



# SCCAVS Newsletter



July 2012

The Science & Technology of Materials, Interfaces, & Processing

## Special points of interest:

- SCCAVS Equipment and Short Course Program this Fall at UCLA's Covell Commons
- OCSEF 2012 Winners
- Report on Michael Fulton's talk "Advanced Large Area Deposition"

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## Announcing the SCCAVS Show on October 3, 2012 at UCLA!

*You asked for it... you got it!* Right here at UCLA's beautiful Covell Commons, this Equipment Exhibition will be given by the Southern California Chapter of AVS (SCCAVS) and the UCLA AVS Student Chapter on Wednesday, October 3, 2012. In conjunction with the Exhibit is a Student Symposium, a half-day technical session on Helium Leak Detection, and an AVS Chapter Short Course program. The Exhibit will be open from 12:00 noon to 6:00pm, and exhibit attendance is FREE!

**Meals and Raffle:** Refreshments will be provided in the exhibit hall area. In addition, a raffle drawing will be held between 5:00 – 6:00pm in the Exhibit Hall, during which time we will be giving away a Hi-Tech item. All attendees will be eligible to register for the drawing.

**Student Symposium:** The Student Symposium is jointly sponsored by SCCAVS and the UCLA Student Chapter, and will include both oral and poster presentations by undergraduate and graduate students from Southern California colleges and universities, showcasing their recent research results. It will be held from 9:00 – 3:00pm on October 3, 2012. Registration for the Student Symposium is \$50 per person. Call for Papers, registration and details available at <http://www.sccavs.org/symposium2012.html>.

**Technical Sessions:** The technical session on Helium Leak Detection will be from 1:00 – 5:00pm. Registration for the technical session is \$50 per person. Registration and details are coming soon to [www.sccavs.org](http://www.sccavs.org).

**Short Courses:** The SCCAVS will be offering a Short Course program with course topics varying from vacuum technology, thin film deposition, and surface analysis. Courses descriptions and details available at <http://www.avs.org/education-short-courses-schedule.aspx>.

Please see below for registration information or contact [chair@sccavs.org](mailto:chair@sccavs.org).



## Equipment Exhibitor Registration Information

**Format and Rules:** Exhibit registration includes 6-foot skirted table top with two chairs and electrical power, lunch and post attendee list (if you need additional outlets, bring your own power strip). Hanging over onto your neighbors' tables or in the aisle is not allowed. No one is to use the walls of the exhibit hall as a part of the backdrop or support for the exhibit. Your exhibit must be self-supporting. We strongly recommend bringing your own table top backdrop. Space is limited to 20 tables which will be reserved on a first-come, first-serve basis. The tables will be assigned based on the date your registration form/payment is received. We will also be aware of potential conflicts, and will attempt to adjust the assignments accordingly.

**Registration:** The 2012 Exhibit table registration fee is \$525 (1 table) and \$1,000 (2 tables). You may pay by credit card (VISA, MasterCard or AMEX) or by check. Sponsorship is also available; see exhibit registration form for details.

**On-Line:** Go to the Chapter Website at <http://www.sccavs.org/symposium2012.html>. Complete the online registration form (including payment information). When processed, we will send a confirmation e-mail including the hotel and shipping information.

**BY MAIL:** Go to the Chapter Website at <http://www.sccavs.org/symposium2012.html>. Complete and print the form, and make your check payable to SCCAVS. Mail the form and your check to AVS 110 Yellowstone Dr., Ste. 120, Chico, CA 95973. When your registration/payment is received, we will send a confirmation e-mail including the hotel and shipping information.

If you have any questions, please contact Corinne D'Ambrosio, SCCAVS Chair at 714-536-2800, or by email at [chair@sccavs.org](mailto:chair@sccavs.org).

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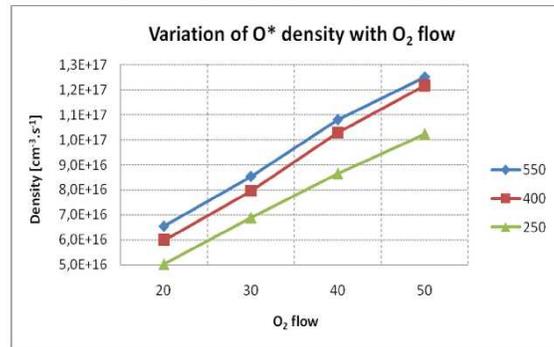
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**SOUTHERN CALIFORNIA  
CHAPTER OF THE AVS :  
THE SCIENCE &  
TECHNOLOGY OF  
MATERIALS,  
INTERFACES, AND  
PROCESSING**

