



**Science and Technology
of Materials, Interfaces, and Processing**

Southern California Chapter

SUMMER 2014

Quarterly Newsletter

Special points of interest:

- OCSEF 2014 Winners
- Angus Macleod talk at ZC&R draws large crowd
- Registration is OPEN for exhibitors and short courses for SCCAVS Expo October 1, 2014 at UCLA-Covel Commons-Technical Presentations Announced
- Science Educator's Workshop at AVS 61

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Orange County Science & Engineering Fair 2014 Winners

Corinne D'Ambrosio & Dan Coursen

The annual Orange County Science and Engineering Fair took place at Orange County Fairgrounds on April 9, 2014, and drew hundreds of middle and high school aged science enthusiasts to enter. Winners qualify to present their projects at the California State Science Fair. The SCCAVS provides special awards for projects of interest in fields related to vacuum technology.

This year's first place winner was Andrew Kim from Fairmont Mable High School in Anaheim for his project, "Solar Trackers in Motion."

Andrew Kim's project was to design a system that can track the sun to maximize solar panel output on a moving object, like a car. His goal was to demonstrate a system that can consistently hold a 90 degree angle of incidence on a solar panel, despite the fact that that object it is mounted to will be moving.

He did this by building a robot using LEGO NXT and programming it using LABVIEW. Through a combination of a Compass and GPS sensor, the panel could be placed according to location, time of day, and direction the robot is facing. With input from the SolarDEC, Azimuth, and Elevation angles, the robot would move via a series of programmed motors.

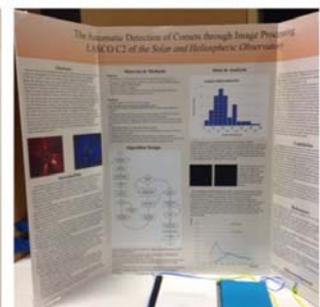
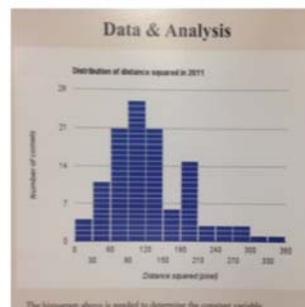
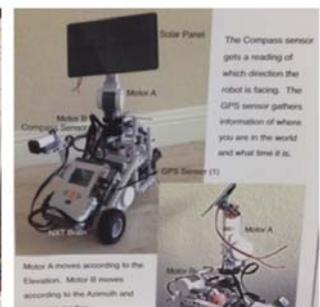
In this way, Mr. Kim was able to create a robot that could track the sun from any position, optimizing the angle of incidence on the solar panel to optimize the

Output. Andrew believes one application of his project will be to increase the range of electric vehicles, citing the 100% electric Nissan Leaf is limited by 75 miles on a single charge. He sees his program being used to track anything with a predictable orbit, such as satellite dishes, space stations, and even telescopes.

Jongho Park from University High School in Irvine was this year's second place winner. His project, "The Detection of Comets through Image Processing: LASCO C2 of the Solar & Heliospheric Observatory," was aimed at developing a program and algorithm to automatically detect comets, which appear in the im-

and Spectrometric Coronagraph (LASCO) C2 of the Solar and Heliospheric Observatory (SOHO).

By comparing these images from LASCO to known data on comets and inputting into MATLAB, a computer image processing program, Mr. Park was able to identify whether the output from the program accurately found the comet and not the other objects present like Stars, asteroids, etc. He then worked to correct the algorithm for increased accuracy, and was able to achieve an accuracy of 46.67%. His project helps to identify comets instantly, contributing to a larger database of comets available for further



Clockwise from Top Left: Andrew Kim's "Solar Trackers in Motion", Kim's robot, Jongho Park's "Automatic Detection of Comets", Park's data and analysis from LASCO C2

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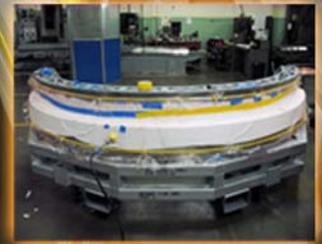
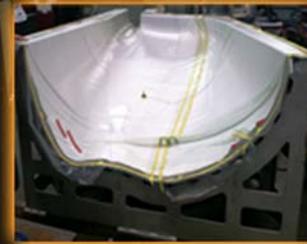
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Chapter to Host Private Tour of NASA's Jet Propulsion Laboratory



Jet Propulsion Laboratory
California Institute of Technology

The SCCAVS has arranged for a private tour of NASA's Jet Propulsion Laboratory to take place on Friday, August 1st, 2014. **THE TOUR IS NOW CLOSED FOR NEW REGISTRATIONS**

AND HAS A WAIT LIST. TO RECEIVE ADVANCED NOTIFICATION FOR FUTURE TOURS PLEASE CONTACT CHAIR@SCCAVS.ORG.

The following are some anticipated highlights of the tour:

- A multimedia presentation at the von Karman Visitor Center entitled "Journey to the Planets and Beyond," which provides an overview of the Laboratory's activities.
- View full scale replicas of the Galileo spacecraft, Mars Curiosity, Mars Exploration and Mars Pathfinder Rovers and scale models of the Cassini, Voyager and Mars Exploration Orbiter.
- Visit the Space Flight Operations Center (Mission Control) to see where scientists and engineers control dozens of spacecraft out in space.
- Visit the Spacecraft Assembly Facility and see the newest spacecraft, SMAP, being built.



