SVC™
SOCIETY of VACUUM COATERS

TechCon 2026 Long Beach

Long Beach Convention Center
Long Beach, California, USA

April 25 - April 30, 2026

Extended Call for Papers

Featuring Select Keynote and Invited Speakers & Preview of the 2026 In-Person Tutorial Program

Technical Program: April 27 - April 30, 2026

- Technical Sessions
- Interactive Networking Forums
  + Technology Forum Breakfasts

Education Program: April 25 - April 30, 2026

- Problem-Solving Tutorial Courses

Featuring Sessions on:

Advanced Multifunctional Coatings: Integrating Vacuum and Electrochemical Deposition for Sustainable Energy, Surface Protection, and Biomedical Innovations (Joint Session with The Electrochemical Society - ECS) ***New***
Advances in Thin Film Sensor Technologies: Materials Design and Applications
Atomic Layer Processing
Characterization, Testing and Failure Analysis of Thin Films, Coatings, and Engineered Surfaces ***New***
Coatings and Processes for Biomedical Applications
Coatings for Energy Conversion and Related Processes
Digital Transformation through Artificial Intelligence, Machine Learning, Simulation, and Data Science in the Thin Film Industry
Electron Beam Processes
Emerging and Translational Technologies and Applications
Exhibitor Innovator Showcase
High Power Impulse Magnetron Sputtering (HIPIMS)
Large Area Advanced Packaging and Integrated Photonics ***New***
Large Area Coatings
Optical Coatings
Organic and Perovskite Electronics
Photonically-Induced Transformations of Thin Films and Surfaces ***New***
Plasma Processing and Diagnostics
Process Monitoring, Control, and Automation
Protective, Tribological, and Decorative Coatings
Quantum Computing
Thin Film Contributions for the Hydrogen Economy
WebTech Roll-to-Roll Technologies and Innovation

For more information, contact the SVC at +1-505-897-7743
or CLICK HERE to submit an abstract

www.svc.org

The SVC Awards Committee Invites Your Nominations

The SVC Awards Committee is responsible for selecting the recipients of our awards: the **Nathaniel H. Sugerman Award** for distinguished achievement, and the **Fellow-Mentor Award** for significant contributions to the SVC or the vacuum coating industry. We request that nominations be sent to Chris Muratore, University of Dayton, Awards Committee Chair, cmuratore1@udayton.edu, by December 15, 2025. The criteria for the awards and a list of past award recipients can be found on the ***SVC website***.

Nominations should give a brief, thoughtful statement about the individual in light of the criteria for the proposed award. The Sugerman and Mentor Awards can be based on a broad range of possible contributions to the SVC and/or the vacuum coatings industry. Please consider candidates whose contributions are significant but perhaps not as apparent based on more formal mechanisms, i.e., scientific publications.

We encourage you to submit nominations for the 2026 awards now!

Fellow-Mentor Awardees are eligible for the Sugerman Award. Employees and contractors of the SVC and current members of the Awards committee are not eligible.

Awards Committee Members:

Chris Muratore, University of Dayton, *Awards Committee Chair* | cmuratore1@udayton.edu
Ladislav Bardos, Uppsala University, Sweden, *Immediate Past Chair* | ladislav.bardos@angstrom.uu.se
Clark Bright, Bright Thin Film Solutions (3M retired), *Past Chair* | brightcrew@aol.com
Traci Langevin, Soleras Advanced Coating | Traci.Langevin@soleras.com
Gary Vergason, Vergason Technology, Inc. | gvergason@vergason.com
Jolanta Sapieha, Polytechnique Montréal, Canada| jsapieha@polymtl.ca

TechCon 2026 Long Beach

SVC Society of Vacuum Coaters

Technical Program
April 27 – April 30
Education Program
April 25 – April 30
Technology Exhibit
April 28 – April 29

69th Annual SVC Technical Conference • April 25 – 30, 2026

Long Beach Convention Center, Long Beach, California, USA

Featuring the very latest industrial and technical advances in Thin Films, Coatings, and Surface Engineering

