



Science and Technology
of Materials, Interfaces, and Processing

Southern California Chapter

Fall 2015

Quarterly Newsletter

Special points of interest:

- FREE He Leak Testing Workshop
- Mount Wilson Observatory Trip
- Elmer Carvey Winners
- SEW Winners Announced
- SCCAVS Equipment Exhibition and short course program September 28-30th, 2015

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FREE Helium Leak Testing Workshop in Buena Park

By Corinne D'Ambrosio & Cameron Murri

The Southern California Chapter of the American Vacuum Society is holding an annual Equipment Exhibition, Short Course Program, and Student Poster Session at the Holiday Inn Buena Park on Tuesday, September 29th, 2015.

In conjunction with the program will be a FREE hands-on workshop on Helium leak testing, brought to you by LACO Technologies.

This workshop will begin with an overview of vacuum basics in order to provide an understanding of why vacuum technology is so important to helium leak detection.

All common leak test methods will be reviewed, including considerations that must be evaluated when designing, and setting up a leak testing process.

Finally, there will be a hands-on demonstration that will go into the specifics of helium leak detection including: Why Helium? Why Helium Mass Spectrometer Leak Detectors? Helium Leak Detector Building Blocks, Example Vacuum Diagram/ Operating Principle Titan-Test™), Helium Leak Detection Techniques, Brief Overview of Fundamentals, Helium Split Flow Configuration and Alternative Solutions, Helium Background

Calculations, Top 10 Guidelines for Helium Leak Detection, and Helium Background Suppression.



LACO Technologies, Inc. is a leading manufacturer of vacuum and leak testing systems. Established in 1975, LACO has a long history of serving customers across the United States and internationally.

The Workshop will be held from 9:30AM to 11:30AM in the Marquis II room, adjacent to the Grand Ballroom. Attendance is FREE and pre-registration is not required.

Immediately to follow the Workshop will be a FREE lunch in the Grand Ballroom to kick off the Equipment Exhibition, with over 30 vendors, raffle prizes, FREE reception from 4-6pm and more!

More information is available on the web at:

<http://www.sccavs.org/symposium2015.html>

See you at the Expo!



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Elmer Carvey Scholarship Winners 2015

By Jeff Lince

The winners of the 2015 Elmer Carvey Scholarship are Claire-Alice Hébert, an undergraduate student at University of California, Santa Barbara, majoring in Physics, and Shahriyar Jahanbakhsh, an undergraduate student at University of California, Los Angeles, majoring in biochemistry.

Ms. Hébert has been performing undergraduate research with Professor Seshadri's group in the Materials Department at UCSB since 2013. Her primary research involves using first-principles calculations to study inorganic phosphors for solid-state white lighting. She is carrying out Density Functional Theory (DFT) calculations and then using the results to extract computed Debye temperatures for phosphor hosts, allowing for rapid screening of materials that could make efficient phosphors. In addition, she is carrying out DFT calculations on super-cells of phosphor host materials in order to obtain absolute band positions of the valence and conduction bands. Ms. Hébert has presented work in this area to the 2015 Meeting of the American Physical Society.

In addition to the phosphor-related projects, Ms. Hébert has contributed to electronic structure calculations to model heat transport in materials, determine band energies and band positions in photovoltaic materials, and to determine the energy levels of electrons in battery materials. In the subject of battery materials, she is a coauthor on a publication led by the group of Professor Clare Grey FRS at the University of Cambridge (S. Britto, M. Leskes, X. Hua, C. Hébert, H. S. Shin, S. Clarke, O. Borkiewicz, K. Chapman, R. Seshadri, J. Cho, and C. Grey, *Multiple redox modes in the reversible lithiation of high-capacity, Peierls-distorted vanadium sulfide*, J. Am. Chem. Soc. (2015) in press).

In general, she has become the established expert in Seshadri's group for electronic structure methods. She trains other group members – both graduate students and post-docs – in these methods.

