuit patterns. Nanoscale patterns can also help scientists speed up chemical reactions and manipulate light, but the

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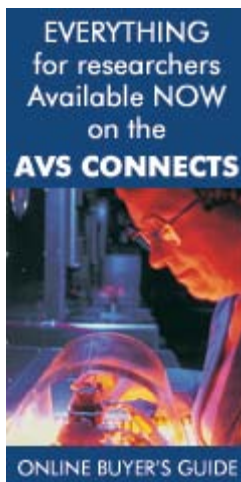
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costs of producing the patterns can be high. Now a team of researchers from Case Western Reserve University, in Cleveland, Ohio, has demonstrated a new way to create tiny patterns that eliminates an expensive requirement of some other manufacturing processes: the vacuum. The team's new techniques could help pave the way to low-cost mass production of nanoscale patterned films at atmospheric pressure.

As a first step in the new process, the Ohio researchers created thin films of polymer laced with positively charged metal ions. By supplying free electrons in the gas phase to reduce the ions in select locations, the team could then create a pattern of crystalline metal in the film. Pure electron beams might seem like a natural source for the necessary negatives charges, but because specialized and expensive vacuum systems are required to generate such beams, the team turned its attention to plasma discharges instead. Plasmas contain ions and other highly reactive particles, in addition to electrons, but the researchers found the jumbled mix could successfully reduce the metal ions in the polymer film without oxidizing the film. Perhaps more importantly, the plasma could be generated at ambient temperature and pressure, greatly reducing the processing costs.

Initially, the research team tested their idea by exposing the films directly to the plasma. The direct approach produced patterns with line widths as small as 30 micrometers, but also caused unwanted heating and sputtering of the film. In order to separate the film from the punishing heat of the full plasma beam, the team developed a way to extract just a small portion of the plasma current. "The new process is gentler and cleaner," says Mohan Sankaran, a professor of chemical engineering at Case Western who helped lead the project.

Another aspect of the team's new approach was to use a mask to create patterns, as opposed to moving the plasma beam to write directly on the film. To get help with the masking techniques, Sankaran's group partnered with the lab of Philip Feng, a professor in the Electrical Engineering and Computer Science Department at Case Western, and an expert in mask fabrication. "We combined Professor Feng's masking techniques with a novel plasma source that my group developed to produce the nanoscale patterns," says Sankaran. So far, the team has created patterns of silver particles approximately 150 nanometers in size. They describe the new approach in a paper appearing in the [Jan/Feb edition of the Journal of Vacuum Science and Technology B](#).

The key advantages of the process are that it takes place at ambient temperature and pressure, is a single step whereby metal is reduced directly as a film, and is scalable for large area fabrication, notes Sankaran. As a next step, the team plans to experiment with ways to optimize the mask geometry to ensure quality pattern transfer and reduce the width of the pattern even further.

**Article:** ["Extraction of a low-current discharge from a microplasma for nanoscale patterning applications at atmospheric pressure," J. Vac. Sci. Technol. B 30 \(1\), Jan/Feb, 2012](#)

[return to top](#)

## Nothing Matters

### Check Out AVS Connects Online Buyer's Guide

AVS is pleased to announce that we have launched the first year of [AVS Connects](#) online buyer's guide in partnership with MultiView, Inc., the leading provider of digital media solutions for the association world.

From sputtering systems to light sources, connecting with the best suppliers has never been easier than with the [AVS Connects](#) online buyer's guide. [AVS Connects'](#) comprehensive database, specific to the science and technology of materials, interfaces, and processing, makes finding relevant results effortless. Tap into the incredible network of AVS with the premier online search tool and directory for researchers.

If you have any questions or are interested in learning more about how to feature your company in the *AVS Connects*, please call 800-816-6710 or e-mail [AVS@MultiView.com](mailto:AVS@MultiView.com).

[return to top](#)

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## Membership Highlights

### AVS 2012 Call for Award Nominations

#### Professional Awards Nomination Deadline:

**March 31, 2012**

Do you know people in areas of interest to AVS, who should be recognized for?