Plus! Interactive Networking Forums, Discussion Groups and Social Events
Free Conference Admission on April 28th and April 29th

Problem solving tutorials taught by the world's leading experts in vacuum technology, thin film science, and surface engineering

Over 125 exhibiting companies dedicated to vacuum coating technologies
Plus! Free Exhibition Admission, Exhibit Hall Presentations, and Social Networking Events

The 2026 SVC TechCon in Long Beach, California USA focuses on the essential role that Thin Films, Coatings, and Surface Engineering play in the products and services that drive our daily lives and the impact that Artificial Intelligence has had in our field. The SVC represents the latest technologies, manufacturing methodologies, and business insights, supporting a global group of stakeholders. Highlighted by prominent Keynote presentations and Invited speakers, the TechCon offers an engaging podium for contributed talks & posters as well as roundtable discussions and other interactive features addressing the following themes:

Advanced Multifunctional Coatings: Integrating Vacuum and Electrochemical Deposition for Sustainable Energy, Surface Protection, and Biomedical Innovations (Joint Session with The Electrochemical Society - ECS) ***New***
Advances in Thin Film Sensor Technologies: Materials Design and Applications
Atomic Layer Processing
Characterization, Testing and Failure Analysis of Thin Films, Coatings, and Engineered Surfaces ***New***
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Organic and Perovskite Electronics
Photonically-induced Transformations of Thin Films and Surfaces ***New***
Plasma Processing and Diagnostics
Process Monitoring, Control, and Automation
Protective, Tribological and Decorative Coatings
Quantum Computing
Thin Film Contributions for the Hydrogen Economy
WebTech Roll-to-Roll Technologies and Innovation
Exhibitor Innovator Showcase

The SVC TechCon provides the forum where researchers, technologists, innovators, business leaders, decision makers, and newcomers to the field can connect, exchange ideas and gain knowledge. An industry-leading Exhibition, Technical Program, and Education Program complement each other for exceptional attendee value. The Nashville venue is an industry favorite, offering both professional networking as well as recreational value in a relaxed atmosphere. See you in Long Beach!

CLICK HERE to submit an abstract to TechCon 2026

P.O. Box 10628, Albuquerque, NM 87184 • Telephone: +1 (505) 897-7743 • Fax: +1 (866) 577-2407 | www.svc.org

Message from the Program Director

The 2025 TechCon in Nashville finished a few weeks ago after putting a very robust technical program on the stage at the Gaylord Opryland venue. We knew at the start of the planning cycle that the SVC would suffer from an unfortunate schedule overlap with the Optical Interference Coatings Conference (OIC) that prevented several community members from attending the TechCon. However, due to additional headwinds in the international business climate that constrained travel funding and international attendance, turnout for this TechCon was below our ambitious goals but still considerably better than some of our peers' events thanks to the herculean efforts of SVC staff and the volunteer program leadership team. We highlighted several new technical sessions, secured prominent Keynote and Invited speakers, and showcased contributions from our exhibitors in both the technical sessions as well as the Exhibitor Innovation Showcase. The interactive program elements – Technology Forum Breakfasts (TFBs) and in-session Colloquia – were again an enormous success and remain a hallmark of the SVC's program that we will carry forward. We are now in the phase of preparing the "memorialization" of the program content through a wide range of publication options – PowerPoint presentations (static or narrated/ pre-recorded) or a manuscript in the conference proceedings, or peer-reviewed submissions to a high-impact scientific journal. Note that the stellar technical content of this edition of the Bulletin is based on an outstanding contribution to past TechCon programs as an example of preserving the knowledge we share with our community, and I encourage every presenter to take advantage of the publications options the SVC offers.

With the 2025 event wrapped up, no time was wasted to start planning the 2026 SVC TechCon in Long Beach, particularly since we will have a somewhat shorter planning cycle due to the difference in timing of the two events. Long Beach is an extremely attractive venue based on past experience, and we will offer several new technical sessions, and fine-tune the line-up of TFBs and in-session colloquia. The 2026 TechCon offers an industry-leading technical exhibition, abundant networking opportunities, along with an extensive educational program and in-depth technological expertise. We plan to emphasize and highlight the opportunities and potential of our young members (students and early-career professionals) that are so important to the growth of our industry. The 2026 TechCon will be a wonderful opportunity to present your latest research results, coating processes, and equipment applications in the field. Please enjoy the technical content of this Bulletin, mark your calendar for the 2026 TechCon (April 26 – 30, 2026), and review the upcoming Call for Papers to contribute a talk or poster that highlights your current technical or business achievements.

