



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

Spring 2021

Quarterly Newsletter

## Special points of interest:

- SCCAVS Short Course Program and Exhibition September 2021
- *World's first full-scale hyperloop isolation valves unveiled*
- Los Angeles County Science & Engineering Fair winners
- NEW Job Postings

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## SCCAVS Short Course Program September 27-29, 2021

The Southern California Chapter of AVS (SCCAVS) is planning to return and host, IN PERSON, two (2) AVS Short Courses in conjunction with their Exhibit and Technical Keynote speakers, September 27-29, 2021, at the Holiday Inn Buena Park, in Buena Park, CA.

### An Overview of Applied Vacuum Technology

**Instructor: Tim Gessert**

**Monday-Tuesday, September 27-28, 2021**

The course begins with a definition of vacuum and a description of the physical conditions existing in a vacuum environment. Following this introduction will be a discussion of gases at low pressures and the interactions between gases and solids. The phenomena of gas flow through vacuum systems will then be examined. The primary components of vacuum systems, with an emphasis on pumps and gauges, will be described.

### Vacuum System Design

**Instructor: Tim Gessert**

**Wednesday, September 29, 2021**

This course deals with the principal aspects of system design, including materials selection, fabrication techniques, pump selection, sizing pumps and vacuum piping to a chamber, determining pump-down time, leak rate specification, and surface preparation procedures. Methods for determining ultimate pressures are also discussed.

**Timothy Gessert** is the Managing Member of Gessert Consulting, LLC (Conifer, Colorado, USA), and a former/retired Principal Scientist at the National Renewable Energy Laboratory. Tim received degrees in physics from University of Wisconsin - River Falls (B.Sc, 1982), Colorado School of Mines (M.Sc, 1984), and University of Wales - College of Cardiff (Ph.D, 1996). His 35+ years of research includes synthesis and characterization for photovoltaic and other thin films including GaAs, InP, Si, CuInGaSe<sub>2</sub>, CdTe, and transparent conducting oxides (TCOs). Interests also include mentoring graduate students from institutions such as Colorado School of Mines, Colorado State University, University of Toledo, Vanderbilt University, and University of Illinois at Chicago. Tim has collaboratively published over 230 papers, 6 book chapters, and has over 30 awarded or pending U.S. patents.

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AVS Chapter  
Short Courses



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## New-Job Opportunities

### Thin Films Process Engineer (Sylmar, CA)

MINIMUM QUALIFICATIONS:  The successful candidate must possess a Bachelor's degree (B. S.) in Engineering, Physics, chemistry or related technical discipline.  Five (5) minimum of engineering experience in vacuum deposition.  Ability to read drawings.  Provide technical support with new project design, troubleshoot production problems, debug production metalizing.  Creation of technical reports, standard work instructions, process specifications.  Ability to analyze data, launch and sustain SPCs, perform 6-sigma process capability (Minitab a plus).  Ability to lead team projects focused on meeting business strategic goals.

[View Full Job Posting HERE](#)

### Principal Coating Engineer (Murrieta, CA)

MINIMUM QUALIFICATIONS:  The successful candidate must possess at minimum a M.S. degree, Ph.D. preferred, in engineering or related discipline, preferably in physics, optics, electrical or mechanical engineering.  20 years minimum thin film coating engineering experience, preferably at an aerospace company.

[View Full Job Posting HERE](#)

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March 31, 2021

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SCCAVS Short Course  
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Exhibition

Holiday Inn  
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September 27-29, 2021

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## World's First Full-Scale Hyperloop Isolation Valves Unveiled

Reprint from Hyperloop TT March 9, 2021

Hyperloop Transportation Technologies (HyperloopTT) revealed their safety isolation valves today, critical safety components for HyperloopTT systems. Built to precise specifications by GNB KL Group in Elk Grove, CA, the valves will isolate sections of hyperloop system tubes to allow for easier system pressurization for maintenance or emergency.

The full-scale valve is built for commercial operations measuring 16.5 feet in height, weighing 77,000 pounds, and can withstand 288,000 pounds (14.7 PSI) of force. The valves can fully open or close within 30 seconds.

In most emergency scenarios, capsules will stop at pre-determined emergency stations along the route's length to exit the capsule and tube infrastructure. As a redundant emergency response option, the HyperloopTT system will isolate sections of the tube for re-pressurization. If the capsule is unable to stop at a pre-defined exit, a lit emergency path in the depressurized tube will lead passengers to emergency hatches to safely exit the infrastructure.

