



SCCAVS Newsletter

March 2011

The Science & Technology of Materials, Interfaces, & Processing

Special points of interest:

- Ion Beam Sputtering Speaker/Dinner Event Held in Santa Ana
- Letter from our returning chair Jeff Lince
- Astounding Inventions winner suggests coated glass for car windshields
- Elections for Chapter Officers held. New positions announced below.

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A Message from the Chair

Jeff Lince

It is my privilege to serve as the SCCAVS Chair for 2011!

We have been very busy lately, and I hope you have gotten a chance to benefit from some of our activities. In 2010, we experienced enlightening and stimulating presentations from speakers in the Southern California technical community. For example, we heard about recent advances in Photovoltaic Solar Power Technology from Dr. Lori Greene at UCI, and about novel uses of trace chemical detection by Dr. Jack Syage at Syagen Technology. We had a successful and well-attended tour of the Mt. Wilson Observatory (The vacuum connection? The guides allowed us to see the 1930's-era diffusion-pumped aluminum evaporation chamber still used for coating the 60- and 100-inch mirrors in the main telescopes).

In addition to these more visible events, we show our commitment to the next generation of coating experts and surface analysts. We provide an annual \$1500 scholarship for an exceptional student attending a four-year public university in California studying areas of interest to the AVS. We supported a high school teacher to attend the Science Educators Workshop at the National AVS Symposium. We judged several science fairs and gave prizes to deserving students.

I also wanted tell you about a service we can provide for local companies and universities: short course programs. In addition to periodically holding short courses for the general Southern California technical community, we can also set up an onsite short course for your employees on the topic of your choice. There are over 60 subjects available, running the gamut from vacuum pump/gauge operation to surface analysis

techniques, from general courses in thin film deposition techniques and sputter-deposition to Plasma-Assisted Chemical Vapor Deposition (PACVD) and Atomic Layer Deposition (ALD) (see <http://www.avs.org/pdf/courses/Master.pdf> for programs we offer). Please contact me at chair@sccavs.org if you would like to explore having a short course at your company.

I also wanted to tell you about some exciting news for the Southern California AVS community: the genesis of a new student chapter at UCLA! We at the SCCAVS congratulate them, and will support their efforts to involve students in AVS-related pursuits.

Our Chapter has a small but devoted

Committee that is enthusiastic about continuing to serve you. I especially want to thank our previous chair, Larry Oberlander, for his years of dedicated and insightful contributions to our Chapter. If you are interested in learning how you can contribute to our Chapter, please contact me (chair@sccavs.org) to find out when our next Committee meeting will be held. We welcome your ideas for the future!

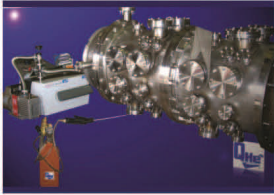
We are actively working on possibilities for new presentations, and will send word to you as soon as plans have gelled. I am looking forward to an exciting 2011 for the SCCAVS, and hope to see you at an upcoming event!



March 1st SCCAVS Event (see pg. 3) From Left to Right: Corinne D'Ambrosio (Treasurer), Keqi Zhang (VPT), Ralph Faber (VPT), Larry Oberlander (Secretary), Jeff Lince (Chair), Richard Stamberg (Member at large) at VPT presentation at the Holiday Inn, Santa Ana

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We're on the web!
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Upcoming Events

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Local Chapter Events

ION BEAM SPUTTERING – DINNER MEETING

March 1, 2011 at the Holiday Inn in Santa Ana
James Garner

One of the ways that the SCCAVS serves our community is through dinner presentations on related cutting edge technology. On March 1, we had a very interesting and well-attended presentation on Ion Beam Sputtering (IBS) by Ralf Faber (CEO) and Dr. Keqi Zhang (CTO) of Vacuum Process Technology, Boston. They report that their IBS system can repeatedly create complex films of very high quality that are taking precision optics to a new level of performance. Thickness and uniformities are on the order of 1% even for nanometer scale films. The talk described principles of operation and surveyed the kinds of high performance films that have been produced.

In a typical system, neutral and/or reactive ions from a 15cm, 400ma Kaufman ion source sputter material from a flat target onto a substrate (see Figure 1). Operating pressure is about 0.1 mTorr. Sputtering yield is relatively independent of target wear, which helps ensure good repeatability. Several discrete targets can be sputtered alternately or simultaneously to create precise and homogeneous mixes of material. Although the process is a little slower than other PVD technologies, its controllability makes automation for unattended operation feasible.

One example film presented was a 3-notch optical filter made of 1,854 layers with a total thickness of 18.1u that took 24 hours to deposit. Spectral response was surprisingly consistent with the design response. Baking made almost no difference, which demonstrated that IBS films generally do not need baking.

Index of refraction of a particular layer can be precisely tuned by simultaneously sputtering two or more materials to create a new dimension of film design flexibility. Certain mixes of materials in discrete layers display 3X higher laser damage thresholds. IBS can also create Rugate filters with continuous films of sinusoidally varying index. These eliminate discrete film interfaces where electric fields can become very high and therefore improve laser damage thresholds by over 10X. Some discrete optical filter design programs can handle these filters. Analytic designs of Rugate filters area are also available in the literature.