After graduating with her B.S degree in 2016, Ms. Hébert intends to attend graduate school with the goal of attaining her Ph.D. in Physics or Materials Science. (Cont'd on page 4)



**SOUTHERN CALIFORNIA
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Upcoming Events

SCCAVS Equipment
Exhibition & Short
Course Program
September 28-30, 2015
Holiday Inn
Buena Park, CA
www.sccavs.org



AVS 62nd International
Symposium & Exhibition
October 18-23, 2015
San Jose Convention
Center
San Jose, CA
www.avs.org

Chapter Activities

Mount Wilson Observatory Trip

By Corinne D'Ambrosio

Located on the summit of Mount Wilson above Pasadena at an altitude of 5715 feet, the Mount Wilson Observatory is visible from much of the Los Angeles area. What you can see from the summit of Mount Wilson, however, FAR exceeds the view from below! Mount Wilson is home to both 60-inch and 100-inch nighttime telescopes, a 150 foot solar tower, and of course the CHARA array. The Observatory dominated the world of astronomy during the first half of the twentieth century. Today, Mount Wilson's original solar and night-time telescopes, the world's largest for two generations of astronomers, have been joined by new facilities achieving unprecedented high-resolution views of the stars.

On Saturday, August 22nd, 25 astronomy enthusiasts from the SCCAVS community had the opportunity for a private tour of the grounds, including private viewing through the 60-inch and the chance to be admitted to the viewing gallery and telescope floor directly beneath the 100-inch. An extra special opportunity was had by all to speak with one of the technical staff about the CHARA array. The Center for High Angular Resolution Astronomy (or CHARA) operates the array, a six-telescope optical/infrared interferometric array on Mount Wilson, California. The CHARA Array provides the highest resolution of any telescope at visible and near-infrared wavelengths making it one of the most powerful facilities in the world for studying stars and stellar systems at resolutions not previously available.

The group had the opportunity to view Saturn, the Moon, Iridium 84, EPS1 LYR, EPS2 LYR, M13, M57, M11, Neptune, and BET1 CYG, among many other extraterrestrial objects. We were even able to step outside to catch a glimpse of the solar flare with our bare eyes, to top off a truly wonderful evening. Pictures to follow on page 5.

A large advertisement for Helium Leak Testing, Inc. (HLT). The main image shows a large, cylindrical industrial test chamber. Text overlaid on the image includes: "QHe+ Helium Leak Testing, Inc.® Setting Standards Since 1960", "HLT's Newest Test Chamber", "Environmental Vacuum Testing (Cryogenic, Temperature Cycling)", "Pressure / Vacuum", "Vacuum Degassing", "Altitude Testing", and "Absolute Pressure Differential Leak Testing". Below the main image are three smaller inset photos showing different views of the test chamber and internal components. At the bottom of the advertisement, contact information is provided: "www.heliumleaktesting.com - info@heliumleaktesting.com - (818) 349-5690".



**Science and Technology
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Southern California Chapter

Elmer Carvey Winners (Cont'd from page 2)

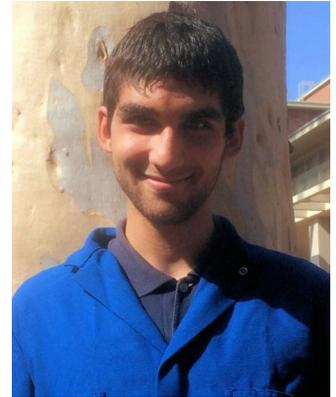
Shahriyar Jahanbakhsh has been working with Professor Bouchard's group in the Chemistry Department at UCLA since 2014. His research is concentrating on developing biomedical applications for fluorescent nanodiamonds. The unique optical and electronic properties of these diamonds originate from lattice defects formed during manufacture. These properties, as well as the biological inertness and facile functionalization of elemental carbon, make nanodiamonds well-suited for a variety of biological imaging, sensing, and drug delivery applications.

Specifically, Mr. Jahanbakhsh is working to create nanodiamonds that fluoresce without any need for external illumination. His research exploits bioluminescence resonance energy transfer from luciferases (a class of luminescent proteins) attached to the surface of the diamonds to excite the fluorogenic lattice defects. By also conjugating antibodies to these "self-illuminating" diamonds, he is able to direct them to specific structures within mammalian cells. The goal is to allow for automated and high-throughput identification and characterization of organelles found in electron micrographs, and ultimately, targeted drug delivery to specific sites within the cell.

Because of their electronic structures (their ground level is a spin triplet state), these same lattice defects are exquisitely sensitive magnetometers, electrometers, and thermometers. Thus, nanodiamonds containing these defects can also be used to probe microenvironments within the cell.

After graduating with his B.S and M.S. in 2016, Mr. Jahanbakhsh intends to complete a medical scientist (M.D.-Ph.D.) training program.

The Elmer Carvey Memorial Scholarship was established in honor of Elmer Carvey, an active member of the SCCAVS from 1964 until 1982. The Scholarship is awarded to undergraduate students attending public, four-year colleges in California who are planning careers in areas of interest to the society, which include vacuum-related technologies, surface and thin film science, nanotechnology, the understanding of materials properties, and the development of new materials. The stipend is \$1,500.00 for one year.