GNB began collaborating with HyperloopTT engineers in 2019. Now complete, the valves will be shipped to the HyperloopTT facility in Toulouse, France, for integration and certification.

*"This is science and innovation at work," said U.S. Congressman Ami Bera M.D., "I applaud HyperloopTT and GNB for not just imagining the future but are going out and making it a reality."*

"One of the questions we regularly receive regarding our technology is about safety, especially in emergency scenarios," said Andres De Leon, CEO of HyperloopTT. "These valves, built to safety certification standards by a world-class leader, are an essential part of hyperloop safety, as they allow us to isolate portions of the track in the event maintenance is needed or in the rare case of an emergency."

"Working with HyperloopTT has allowed us to showcase our world-class abilities with vacuum parts and technology," said Ken Harrison, president of GNB. "We specialize in building specialty valves and chambers for fusion reactors, government science labs, and more, so HyperloopTT's groundbreaking transportation system is a perfect project for us."

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### About HyperloopTT

Hyperloop Transportation Technologies (HyperloopTT) is an innovative transportation and technology company focused on realizing the hyperloop, a system that moves people and goods safely, efficiently and sustainably by bringing airplane speeds to the ground. Through the use of unique, patented technology and an advanced collaborative business model, HyperloopTT is creating the first new form of transportation in over a century.

HyperloopTT's European Research and Development Center in Toulouse, France, the aerospace capital of Europe, is home to the world's first and only full-scale test system. In 2019, HyperloopTT released the first comprehensive feasibility study analyzing a hyperloop system, which found that the system is economically and technically feasible and will generate a profit without requiring government subsidies. Founded in 2013, HyperloopTT is a global team of more than 800 engineers, creatives and technologists in 52 multidisciplinary teams, with 50 corporate and university partners. Headquartered in Los Angeles, CA and Toulouse, France, HyperloopTT has offices in North and South America, the Middle East and Europe.

HyperloopTT is led by Dirk Ahlborn (Founder and Chairman), Andres de Leon (CEO) and a senior management team of experienced professionals.

### About GNB

GNB is a world-class vacuum hardware manufacturing organization and a market leader for large-sized, high-temperature gate valves, valves for highly contaminated environments, valves integrated into systems, and valve customization. With ISO 9000 certification and ASME U-stamp certification, GNB specializes in vacuum valves, angle valves, ball valves, vacuum chambers, and vacuum hardware accessories, including KF flanges, CF flanges, ISO Flanges, and vacuum fittings. <https://www.gnbvac.com/>

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## Los Angeles Science & Engineering Fair Winners

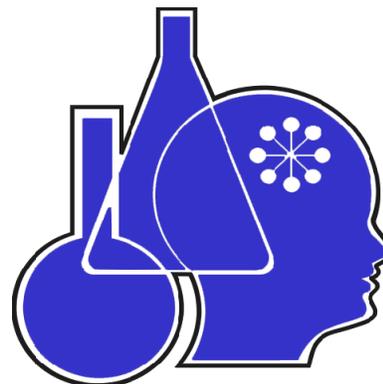
By: Jim Garner

The SCCAVS strives to encourage promising high school students to pursue careers in science and engineering. Our prizes go to projects that demonstrate excellent experimental techniques and student knowledge of the subject. Ideally (but not necessarily), they will be in fields associated with the AVS. Our winners this year are:

**FIRST PRIZE** – “Effect of pH on the Concentration of Fucoxanthin in *Isochrysis Galbana*” by Yeonji (Helen) Choi, conducted in conjunction with the Cabrillo Marine Aquarium. This experiment measured the relationship between the pH of seawater and the production of chlorophyll in one-cell organisms, *Isochrysis Galbana*, which are a major part of the aquatic food chain. The organisms were grown under controlled conditions, vacuum filtered, and analyzed for chlorophyll content using a spectrophotometer. The results revealed a highly consistent decline with pH. This suggests a significant reduction in sea life by the end of the century if pH continues to decline at current rates.