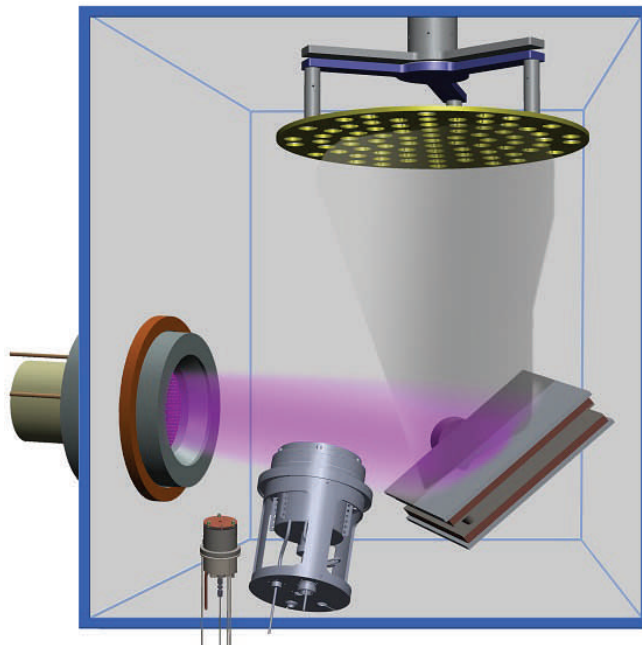


Image courtesy of Vacuum Process Technology www.vptec.com

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Astounding Inventions at Irvine Valley College

Corinne Freeman

On Saturday, January 29, 2011 the SCCAVS acted as a guest judge at Astounding Inventions held at Irvine Valley College. This year drew 405 inventors from grades 2-6 and featured exhibits by local organizations like The Optical Society, RapidTech, VOLTA Mobile Solar, Beckman High School Robotics Team, and CSULB's Mobile Science Center.

This year's winner was Amit "Amy" Avram, a 6th grader from Mrs. Jeffries class at Oak Creek. Her project was titled "Protecting Windshield", and suggested the use of transitional or coated glass to tint the windshield glass when the sun's rays are on it, protecting the driver from sun-blindness and harmful rays. We discussed the use of electro-chromic glass, a type of glass made under vacuum that has better control of shade by applying a little electricity. I suggested she visit the website for company Soladigm, and continue with her passion for science. I also had the opportunity to speak with her mother over the phone, who told me that Amy's confidence was so bolstered by our award that she was actively seeking patents through one of the law firms partnered with Astounding Inventions. Amy received a \$50.00 SCCAVS check along with a certificate and letter from the Chapter Chair, presented at the Astounding Inventions award ceremony later that afternoon by IVC staff.

Honorable mentions were James Gow, a 3rd grader with a project titled, "All Weather Powered Electric Car". His premise was that an electric car could be made that uses a rechargeable battery which is powered by solar power on sunny days, steam power from rain on rainy days, and even wind power generated from the body of the car while driving. Another honorable mention is 5th grader Meha Magesh, for his invention of a magnetically powered mill to generate electricity. The last mention was a close 2nd for his invention, the "Vehicle of the Future". 5th grader Edward Jacobs imagined a self-sustaining engine that turns water into thrust by adding electricity from wind turbines and turning it into its natural elements, O₂ and H₂. He then explained that these elements would go to a fuel cell where energy or "thrust" is produced to propel the vehicle into the air. His research included quite a discussion on CHFC (Compact Hydrogen Fuel Cells) technology, and the use of both wind turbines and solar panels to create energy stored in a hi-lithium battery. Overall, quite an impressive bunch of youngsters and future scientists. It was a pleasure for the SCCAVS to support this event.



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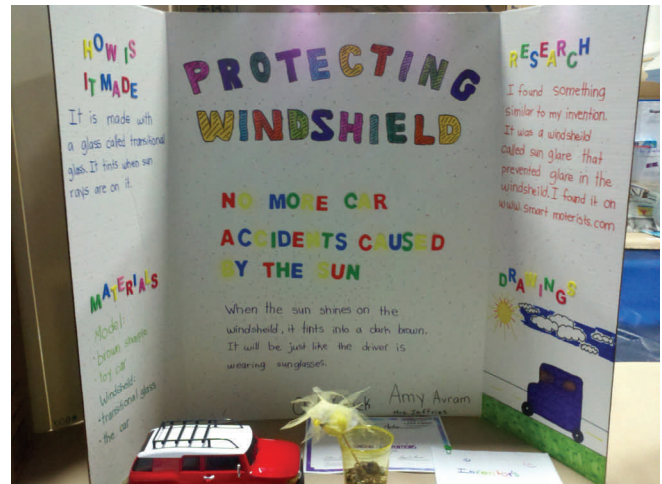
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Winning Project at IVC's Astounding Inventions by Amy Avram