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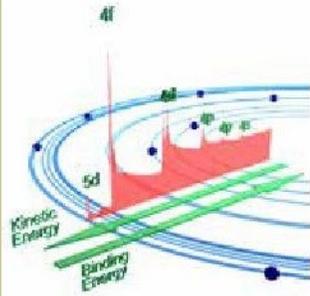


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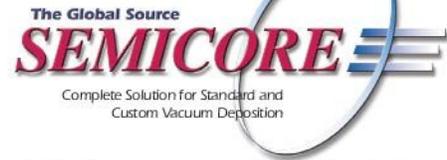
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Chapter Activities

Mount Wilson Observatory Trip (Images Courtesy of Michael Hollins and Jeff Lince)



Science Educator's Workshop Winners Announced

By Corinne D'Ambrosio

AVS has conducted a two-day in-service workshop on low-pressure experiments and modeling for middle and high school science teachers from the United States and Canada since 1990. The SCCAVS sponsors a number of local teachers each year to attend the workshop from schools here in Southern California. The next workshop will be held on October 19-20th at the San Jose Convention Center in San Jose, CA during the AVS 62nd International Symposium & Equipment Exhibition.

The workshop is accredited for CEU's and is aligned with the National Science and Mathematics standards. The program is divided into two parts: (1) lectures on the underlying science and the mathematical calculations and (2) hands-on experience in which a group of teachers perform experiments and develop models under the guidance of an instructor team. Upon completion of the workshop, teachers receive a vacuum system for their school identical to ones used in the workshop.

This year the Southern California Chapter of the AVS will be sending two teachers to San Jose. The first is Mariah Fontijn of Culver City High School. She teaches AP Chemistry and Chemistry Honors to grades 10-12. A graduate of the University of Illinois, Urbana-Champaign, she has both her B.S. in the Teaching of Chemistry and her M.A. in Teaching English as a Second Language. With 15+ years teaching high school chemistry, physical science, algebra and geometry, she brings experience to the SEW. One of her interests is teaching science camps for middle school girls with the Society of Women Engineers, UIUC.

The second teacher chosen to attend the SEW in San Jose this year is Roger Wynn of Mountain Empire High School in Pine Valley. He has been teaching Earth Sciences and Chemistry to grades 9-12, and brings 20+ years experience teaching junior and high school-life, biology, physical science, chemistry, earth science, and even biotechnology. He has been awarded the San Diego Science Alliance Teacher of the Year, and has been the District Teacher of the Year two times. One interesting fact about Mr. Wynn is that he has worked with General Atomics twice on curriculum development.

If you know of a teacher in Southern California that would be a good candidate for next year's Science Educator's Workshop, please encourage them to apply online at <http://www.avs.org/Education-Outreach/Science-Educators-Workshop>

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2015 SCCAVS Equipment Exhibition, Short Course Program, and Student Poster Session

In just TWO WEEKS the annual **SCCAVS Equipment Exhibition** will be held at The Holiday Inn Hotel & Convention Center - Buena Park (7000 Beach Blvd., Buena Park, CA 90620). Learn about the latest vacuum products, technology, and science. Network with other key players in the Southern California technical community.

Tuesday, September 29, 2015
Equipment Exhibition

12:00 - 6:00PM

FREE Attendance - No pre-registration required!

FREE Lunch from 12:00-1:00PM

FREE Reception 4:00-6:00PM

FREE Workshop on Helium Leak Detection

9:30-11:30AM

For more information visit <http://www.sccavs.org/symposium2015.html>

Do you have a suggestion for a speaker dinner sponsored by the SCCAVS?

We are currently seeking the following:

Venues for technical presentations or speaker dinners

Locations for facility tours

Speakers on topics of interest to the Southern California technical community including:

- vacuum science and vacuum-related technologies
- surface and thin film science
- nanotechnology
- understanding of materials properties
- development of new materials

Please send your suggestions to Program Chair Jim Garner at jim@sccavs.org

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September/October 2015

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	21	22	23	24	25	26
27 	28 SCCAVS '15	29 SCCAVS '15	30 SCCAVS '15	1	2	3
4	5	6	7	8	9	10
11	12	13 • <i>New Moon</i>	14	15	16	17
18 AVS '62	19 AVS '62	20 AVS '62	21 AVS '62	22 AVS '62	23 AVS '62	24
25	26	27 ° <i>Full Moon</i>	28	29	30	31



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