AVS Science and Technology of Materials, Interfaces, and Processing
Southern California Chapter

Fall 2018 — Quarterly Newsletter

Special points of interest:

- Speaker Dinner with BFK Solutions Barbara & Ed Kanegsberg at ZC&R
- 2018 Elmer Carvey Scholarship Winners
- Your Invitation To:

Hospitality Suite at AVS 65 for SCCAVS/NCCAVS Members and Vendors

Tuesday, October 23
4-5pm

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"Cleaning, Adhesion & Productivity" A Talk by Barbara & Ed Kanegsberg

Contributed By Jim Garner

Barbara and Ed Kanegsberg delivered a very interesting and useful presentation to SCCAVS at the ZC&R division of Abrisa, attended by about 40 people, on the nature of contamination and the cleaning of surfaces. These issues impact film adhesion, stability, and appearance that affect most AVS-related production and research. Following is a summary of their presentation:

The three main forces that bind contamination are: Polar-molecular attraction, Hydrogen/proton attraction, and Van der Waals forces due to transient charge variations. A cleaning process overcomes these by a combination of temperature, mechanical force, and chemical activation applied over an appropriate duration and followed by a rinse and dry step.

The "Hansen Solubility Model" helps choose an effective solvent ("solv") as one that most closely matches the contaminant ("solute") in three quantifiable variables as follows:

$$R_a = \sqrt{4(D_{solv} - D_{solute})^2 + (P_{solv} - P_{solute})^2 + (H_{solv} - H_{solute})^2}$$

Where: R_a must be minimized. *D,P,* and *H* are measures of Van der Waals, Polar, and Hydrogen forces respectively.

Values of these parameters are published for many substances.

Solvent rinsability must also be considered. Otherwise, a solvent residue may, itself, become a contaminant.

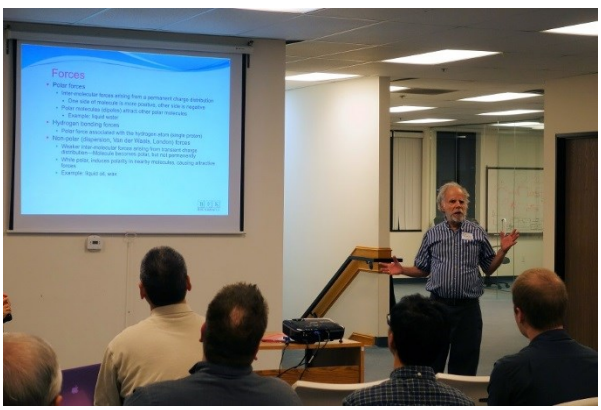
Kanegsberg (Continued from Page 1)

Solvent rinsability must also be considered. Otherwise, solvent residue may, itself, become a contaminant. Unfortunately, this is greatly affected by formulation changes that are not on MSDS sheets and frequently go unreported. It is important to use fluids made by reputable manufacturers from reputable distributors who are forthcoming about discussing reformulations.

The nature of contamination is so diverse that there are no standard recipes. Cleaning process development must start by identifying the sources of contamination, particularly from nearby processes. Samples may need to be analyzed by a laboratory using chromatography and/or spectroscopy to determine exactly what the contamination is. Once the contaminant is identified, an appropriate solvent and cleaning process can be developed. This must avoid damage to the product as well as meet human and environmental safety standards. Sometimes the product itself must be redesigned to support cleanliness. The resulting process should be validated against performance and regulatory standards. Finally, controls must be established to prevent contamination from recurring.

In many applications, it is more economical to start with clean parts and use clean processes rather than trying to clean-up dirty parts. In this case, suppliers must be managed to achieve a specified incoming cleanliness. This is referred-to as "Strategic Cleaning."

