On behalf of the AVS community, we invite you to participate in, and submit an abstract to, the 60th International Symposium & Exhibition (AVS-60), to be held in Long Beach, California, October 27-November 1, 2013.

The AVS Symposium is a full-week conference; we anticipate having 20-15 parallel sessions sponsored by 10 divisions, 2 technical groups, and 16 focus topics surrounded by an extensive equipment exhibition and a wide range of networking and career advancement events. We encourage you to contribute to these exciting sessions and events and submit your abstract before the deadline on Monday, May 6, 2013.

This year's Symposium promises to be more exciting and forward-looking than ever with feature programming in cutting edge topical areas in addition to the core AVS technical program. Running concurrent with the symposium, for the 60th we have organized a range of new Focus Topics (FTs) featuring state-of-the-art research on:

- Accelerating Materials Discovery for Global Competitiveness
- Advanced Imaging of Cell and Bacteria Interactions with Surfaces
- Atom Probe Tomography
- Biomolecules at Aqueous Interfaces
- Ions at Aqueous Interfaces
- Nanoparticle-Liquid Interfaces
- Synchrotron Analysis

In addition, we have the following exciting FTs continuing in areas of:

- Actinides and Rare Earths
- Spectroscopic Ellipsometry
- Energy Frontiers
- Graphene and Other 2D Materials
- Helium Ion Microscopy
- In situ Spectroscopy and Microscopy
- Scanning Probe Microscopy
- Transparent Conductors and Printable Electronics
- Tribology

If your work focuses on any of these leading-edge surface and interface research areas - then AVS-60 is the place to showcase your advances!

Nanoscale science and technology is a prevailing theme throughout the symposium, as the properties and processing of nanoscale materials are strongly affected by surfaces and interfaces. The use of nanostructured materials is ubiquitous and ranges from energy harvesting to electronic, optical
or biomedical devices. Three quarters of the planned program encompass various aspects of Nano Science and Technology. If you work in or with Nano, consider submitting an abstract to one of many sessions on nanoscale science and technology. AVS-60 is also highlighting cutting research in the field of biological surface science. We start with the Biomaterials Plenary on biomembranes and new tools to look at nanoscale features of biointerfaces. This is a prelude to several Focus Topics on non-linear optics techniques applied to biointerface science and super resolution imaging of cells and bacteria at surfaces. Also covered is a comprehensive program on new developments in biomaterial surface science including research on cell and biomolecule interactions with surfaces, including the latest research on QCM, and much more!

The foundation of the AVS is vacuum science and technology, which over the years has evolved into the use of controlled and sophisticated environments for quantitative measurements and processing of material surfaces and interfaces. While there are many direct links to vacuum science and technology in many of the program topics, controlled environments and measurements are now being applied to a spectrum of in vacuo, in situ, in operando, and in vivo systems. If your work involves the development of controlled environments, the processing of interfacial systems, or quantitative interfacial analysis - from vacuum, to plasmas, to biological systems, then the AVS is the venue where you need to present your work!

As you examine the Call for Abstracts, we are certain that you will see many sessions that will interest you and still many others that will be a perfect fit for your latest research. We think that you will benefit greatly by participating in this Symposium and networking with the rest of the AVS community. We look forward to receiving your abstract and seeing you in warm, sunny Long Beach!

### Publication Highlights

**Pushing the Envelope: New Findings Will Help Researchers Develop Next-Generation DRAM Memory**

*Article: "Considerations for further scaling of metal-insulator-metal DRAM Capacitors," Journal of Vacuum Science and Technology B31, January/February 2013*

Society's insatiable need for faster, smaller processors to run our everyday electronics is pushing the limits of a key memory component of these devices called Dynamic Random Access Memory (DRAM). To achieve additional functionality and boost the performance of DRAM the enabling technologies must be scaled down while keeping the cost of memory the same. Recently, significant progress in the scalability of DRAM has been made, and now a team of researchers at Imec in Belgium has developed an approach that can push the technology to its ultimate scaling limits.

Until now, progress was based on conventional scaling and modifications to the three main components of the DRAM memory cell: the cell transistor, the cell capacitor and the periphery transistor. The major technical challenge in optimizing performance of the DRAM cell capacitor is reducing the "electrical" thickness of the insulating layer to boost capacitance density and hence the amount of charge (i.e., information) stored in the capacitor while maintaining leakage currents through thicknesses sufficiently large that the stored charge does not deplete. Very high dielectric permittivity insulating films are used to balance these requirements and, to further maximize the capacitor area, manufacturers employ integration schemes with more complicated, 3D shapes that limit further downscaling of the DRAM capacitors, bringing about a third challenge: developing capacitors with maximum specified physical thickness. This constrains all layers of the capacitor, particularly the insulating dielectric, and is in direct conflict with maintaining the leakage currents, the focus of this research.