Thank you to ZC&R and Angus Macleod for “What’s Happening in Optical Coatings”

On April 1, 2014 ZC&R in Torrance hosted a talk by Dr. Angus Macleod, President of Thin Film Center Inc, Tucson and Professor Emeritus of Optical Sciences at the University of Arizona. He is a world authority in the field of optical coating technology, has over 200 publications in the area of optical coatings, and is well-known for his book “Thin-Film Optical Filters,” now in its fourth edition. The talk drew over 40 participants, many from outside the traditional realm of optical coatings!

Modern optical coatings date back some 80 years and so are sometimes described as a mature technology, which Dr. Macleod said is a rather incorrect and misleading description. His talk ranged over aspects of the current state of the art in optical coatings including the technology, materials, applications and some of the fundamentals. The talk brought to light how the ever-increasing volume of advances in optics constantly brings newer and greater challenges to the optical coater, and how not all of these challenges are purely optical. Dr. Macleod gave poignant examples such as how special sensors based on optical coatings are penetrating biochemistry and medicine, metamaterials that show promise as components of optical coatings, and coherent perfect absorbers presenting interesting properties as optical switches.

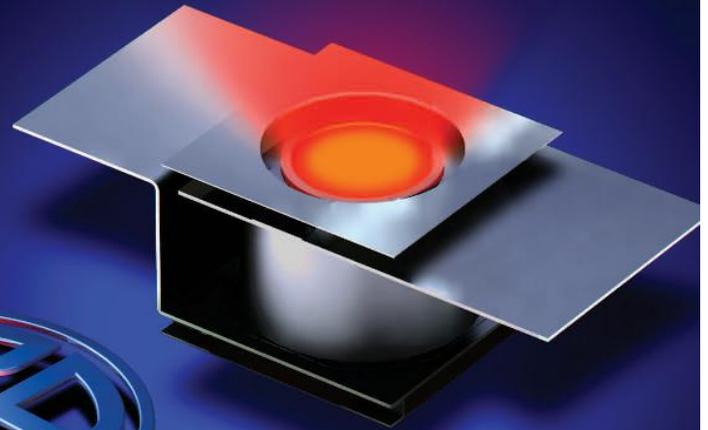
The SCCAVS would like to thank Dr. Macleod and the staff of ZC&R (and parent company, Abrisa) for making this such a successful event!



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Upcoming Events

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San Francisco, CA

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2014 SCCAVS Equipment Exhibition & Conference-Technical Presentations & Short Courses

Wednesday, October 1, 2014
UCLA - Covel Commons, 3rd Floor

Technical Presentations-SCHEDULE TO BE ANNOUNCED

▶“*Super Cooled Argon Clusters – A Universal Sputtering System?*”, Dr. David Surman, President of Kratos Analytical, Inc. discusses technological advances and applications of super-cooled argon cluster sputtering and XPS for depth-profiling of biological and other fragile interfaces.

▶“*Index Dispersion Enhanced Monitoring (IDEM) for Rate Control*”, Wayne Rodgers, President & CEO of Eddy Company presents a new and highly accurate method for controlling the deposition of transparent thin films.

Short Course Program

- ▶Fundamentals of Vacuum Technology (3 days)
- ▶Reactive Sputter Deposition (1 day)
- ▶Controlling Contamination in Vacuum Systems (1 day)
- ▶Plasma Etching & RIE (2 days)

Thinking About Exhibiting?

- ▶Table Cost \$525
- ▶Sponsorship \$500/\$1000

Information & Registration ONLINE at: <http://www.sccavs.org/symposium2014.html>

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Science and Technology
of Materials, Interfaces, and Processing

Southern California Chapter

Science Educator's Workshop to be Held in Baltimore at AVS 61

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 next workshop will be held November 10-11, 2014 in Baltimore, Maryland during the AVS 61th International Symposium & Equipment Exhibition. The Southern California Chapter of the AVS will be sponsoring one teacher from the region to attend, with a 3 day, 2 night all expenses paid trip to Baltimore!

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 at no cost

- A certificate of completion
- 1.5 Nationally certified CEU's or 150 sixty-minute clock hours from the University of Dayton
- A vacuum system for their school identical to ones used in the workshop

To apply go to <http://www.avs.org/Form/SEW-Application> for an on-line application or request one by contacting Chair@sccavs.org



From Left to Right: Tour of Coatings By Sandberg, Inc. in Orange, 2013 SEW lecturer at AVS 60 in Long Beach, bell jar experiment in SEW hands-on section of workshop

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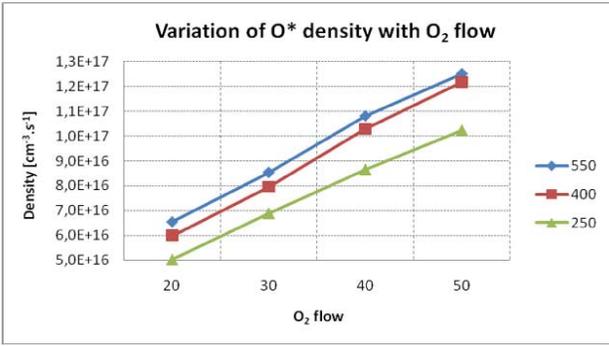
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30	~8.5E+16	~7.5E+16	~7.0E+16
40	~1.1E+17	~1.0E+17	~9.0E+16
50	~1.3E+17	~1.2E+17	~1.1E+17

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6	7	8	9	10	11	12 ◦ Full Moon
13	14	15	16	17	18	19
20	21	22	23	24	25	26 • New Moon
27	28	29	30	31	1 	2