— Chris Stoessel, SVC Program Director
cstoessel@stoesselconsulting.net

SVC™ Society of Vacuum Coaters

Our Vision: *To provide a dynamic forum for transitioning and commercializing thin film and surface engineering innovation to industry.*

Our Mission: *To promote technical excellence by providing a global forum for networking, educating, and informing the stakeholders, the technical community, and the industrial eco-system on all aspects of industrial vacuum coating, surface engineering and related technologies.*

Publication Options:

There are two publication options and one video presentation option for work presented during the 2026 Technical Program

WITHOUT PEER REVIEW

Submission Deadline:
September 11, 2026
Publication in PowerPoint OR Manuscript format in Society of Vacuum Coaters Annual Technical Conference Proceedings (ISSN 0737-5921)

PEER REVIEWED

Submission Window Open
April 15 - September 11, 2026
Publication in a special edition of Elsevier's Surface and Coatings Technology Journal (ISSN: 0257-8972)

VIDEO PRESENTATIONS

Submission window open
April 15 - September 11, 2026
Narrated mp4 or PowerPoint video to be posted to the SVC's dedicated YouTube Channel

SVC and SVC Foundation Travel Support for Students and Young Professionals

Young professionals and students are our future. The SVC and the SVC Foundation recognize that capturing the imagination and the interest of young technicians, engineers, and scientists are essential activites that will perpetuate the technologies and the companies that comprise the SVC. Student education scholarships and sponsorships supporting travel and conference participation are offered annually through programs that encompass a global reach to qualified and deserving individuals.

SVC Student/Young Professional Travel Sponsorship Program

The SVC Travel Sponsorship Program provides travel support and complimentary conference registration to selected full-time students and young professionals (under the age of 35 working in industry) to make an oral technical presentation at the SVC Annual Technical Conference. A limited number of sponsorships will be awarded to the best applicants. Applicants from industry, academic, research, and technical institutions from the United States and around the world are encouraged to apply. The Travel Sponsorship Committee evaluates applications and makes selections based on the quality and relevance of the applicant's project to the interests and mission of the SVC. It will also consider the quality of the application itself (completeness, quality, etc.), potential impact of the oral presentation, its relevance to the specific session, as well as the need for funding.

Requirements for Participation:

The applicant must have a sponsor. The sponsor can be a faculty member or supervisor at the student's institution/place of employment or another academic, technical, or research institution. The sponsor must indicate that he or she understands the nature of the conference and what SVC technical programs are about. The applicant must commit to providing a manuscript based on the content of the oral presentation at the TechCon or the PowerPoint presentation delivered at the TechCon for subsequent publication by the SVC before any financial support is provided.

During the selection process, preference will be given to those applicants who have not already received sponsorship from SVC. The successful candidates should also preferably come from different institutions.

SVC Travel Sponsorship Program Abstract and Application Deadline: October 4, 2025

The SVC Foundation provides scholarships and/or stipends for travel expenses to attend the annual SVC technical conference. Scholarships are open to well-qualitified students planning to enter fields related to vacuum coatings as well as techicians already working in the field practicing the craft. The Society of Vacuum Coaters (SVC), the SVCF's founder, and AIMCAL, an organization committed to advancing vacuum roll-coating technology, and their members, provides support for the Foundation to pursue these goals. Since its inception in 2002, the SVCF has awarded more than 220 scholarships and travel awards totalling over $600,000 to students from more than 28 countries.