- **Outstanding research:** Medard W. Welch Award
- **Outstanding discoveries and inventions:** Gaede-Langmuir Award ; this award will be given biennially in even-numbered years.
- **Outstanding contributions to the solution of technological problems:** Albert Nerken Award
- **Outstanding research or technological innovation with emphasis on the fields of thin films, plasma processing, and related topics:** John A. Thornton Memorial Award; this award will be given biennially in odd-numbered years.
- **Outstanding theoretical or experimental work by a young scientist or engineer:** Peter Mark Memorial Award
- **Outstanding performance in technical support of research and development:** George T. Hanyo Award
- **Sustained and outstanding technical contributions:** Fellow of the Society
- **Eminent service to AVS:** Honorary Membership

#### Graduate Student & Divisional Award Nominations Deadline:

**May 2, 2012**

Outstanding research by a graduate student: Society Student Awards including several Top Level Awards: Dorothy M. and Earl S. Hoffman Award, Nellie Yeoh Whetten Award, Russell and Sigurd Varian Award, Dorothy M. and Earl S. Hoffman Scholarships. In addition, Graduate Research Award and numerous Divisional Awards in technical areas of interest to AVS are available.

Beginning in 2010, students may apply for a National Student Awards (Graduate Research Award/Top Level Award) and one Division Group Award in a given year. There will be one [application form](#) and package. For details and application forms please visit [www.avs.org](http://www.avs.org).

### Changes to ASSD Student Awards

The Applied Surface Science Division (ASSD) of AVS is pleased to announce changes to the ASSD student awards. Details are provided below. Please inform you colleagues and friends of the changes--help spread the word.

- If the ASSD has more than three student award candidates, the ASSD Student Award Committee Chair will ask the student candidates (presenters) to submit a four-page paper which will be used to down select the number of finalists to three. The ASSD encourages each of the award candidates to submit their original paper to *JVST* in parallel with the submission to the ASSD Award Committee Chair. A copyright transfer agreement will be needed for the *JVST* submission, but not for the Award Committee review. We will strive to have the accepted manuscripts posted online in *JVST* prior to the AVS International Symposium and Exhibition.
- The ASSD will pay the meeting registration costs (full week) for each of the three finalists.
- The ASSD will highlight the three ASSD student award finalist presentations in the technical program.

Final judging will be performed based only on the capsule presentations, which will take place at the Tuesday night ASSD business meeting. The awards will be announced and issued at the end of the Tuesday night business meeting.

- The student that wins the best presentation award in year 'X' will be provided complimentary meeting registration in year 'X'+1 and ASSD will ask the award winner to give an invited talk *in a session co-sponsored by ASSD* in the 'X'+1 program.

▣ [return to top](#)

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### Message from 2011 Outgoing ASSD Chair

*By Vincent Smentkowski, AVS 2011 ASSD Chair*

As I complete my term as Chair of the ASSD, I wanted to thank our Executive Committee Members for all of the time and effort they put into strengthening the ASSD; I would also like to thank our membership for providing feedback and suggestions, as well as attending many of our 2011 events .

The main accomplishments for 2011 included: the launch of the new ASSD web page, surveying the ASSD membership and implementing some changes based upon the feedback; having a multi-year plan for our annual Surface Analysis meeting (chapters have expressed interest in hosting SA14 and 15 and are working on proposals); formation of a new committee to chair the future Quantitative Surface Analysis (QSA) meetings; and changing our student award process (and increasing the awards) with the objective of engaging new students (as outlined in the article above). I am also glad to report that the ASSD made a profit in 2011.

It has been my pleasure to work with the ASSD executive committee members and to serve as the 2011 Chair of ASSD.

The ASSD technical program for AVS 59 (2012) is very strong with many new sessions. I am glad to see that ASSD is interacting more with other divisions such as Thin Film, Surface Science, and Nanometer-Scale Science/Technology (and continuing to have strong interactions with Biomaterial Interfaces Division). We also are engaging and growing our "sector based" population by championing two Focus Topic symposia (and helping with most of the other Focus Topic symposia).