A PDF of the presentation is posted at https://



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

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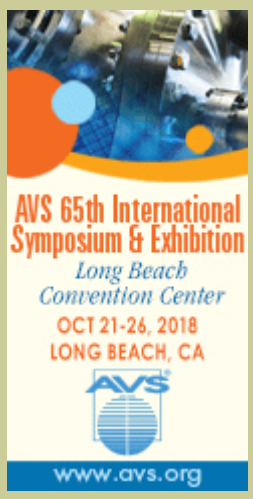
We're on the web!
www.sccavs.org

Upcoming Events



AIMCAL R2R Conference
Phoenix, AZ
October 28-31, 2018
www.aimcal.org

Chapter Activities

Elmer Carvey Scholarship Winners for 2018

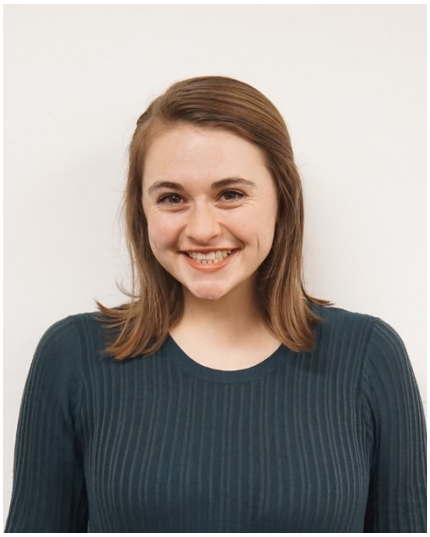
The winners of the 2018 Elmer Carvey Scholarship are Vivian Wall, an undergraduate majoring in Chemistry at UCLA, and Carlos Lima, and undergraduate majoring in Physics and Mathematics at CSU Long Beach.

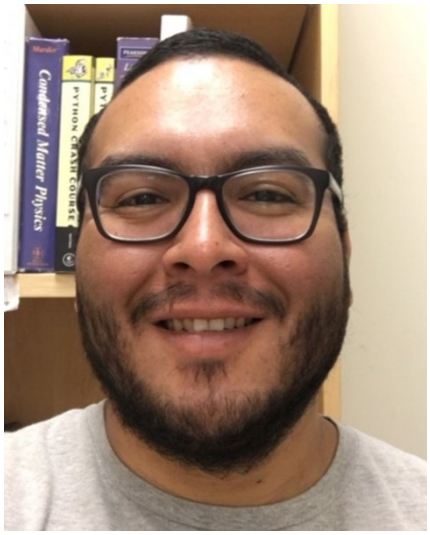
Ms. Wall is conducting research in Professor Sarah Tolbert's lab, where she has worked for the past year. She is working on the ARPA-e THINNER Coatings project, which aims to develop insulating coatings for single-pane windows. The purpose of such coatings is to decrease the energy loss from single-pane windows to avoid the financial and logistical difficulties of double-pane windows. She is using polymer templated silica to achieve a nanoporous insulating structure.

Initial studies of rare earth oxides – chosen because their hydrophobicity might stop strain cracks on the surface of the silica window panes – did not pan out because of producibility problems. Ms. Wall is now working on introducing a zirconia impurity to lower the thermal conductivity of the silica window base material: Lower thermal conductivity results in higher insulating ability.

In the course of her research, Ms. Wall has become an expert in film synthesis, involving plasma cleaning, spin coating, dip coating, and drop casting. She uses a variety of techniques to characterize the effectiveness of her synthesized coatings, including SEM, EDS, contact angle measurement, and other scientific techniques.

Ms. Wall's long-term goals are to attain her PhD, using her knowledge of nanoscience and thin films to conduct research into the chemistry behind energy conservation. (Cont'd p.4)





2018 Elmer Carvey Winners: Vivian Wall (UCLA) and Carlos Lima (CSU Long Beach)

Elmer Carvey Winners (Cont'd from Page 3)

Mr. Lima has been working with Professor Michael Peterson and his condensed matter theory research group over the last year. He is applying Density Functional Theory (DFT) for determining magnetic spin exchange interactions in novel materials. His current project is using DFT to understand and model the magnetic behavior of a particular transition metal oxide recently synthesized in the CSULB Chemistry Department. He is also participating in a Research Experience for Undergraduates (REU) at the University of Connecticut, studying problems in mathematical physics.