1st prize winner Yeonji (Helen) Choi



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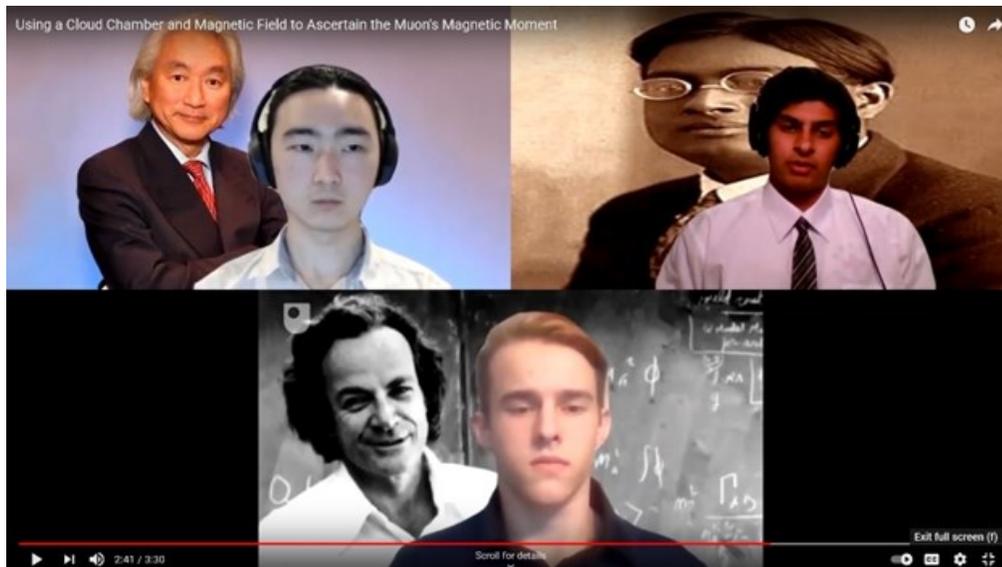
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**SECOND PRIZE – “Feasibility of Using a Cloud Chamber Particle Detector and a Spatially Varying Magnetic Field to Ascertain the Muon’s Magnetic Moment”** by Daniel Belzberg, Beom Joon (John) Kim, and Kapilaksha Dheeriya, students at Palos Verdes High School. This project inferred the magnetic moment of a muon by measuring the curvature of its path in magnetic field. Muons were chosen because they are fairly abundant as cosmic rays. An electric solenoid was used to create a spatially varying magnetic field. The experimenters constructed a cloud chamber to measure the path of the muon. Although the resulting measurement of magnetic moment was far larger than published values, we found that the experimental methods and student grasp of the material to be exceptional.



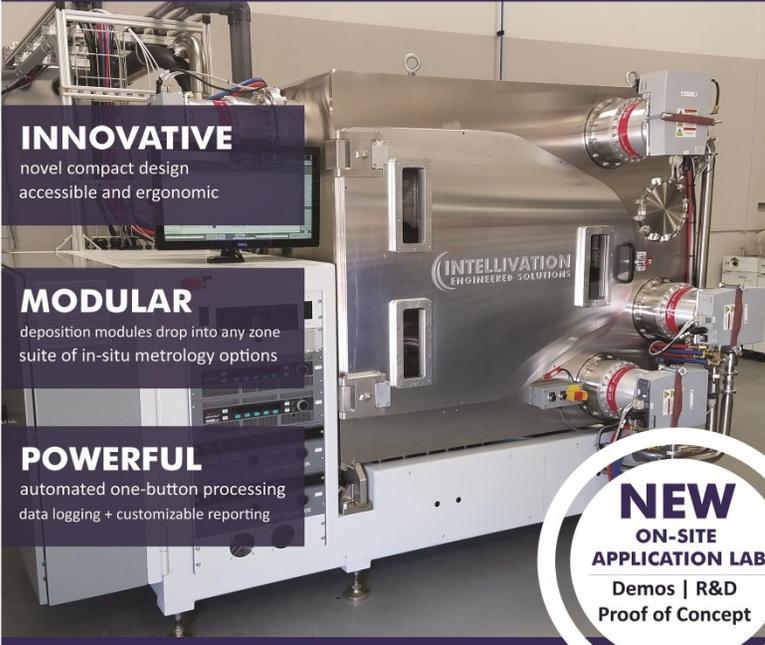


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The Los Angeles County Science and Engineering Fair provides a yearly setting for middle and high school students to show off their investigative skills and creativity to compete for medals, special awards and scholarships. Students not only receive recognition for their projects but the Science Fair nurtures student interest in various scientific and engineering fields.

The Southern California Chapter of the AVS awards a \$200 First Prize and \$100 Second Prize annually at the LA County Science & Engineering Fair as well as the Orange County Science & Engineering Fair, which judging occurs March 24-28, 2021 and will be included in next issue.

For more information, go to the official website at [www.lascifair.org](http://www.lascifair.org)



## April 2021

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