Looking forward, we have plans to increase funding, engage students and young professionals, and to continue to add content to our web page (including, but not limited to more member sketches, tutorials, testimonials on how surface analysis helped solve problems, etc). I am also glad to see that we have a very strong slate of future executive committee candidates. The division, with a clear strategy and a strong committee, is placed for future success. I am certain that ASSD will grow and remain vital under the leadership of Amy Walker in 2012 and Steve Pachuta in 2013!

▣ [return to top](#)

## Conference Reports

### ICMCTF 2011 Proceedings Available Online

Starting January 1, 2012, the ICMCTF 2011 Proceedings are available with complimentary open access for 16 months on the websites of the Elsevier journals *Thin Solid Films* and *Surface and Coatings Technology* at:

[Volume 206, Issue 7 \(2011\)](#) and [Volume 520, Issue 5 \(2011\)](#)

Throughout the next 16 months, until April 30, 2013, anyone can view, download, and print published 2011 conference papers. Open access, which is provided by ICMCTF, means that people world-wide can download and read our conference publications at no charge. Such wide distribution enhances the visibility of our proceedings and will increase article citation rates.

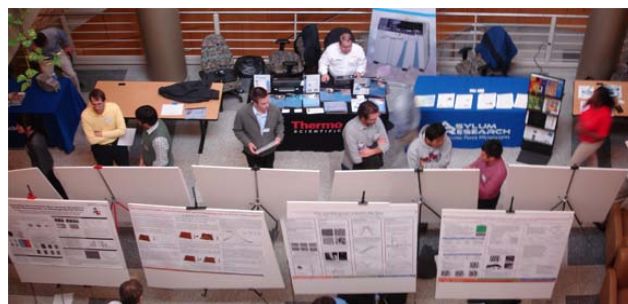
The open access agreement, implemented for the first time this year, is a substantial benefit for ICMCTF authors and readers. Please also note that there is no longer a page limit for conference papers.

[return to top](#)

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## NC Research Triangle Area MRS/ASM/AVS 2011 Symposium November 18, 2011 North Carolina State University Centennial Campus

The 2011 MRS/ASM/AVS symposium was held November 18 on NC State University's Centennial Campus. Once again, the meeting had excellent attendance and achieved record levels of student participation with 40 student posters and 3 student oral presentations.



One of the highlights of the meeting was an invited talk by AVS president-elect Alison Baski on the "Current Role of Professional Societies." Through vendor and society chapter support, a total of \$2,000 in prizes was awarded to the student presenters, including an AVS Mid-Atlantic Chapter prize of \$1,000 to help a student attend the 2012 AVS International Symposium in Tampa. The winner of the AVS Mid-Atlantic Chapter award was Marcus Kramer of NC State for his poster on "Biomaterials Modification of a Tissue Construct Using Novel Dip-pen Nanolithography Techniques." The symposium included exhibits by 12 equipment vendors, the AVS, and the analytical groups at UNC, Duke, and NCSU. For more information and access to the program and abstracts, please visit <http://www.ncsu.edu/aif/asm/mrs/>

This annual meeting is a joint symposium for local chapters of three societies: Materials Research Society, ASM International, and AVS. The aim of the meeting is to provide exposure to current developments on a range of topics that include materials science, textiles, and bio-engineering. The meeting is typically attended by about 100 students, faculty, and professionals. The organizing committee includes representatives from NC State University, University of North Carolina at Chapel Hill, Duke University, North Carolina A&T, and RTI.

[return to top](#)

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## 55th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN 2011) May 31-June 3, 2011 Las Vegas, Nevada

*By Richard Blaikie Program Chair, EIPBN 2011*

The 55th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication was held in Las Vegas, Nevada, from May 31 to June 3, 2011. The conference received technical co-sponsorship from AVS in cooperation with the IEEE Electron Device Society and the Optical Society of America (OSA).