Please visit www.svcfoundation.org for more information

Academic Scholarship application deadline: October 18, 2025

Industry Scholarship application deadline: January 23, 2026

Student Travel Sponsorship application deadline: October 4, 2025

For more information, contact the SVC at +1-505-897-7743 or CLICK HERE to submit an abstract | 2026 TechCon

Introducing the SVC's Keynote

Sustainability and Life Cycle Thinking as Innovation Drivers for Surface Engineerings

Christoph Herrmann
Fraunhofer Institute for Surface Engineering and Thin Films IST and TU Braunschweig, Braunschweig, Germany

Surface technologies are fundamental to a wide range of industrial applications and are typically integrated within comprehensive process chains comprising both upstream and downstream activities. Achieving sustainable development demands that engineered solutions operate within the Earth's biophysical limits and adhere to established environmental boundaries. This necessitates the identification of challenges throughout circular value chains and emphasizes the importance of practical, application-oriented research into sustainable product and process innovations. Concurrently, it is crucial to ensure that micro-level engineering decisions are consistent with macro-level sustainability frameworks, such as planetary boundaries, which recognize the finite capacities of global climate and ecosystems. This presentation will outline a systematic methodology designed to identify and prioritize mitigation strategies, thereby providing valuable insights for engineering initiatives. Relevant case studies from the field of surface engineering will illustrate the effective implementation of this approach..

Prof. Dr.-Ing. Christoph Herrmann is university professor for Sustainable Manufacturing & Life Cycle Engineering and co-director of IWF, Institute of Machine Tools and Production Technology, Technische Universität Braunschweig as well as director of the Fraunhofer Institute for Surface Engineering and Thin Films IST since November 2018. Prof. Herrmann serves on different boards, including the Open Hybrid LabFactory (Wolfsburg), the Hydrogen Campus Salzgitter, and the Battery LabFactory Braunschweig. He currently acts as the Spokesperson of the Fraunhofer Center for Energy Storage and Systems (ZESS) in Braunschweig. Since July 2025, he is also the chairman of the Fraunhofer Group for Production. Prof. Herrmann has conducted various industry and research projects in the context of life cycle engineering and sustainable manufacturing on national and international level. He has published more than 500 papers and book publications as author, co-other and editor. Prof. Herrmann is member of the German Academic Association for Production Technology (WGP) and the International Academy for Production Engineering (CIRP).

Plasma Technologies for Precision and Large-Scale Surface Engineering

Elizabeth von Hauff
Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technologies FEP and TU Dresden, Dresden, Germany

Fraunhofer Society's mission is to bridge the gap between fundamental and applied research by partnering with industry to translate laboratory results into real-world applications. Fraunhofer FEP in Dresden specializes in electron-beam and plasma technologies for large-scale and precision coatings, alongside advanced surface engineering. By integrating process and hardware development, we deliver technical solutions across a broad range of fields, including energy technologies, architectural glazing, semiconductors, optics, sustainable packaging, and environmental and biomedical applications. Our collaboration models span from feasibility studies to pilot-scale production, accelerating knowledge transfer and reducing risk for industry, with a focus on overcoming bottlenecks in cost, reliability, and performance to deliver scalable, robust solutions. In this talk, I present our latest results in precision coatings for optics and power electronics, and in large-scale, flexible coatings for photovoltaic and battery technologies. We also highlight advances in plasma-chemical processes and discuss how tailored hardware platforms and integrated process chains can reduce material usage, lower energy consumption, and eliminate toxic precursors, without compromising performance. The focus is on strategies that combine process design, equipment engineering, and system integration to enable cleaner, more efficient solutions.

Elizabeth von Hauff studied Physics at the University of Alberta in Edmonton, Canada. Her PhD and Habilitation work was performed at the University of Oldenburg, Germany in experimental physics. In 2011 Elizabeth accepted a joint appointment between the Institute of Physics, University of Freiburg and the Fraunhofer Institute for Solar Energy Systems (ISE). From 2013 – 2021 Elizabeth was an Associate Professor in Physics at the VU Amsterdam. In 2020 she was appointed as a special Chair in Chemistry at the University of Amsterdam. In 2021, she accepted an appointment as director of the Fraunhofer FEP and Professor in Electrical Engineering at the TU Dresden. Her research interests lie in fundamental questions in physics and chemistry within the context of real applications.