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**We're on the web!**  
[www.sccavs.org](http://www.sccavs.org)

**Upcoming Events**

Semicon West  
July 10-12  
Moscone Center  
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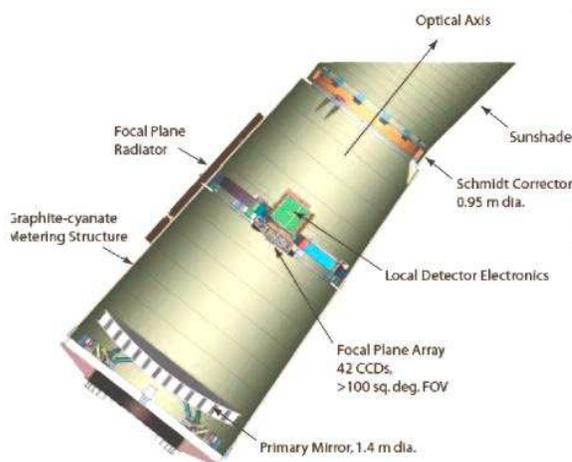


**Local Chapter Activities**

**“Advanced Large Area Deposition Using Focused Beam Sources”**

Synopsis of presentation given by Michael Fulton of Surface Optics May 15, 2012  
*Richard Stamberg*

Dr. Michael Fulton gave a stimulating presentation on state-of-the-art mirror coating methods used by Surface Optics Corporation. Exceptional quality can be obtained using cutting-edge thin film technologies as demonstrated by one of their recent accomplishments, coating the NASA Kepler Space Telescope’s primary 1.4 meter mirror. Large area deposition was achieved with a uniformity of layers to 2% or better over the entire mirror surface. They used a 3.3 meter vacuum chamber with rotating substrate and Reactive Ion Assisted Deposition (IAD) together with a movable E-Beam deposition stage. It was precisely translated in a computer controlled sequence to provide uniform coatings of silicon nitride and silver as well as sputtered thin layers of nickel-chromium nitride to protect the silver from moisture, tarnishing and space radiation. A dense 5-layer dielectric coating was also added for reflection enhancement and to compensate for the nickel-chrome nitride absorption. The computer controlled sequence only selectively coats a small portion of the large mirror at a time to provide excellent uniformity.



**Kepler Telescope**

Ion Assisted Deposition provides improved adhesion and durability via densified microstructure and reduced defect density. IAD also provides better optical performance via refractive index stability with stoichiometry control and stable optical properties. Pulsed IAD allows the substrate temperature to be kept as low as ambient. The Kepler Telescope with space-qualified silver is so successful that the mission has been extended several more years.



**Coating Chamber**

*(Continued on Page 5...)*

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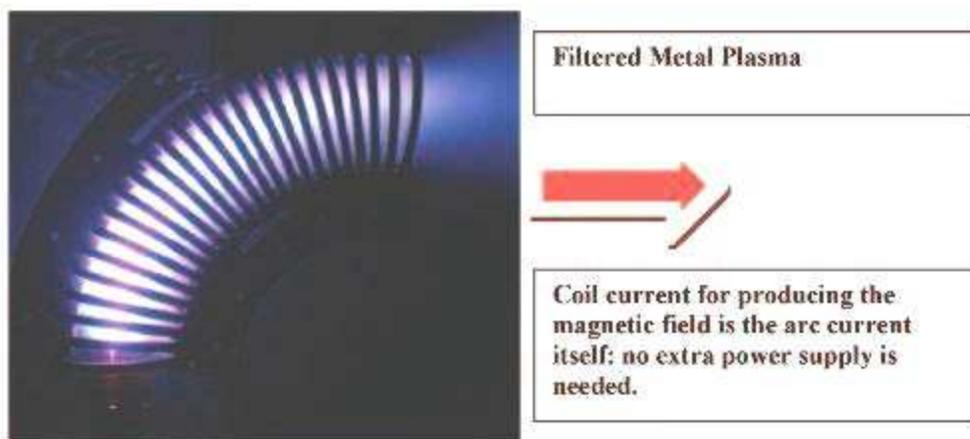


SOUTHERN CALIFORNIA CHAPTER

### CHAPTER ANNOUNCEMENTS

- AVS Short Courses offered by request through your local Chapter , taught by AVS National instructors. For details please contact [corinne@sccavs.org](mailto:corinne@sccavs.org)
- Your local Chapter is seeking corporate sponsors for our area events like speaker dinners, field trips, and student sponsorships. Please contact [jeff@sccavs.org](mailto:jeff@sccavs.org) to inquire about opportunities.