Mr. Lima's long-term goals are to apply his theoretical knowledge to problems in condensed matter physics and materials science. He would like to use the tools and knowledge he gains to benefit others, preferably to build machines that help solve difficult optimization problems. To that end, he would like to pursue his PhD in Physics with Professor Ortiz at Indiana University at Bloomington to study Quantum Information and algorithm generation.

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, coatings, 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.

Invitation

AVS 65th International Symposium & Exhibition

Long Beach Convention Center, Long Beach, CA

OCTOBER 21-26, 2018

www.avs.org

Northern & Southern CA Chapter Member Appreciation Suite
Tuesday, October 23
4:00-5:00PM
Member Center/Room 103C at AVS 65

The Southern California Chapter of AVS has joined forces with the Northern California Chapter to offer "happy hour" for our West Coast AVS members and supporters. Please join us for drinks and light appetizers as our way of saying THANK YOU to our local Chapter supporters, members-at-large, and leadership.

Networking opportunities, raffle prize - Apple Watch valued at $300, and upcoming event announcements.

Beer, Wine, and Hors d'oeuvres

Exhibitors interested in participating in SCCAVS or NCCAVS annual exhibition in 2019 are also welcome.

Raffle Prize Sponsored by NorCal Products

Nor-Cal Products
Where technology takes shape

Kanegsberg Talk (Continued from Page 2)

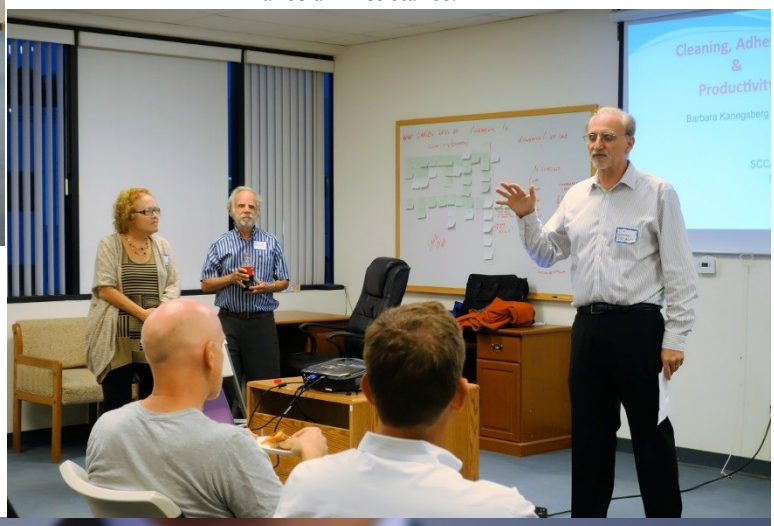
Top Left: Our speakers Ed and Barbara Kanegsberg at ZC&R Coatings for Optics, a Division of Abrisa in Torrance, CA

Bottom Right: SCCAVS Program Chair Jim Garner introducing the speakers

Thank you

ABRISA TECHNOLOGIES

ZC&R Coatings for Optics, an Abrisa Technologies Company provides high-efficiency coatings for industrial, commercial, and opto-electronic applications. The broad selection of coatings is applied via electron beam and ion-assisted electron beam deposition to influence and control reflectance, transmittance, absorbance and resistance.



Thank you to our sponsors:

October/November 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
21 *AVS 65*	22 *AVS 65*	23 *AVS 65*	24 *AVS 65*	25 *AVS 65*	26 *AVS 65*	27
28 *AIMCAL*	29 *AIMCAL*	30 *AIMCAL*	31 *AIMCAL*		2	3
4	5	6	7 *SCCAVS Meeting*	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22 		24
25	26	27	28	29		

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