Speakers for the 2026 TechCon

Fano-Resonant Optical Coatings and Applications

Chunlei Guo
University of Rochester, Rochester, NY

Despite being a century-old technology, optical coating comprises only a handful of types. Here, I introduce a new class of optical coatings exhibiting photonic Fano resonance, termed Fano-resonant optical coatings (FROCs). FROCs consist of just four thin layers, yet they outperform coatings that require orders of magnitude more layers and thickness. I will also discuss a range of applications enabled by FROCs' superior properties, including beam splitter filters that transmit and reflect the same color, full-gamut high-purity structural colors, and efficient solar energy harvesting systems.

Chunlei Guo is a Professor in The Institute of Optics and Physics at University of Rochester, where his research spans femtosecond laser-matter interactions to nanophotonics. His work at Rochester led to the discovery of a range of highly functionalized materials, including the so-called black and colored metals, super-hydrophillic/-hydrophobic surfaces, and advanced coatings. These discoveries have gained extensive public interest, including 4 features in The New York Times. He is a Fellow of the American Physical Society, Optica, and Int'l Academy of Photonics and Laser Engineering. He served as the Editor-in-Chief for the recently released 2nd edition of the CRC Handbook of Laser Technology and Applications, which serves as the most comprehensive handbook in the field of lasers to date.

From Poisoned Targets to Healthy Models: The Quest for Parameters

Diederik Depla
Ghent University, Gent, Belgium

The conceptual simplicity of reactive magnetron sputtering facilitates the description of global trends in process curves characteristic of reactive magnetron sputtering. However, achieving a quantitative description of these trends through simulations remains far more challenging, as the critical bottleneck of every modelling effort lies in the determination of accurate input parameters. Following a brief introduction to the RSD model, this paper provides an overview of several experimental methodologies designed to extract the parameters essential for its implementation. A central parameter in any thin-film deposition technique is the deposition rate. While its determination in metallic mode is relatively straightforward, the task becomes substantially more complex in poisoned mode due to the limited availability of sputter yield data for oxides. Our experiments reveal that in poisoned mode sputter yields exhibit a pronounced dependence on process conditions. Monte Carlo simulations, moreover, uncover a remarkable material-independent correlation between reported partial yields for oxides and experimentally measured yields in poisoned mode. Another crucial quantity, the ion-induced electron yield, can only be reliably determined experimentally, even for metals. By employing empirical scaling laws, however, it becomes feasible to estimate these yields under poisoned-mode conditions. The strong influence of chemisorption on the electron yield explains the discharge voltage behaviour in metallic mode. The influence of chemisorption on target poisoning emerges as the next major challenge, particularly as a novel strategy to control the reactive sputtering process exposes discrepancies between the current formulation of the model and experimental observations. Nevertheless, this measuring strategy provides compelling evidence that the RSD model's prediction of double hysteresis behaviour is fundamentally correct.

Diederik Depla has received his Master Degree in Chemistry in 1991 at Ghent University (Belgium). In 1996 he promoted with a PhD thesis in Solid State Chemistry on spray drying of precursors for superconductors. After a short period as senior scientist in the Department of Solid State Sciences, in 1999 he became assistant professor. As full professor, he is now head of the research group "Dedicated research on advanced films and targets(DRAFT)" in the same physics department. Two fundamental research questions has driven his research up until now. The first question is how deposition conditions influence film growth, while the second question probes for the impact of reactive gas addition on the magnetron process. Under his guidance, the research group has distinguished itself from the traditional, technological approach, and has set an own course seeking for answers on the two above mentioned fundamental questions, translated in the mission statement of the group: "At DRAFT we want to become the recognized leader in the understanding of thin film growth by reactive magnetron sputtering, and to enjoy research by experiments and simulations." This "target on growth" approach has resulted in several publications in peer reviewed papers. He authored the book "Magnetrons, reactive gases and sputtering." He co-initiated in 2000 the successful RSD conference series. He received the Bill Sproul Award from AVS for "his persistence to unravel the fundamental processes during reactive magnetron sputtering." More details on his research can be found on www.draft.ugent.be.