"The approach taken by our research team stipulated that the ultimate leakage of the MIM capacitor would be determined by the so-called direct tunneling, which depends on several parameters: (1) physical thickness of the dielectric layer, (2) the metal/dielectric barrier, and (3) effective tunneling mass."
explains Dr. Ben Kaczer, a member of the research team. "While other optimization efforts focused on the first two parameters, this work focused on the third." Using dielectric film candidate materials titanium oxide (TiO) and strontium titanate (STO) as examples, Dr. Ben Kaczer and his colleagues have demonstrated that the effective tunneling mass is a critical parameter for further DRAM MIM capacitor scaling.

The next step is to find dielectric materials with sufficiently high effective tunneling mass, a parameter not well known in most dielectrics. The Imec research team provides a blueprint to use first-principle calculations for extracting this parameter, which allows quick testing of larger numbers of dielectric materials. A detailed understanding of which particular properties of the dielectric affect the effective tunneling mass will help maximize this parameter by adjusting these properties. Imec is already working with collaborators in industry on follow-on research and development.

These findings will allow researchers to push the technology to its ultimate scaling limits and develop next-generation DRAM-type memories, which in turn will translate into more powerful daily-life applications requiring huge amounts of processing memory. Dr. Kaczer concludes, "Increased capacity can make possible memory-hungry applications such as natural control of digital appliances and smartphones, including voice and gesture, augmented reality, searching and indexing, high-definition entertainment and video communication."

Membership Highlights

AVS Has Two New Student Chapters

Two new Student Chapters were approved by the Board of Directors at the January meeting: Florida International University and Dallas Metroplex. AVS started Student Chapters in 2003 to provide university students tailored opportunities for career and professional development. If you want to join an existing Student Chapter or start a Student Chapter AVS will be happy to assist. The list of current chapters are:

- Dallas Metroplex
- Florida International University
- Northwestern University
- UCLA
- University of Alabama at Tuscaloosa
- University of Central Florida
- University of Florida
- University of Illinois at Urbana-Champaign
- University of Washington

AVS 59 Presentations on Demand Now Available Free to Members

A collection of focus topic audio recordings (with the synchronized PowerPoint presentations) from this October's AVS 59 International Symposium & Exhibition are now available online to AVS members. To enjoy this new membership benefit, please follow the link below, create a new user profile, and provide the designated coupon code.

Click Here to View
AIZ 2013 Call for Award Nominations

Professional Award Nominations Deadline: March 31, 2013
Do you know people in areas of interest to AVS, 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**
- Outstanding theoretical and/or experimental research of interest with special emphasis on surface processes at a fundamental atomic and molecular level, as well as outstanding leadership at the international level: **Theodore E. Madey Award** for Surface Science and Scientific Exchange Deadline May 2, 2013
- Sustained and outstanding technical contributions: **Fellow of the Society**
- Eminent service to AVS: **Honorary Membership**

Student & Divisional Award Nominations Deadline: May 6, 2013
Outstanding research by a graduate student:
The AVS National Student Awards include five (5) top-level awards and three (3) Graduate Research Awards (GRAs). The top-level AVS Graduate Student Awards include: Russell and Sigurd Varian Award, Nellie Yeoh Whetten Award, Dorothy M. and Earl S. Hoffman Award and Dorothy M. and Earl S. Hoffman Scholarships. In addition, numerous Divisional Awards in technical areas of interest to AVS are available.

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 the [AVS Awards Website](AVS Awards Website).
Nothing Matters

NCCAVS Seeking Volunteers for Expanding Your Horizons Program

Expanding Your Horizons (EYH) program is looking for a "Few Good Women" who know that science is a great career and want to tell that to the next generation. If you know a woman (or two!) who can volunteer, please contact Kathy Arnold, kvarnold.avs@gmail.com, as soon as possible. All you need to have is enthusiasm. If you have a daughter who might be interested, click a link to a conference below.

- "We did cool things by sucking air out of the bell jars."
- "We got to see how vacuum can freeze things"
- "I liked that we got to blow stuff up"
- "We learned really cool things about vacuum and air pressure"

These are quotes from questionnaires filled out by attendees of a recent EYH conference. For those of you who are new to EYH: In a one day conference EYH introduces junior high girls to a variety of science disciplines and demonstrates that science is fun. The Northern California Chapter of AVS (NCCAVS) is very proud to participate in this program. The NCCAVS Education Committee has lined up participation in four EYH events in the Bay Area:

- **LaPositas College in Livermore**
  (Formerly held at Diablo Valley College in San Ramon)
  Saturday, March 2, 2013
  www.tveyh.org
- **UC Berkeley in Berkeley**
  Saturday, March 2, 2013
  www.etouches.com/ehome/50188
- **Contra Costa College in San Pablo**
  Friday, March 15, 2013
  www.expandingyourhorizons.org/conferences/ccc
- **Skyline College in San Bruno**
  Saturday, March 16, 2013
  www.skylinecollege.edu/eyh

The experiments are set up as kits. We will work with you to become familiar with them.

**Forward email**