Dr. Fulton's next generation approach will use a 4-5 meter diameter chamber including Ion-Assisted Filtered Cathodic Arc Deposition (IFCAD) source for more advanced coatings. A low DC voltage/high current power supply is used to generate an arc on a water cooled target. The arc vaporizes the target generating high energy ions, neutral atoms and particles. The ions are steered by magnetic and electrical fields through a curved duct so that particles and neutrals are filtered by the non-line-of-sight path. The S-Filter can use a graphite cathode to deposit diamond films that are optically smooth, hard (70 to 100 GPa), very dense (3.0 to 3.3 g/cm<sup>3</sup>) with high adhesion, and without hydrogen. Thin films with excellent properties can be produced using an out-of-plane, double-bend Filter. Other IFCAD source materials include Al<sub>2</sub>O<sub>3</sub>, Ta<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, TiN, AlN, TiCN, CrN, ZrN and ITO.



**Filtered Cathodic Arc Deposition**

The Southern California Chapter of the American Vacuum Technology would like to sincerely thank Dr. Fulton for his willingness to share his expertise on this subject. Our goal is to seek out speakers with a specialized knowledge within the vacuum community, and an ability to share this knowledge through SCCAVS sponsored talks like this one. Michael Fulton gave an energetic and informative talk, for which the viewgraphs are currently available for download online at [www.sccavs.org](http://www.sccavs.org).

## July 2012

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17 <small>SCCAVS Chapter Meeting at Renato's</small>	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

## Orange County Science & Engineering Fair 2012

Dan Coursen, Corinne D'Ambrosio, and Greg Mills

The 57th Annual Orange County Science and Engineering Fair was held Tuesday, April 10, 2012, at the Orange County Fairgrounds in Costa Mesa, CA. Judges Dan Coursen (Coursen Coating Labs), Corinne D'Ambrosio (Mbar Technology Inc.), and Greg Mills (AXR) awarded an \$100 first prize and \$50 second prize to the following students:

### First Prize-Melissa Huang, Foothill High School, 12<sup>th</sup> Grade "Incorporating Biomolecules Into Chemical PEDOT Film Using Electrodeposition"

This student of Mrs. Gypsy Biller at Foothill High School worked with Dr. Reginald Penner at UCI and graduate student Keith Donovan, who helped her prepare Au films for biomolecular deposition by evaporating Cr and then Au onto a glass slide, then spincoating it with photoresist. After removing photoresist with UV, these coated slides were then dipped in three solutions prepared using different biomolecules, and then finally the PEDOT and biomolecule were electroplated on the Au film through alternating current electrodeposition. The charge difference between the control and experimental films were measured and indicate the extent of biomolecular incorporation. Using an SEM, results were revealed that showed a significantly greater amount of amyloglucosidase was deposited on the film compared to the other two biomolecules and to the PEDOT only control film.

Not only does Miss Huang show an ability in PVD processes through use of an evaporator, but she shows proficiency in many surface analysis techniques and a strong understanding of both Chemistry and Physics. For this reason she was awarded the 1<sup>st</sup> Prize at this year's OCSEF.

### Second Prize-Haotian Xu, University High School, 11<sup>th</sup> Grade "Super-Hydrophobic Surface for Anti-Icing Applications"

This University High School student in Mr. Tim Smay's 11<sup>th</sup> Grade class worked with head engineer at Physical Optics Corporation (Torrance), Martin Lopez, to determine if a super hydro-phobic surface repels ice as effectively as it repels water. Mr. Xu is interested in the application of anti-icing coatings for aircraft, aerospace, and defense. His investigation of naturally occurring super-hydrophobic surfaces, like that of the lotus leaf, led him to design a bionic super-hydrophobic surface coating using Teflon microparticles coated onto metal plates using an adhesive layer. He fabricated six different surfaces using different adhesives and measuring the contact angle to determine its hydrophobicity. He found that a surface with a high contact angle ( $170^\circ$ ) is an effective anti-icing surface. In a real-life application he applied this super hydrophobic surface to the rotors of a model helicopter and found that the rotor blades with the coating were free from ice both in-air and on-ground, while the coating-free control blades did accumulate ice.

While Mr. Xu did not use a PVD or vacuum process in his experiment, it is clear through his partnership with POC and his research that this type of finding could be applied to large area coating for the aerospace industry and beyond. It is for this reason we have awarded him 2<sup>nd</sup> Prize at this year's OCSEF.



From Left to Right: 1st Prize Winner Melissa Huang's project on PEDOT films; 2nd Prize Winner Haotian Xu's project on Anti-Icing coatings