EIPBN, commonly known as 'three beams' is the premier conference for the early dissemination of high-impact/high-quality information on the science and technology of nanopatterning and associated electron, ion or photon-beam

technologies (the 3 beams). The technology of nanoscale manufacturing now also includes nanoimprint technology, and engineering molecular structures that grow and replicate themselves. The conference consistently brings together over 500 engineers and scientists in industry, academia, and government from all over the world to discuss interdisciplinary issues at the forefront of these areas.

The first Call for Papers for the 2011 conference was distributed on September 22, 2010. Abstracts were due by Monday, January 10, 2011--409 abstracts in total were received, of which approximately 66% came from universities. The abstracts are reviewed by volunteers and the program organizers. There were 144 papers accepted for oral presentation and 205 for poster presentation. The 2011 conference received abstracts from 21 countries. Papers presented at the EIPBN conference and that pass peer review are published in the Nov./Dec. issue of the *Journal of Vacuum Science and Technology*.

The conference began by remembering Professor Franco Cerrina, a longstanding contributor to the conference and a member of the Advisory Committee and who passed away in July, 2010. In the plenary session that followed Dr Nicholas Economou, PointSpectrum Inc., highlighted the technological and economic developments that led to the Helium Ion Microscope becoming a successful product for microscopy and lithography. Dr Sam Sivakumar, the Director of Lithography at Intel Corp., then looked forward to the future device scaling and lithography requirements for manufacturing microprocessors in a talk entitled "Moore for Less: Lithography for the 15nm Node and Beyond." Other poster and oral sessions followed, where state-of-the-art work was presented in electron and ion beams, nanostructures, nanoimprinting, nanoelectronics, nanophotonics, nanobiology, patterned media, modeling, resists, directed assembly, maskless lithography, metrology and imaging, microfluidics, EUV, and emerging technologies. A special 'entrepreneurs challenge' was also held to allow teams of researchers to present their ideas for new companies they hoped to form to take advantage of advances in fabrication technologies.

The high quality technical program for this conference would not have been possible without the hard work and dedication of many people. Many thanks go to members of the Steering and Advisory Committees, as well as the Section Heads and others who made invaluable suggestions for topics and invited speakers. Special thanks to those who helped perform the critical reviews of abstracts and manuscripts, ensuring the high quality of the conference and the proceedings. I would like to thank Richard Tiberio for his help with the Program Guide, Rich Gerber at softconf.com for his help in customizing the conference software, and Melissa Widerkehr and her staff for their invaluable assistance with the technical program. Their outstanding work is greatly appreciated. Nancy Schultheis and Tonya Yandle, at the *Journal of Vacuum Science and Technology* are largely responsible for coordination and the publication of the proceedings--thank you also for your excellent work.

Financial support for the conference and for student travel was provided by a significant number of corporate and institutional sponsors. These include ACS, ASML, Cambridge NanoTech, FEI, JEOL, KLA Tencor, Nikon, NSF, Raith USA, SEMATECH, Tescan and Vistec. Zyvex Labs generously supported the annual micrograph corporation, with John Randall deserving recognition for his work in organizing and running this event. Thanks also to Hank Smith for coordinating our NSF support proposal, Don Tennant, Cornell University, our financial trustee, and to Alan Brodie, Leo Ocola, Rob Illic, and Brian Whitehead who co-chaired the commercial session. Particular thanks must also go to Martin Feldman for organizing the virtual job fair for students.

I particularly thank the Conference Chair, Alan Brodie, for choosing such a wonderful location for the 55th EIPBN Conference and working so hard to make it a success. I'm grateful to Liz Dobisz, Martin Feldman, Cynthia Hanson, and all the Steering Committee for their help with the program, and I wish the best of luck to Reginald Farrow and Mike Fritze with EIPBN 2012 in Hawaii. Finally, I welcome the newest members of the Steering Committee, Ted Fedynyshyn, and Karl Berggren.