Call for Papers

Advanced Multifunctional Coatings: Integrating Vacuum and Electrochemical Deposition for Sustainable Energy, Surface Protection, and Biomedical Innovations (*Joint Session with The Electrochemical Society*)

Thin-film coatings are at the heart of materials innovation, playing a transformative role in energy systems, corrosion resistance, surface protection, and biomedical applications. This session will bridge expertise from the Society of Vacuum Coaters (SVC) and the Electrochemical Society (ECS) by exploring the synergy between vacuum-based deposition techniques and electrochemical processes, focusing on their combined potential for enhancing specific applications. Whether by integrating vapor-phase deposition methods with electrochemical techniques or applying vacuum-deposited thin films directly to electrochemical devices such as batteries, fuel cells, and sensors, the session will highlight how these approaches can drive the development of high-performance, multifunctional materials for a range of applications.

Vapor-phase methods such as physical vapor deposition (PVD), chemical vapor deposition (CVD), and atomic layer deposition (ALD) enable the deposition of high-purity, conformal coatings with precise microstructural control. These techniques are becoming crucial for the fabrication of next-generation energy devices, corrosion and wear-resistant surfaces, and bioactive films. This session aims to explore the dynamic intersection of vacuum-based deposited thin films materials and electrochemical technology applications. By bridging surface engineering with electrochemical performance, the session seeks to promote cross-disciplinary dialogue and drive innovation across both fields. Discussions will focus on how advanced thin films, coatings, and nanostructures fabricated through vacuum processes can transform electrochemical devices such as batteries, fuel cells, sensors, and beyond.

The Session welcomes papers in the following areas:

- Innovations in PVD, CVD, and emerging vacuum methods for fabricating high-performance electrochemical components,
- Integration of vacuum deposition (PVD/CVD) with electrochemical methods (electrodeposition, electroless plating) for multifunctional and durable coatings,
- Design and development of thin film electrodes for batteries, supercapacitors, and fuel cells to enhance energy storage and conversion efficiency,
- Surface modification using vacuum-based techniques to improve interfacial stability, conductivity, and overall electrochemical performance,
- Advances in scalable vacuum deposition processes tailored for mass production of electrochemical energy storage and conversion devices,
- Vacuum-deposited coatings for next-generation batteries, fuel cells, supercapacitors, and hydrogen storage systems, and
- Novel vacuum deposition approaches to enhance corrosion resistance and extend the service life of components in aerospace, marine, and harsh environments.

Invited Speakers:

Advanced Active and Inactive Coating Technologies to Improve Life and Safety of Lithium-Ion Batteries for Automotive and Grid Applications

Khalil Amine

Argonne National Laboratory, Argonne, IL

To enable mass electrification of vehicles, there is an urgent need of developing high-energy density batteries that offer 15 years calendar life and meet all the abuse tolerance needed to demonstrate excellent safety performance. These challenging requirements make it difficult for conventional battery systems to be adopted in EVs or smart grid application. In this talk, we will present different advanced coating technologies that can stabilize the interface between electrodes and electrolyte leading to significant improvement of both cycle and calendar life as well as battery safety. The protective coating can be done either at the electrode level or at the particle level. We will disclose both inactive coating by spraying nano particle of stable metal oxide, fluoride or phosphate on the secondary particle of the active cathode particles or polymerising a PEDOT conductive polymer to fully protect the secondary and primary particle of the cathode. We will also disclose an active coating using a dual mode gradient approach where we put a stable structure at the surface of the cathode particle to eliminate any Oxygen release responsible for surface parasitic reaction and oxidation of electrolyte causing a thermal runaway. Another alternative is to use functional electrolyte additives to form a robust

coating film on the electrode by either reduction, oxidation or polymerization of the additive to form a passivation film that can prevent any side reaction between electrodes and electrolyte at both high voltage and high temperature. These coating technologies have proven to be very effective low-cost approach to enhance battery safety and performance and can enable low cost long range electric vehicles and smart grid.

Powder Atomic Layer Deposition at the Commercial Scale for Batteries and Other Applications

Christopher Gump

Forge Nano, Thornton, CO

While atomic layer deposition (ALD) has found extensive use in the semiconductor industry, it has been generally regarded as too slow or expensive for powder coating applications, even though the precise and nanoscale films could be incredibly useful across many industries. Even so, the number of research publications on the benefits of ALD onto powders has continued to grow over the last 25 years. Fundamentally, ALD on powders is the same as on flat surfaces like silicon wafers. However, much higher mass transfer rates for precursors and reactions products to and from the substrate surface are required. Substrate handling can also be more challenging.

Much of the powder ALD work has been reported in the lithium-ion battery space, where ALD films have been demonstrated to be an effective way of achieving the higher energy densities and charge/discharge rates necessary to speed the commercial adoption of electric vehicles. For these research findings to benefit industry, processes capable of coating large quantities of high-surface area substrates must be developed. To that end, Forge Nano has designed and built commercial-scale tools capable of coating tons of cathode and anode powders in order to standup a robust supply chain for these applications. This talk will highlight the science and engineering for both our semi-batch rotary tool, capable of coating hundreds of kilograms of material with the hundreds of grams of trimethylaluminum and water precursor required per ALD cycle, and our fully continuous vibrating bed tool, capable of coating tens to hundreds of kilograms of material per hour. Products from these tools have been tested in battery cells and shown to have the same performance improvements seen in materials coated at much smaller scale. Results for ALD coatings on Ti64 additive manufacturing feedstocks will also be shared.

Session Organizers:

Luca Magagnin, *Politecnico Milano 1863*, luca.magagnin@polimi.it
Wei Tong, *Lawrence Berkeley National Laboratory,* weitong@lbl.gov

Jones Alami, *Mohammed VI Polytechnic University*, jones.alami@um6p.ma
Mohammed Makha, *Mohammed VI Polytechnic University,* mohammed.makha@um6p.ma
Chris Stoessel, *Stoessel Consulting,* cstoessel@stoesselconsulting.net

Advances in Thin Film Sensor Technologies: Materials Design and Applications

This technical session highlights cutting-edge developments in thin film sensor technologies, with a focus on the interplay between novel functioning materials, innovative design strategies, and impactful real-world applications. As sensing demands grow across diverse sectors—from healthcare and environmental monitoring to industrial automation and wearable electronics—thin film-based sensors have emerged as a powerful platform for achieving high sensitivity, selectivity, and integration in compact form factors.

Contributions to this session will explore advances in functional thin film materials, including nanostructured, hybrid, and two-dimensional systems; breakthroughs in deposition techniques and micro/nanofabrication; and the engineering of sensor architectures optimized for performance and reliability. Particular emphasis is placed on interdisciplinary approaches that combine materials science, nano-photonics, optoelectronics, electronics, and data-driven techniques to push the limits of sensing performance. Researchers and technologists from academia, industry, and government are encouraged to share innovations, challenges, and future directions in this rapidly evolving field.

The session will welcome contributions on, but not limited to, the following topics:

- Advanced Sensing Materials: Novel nanostructured, hybrid, and 2D thin films,
- Deposition and Fabrication: Innovations in thin film growth and micro/nano-processing,
- Sensor Design and Integration: Compact, robust, and multifunctional architectures,
- Interdisciplinary Approaches: Merging materials, photonics, and electronics,
- Smart Sensing Systems: AI/ML-enhanced data processing and analytics, and
- Application Highlights: Use cases in health, environment, industry, and wearables.

Call for Papers

Featured Speaker:

Self-Assembled Oxide-Metal and Nitride-Metal Nanocomposite Thin Films for Metamaterials and Optical Sensing Applications

Di Zhang
University of Texas at Arlington, Arlington, TX

Integration of nanocomposites and heterostructures can create extraordinary properties that cannot be achieved in single phase materials. Beyond oxide-oxide functional nanocomposite films which have been widely explored in the past two decades of this century, oxide-metal nanocomposites films have attracted increasing interests in recent years owing to their wide range of functionalities, such as metamaterials with plasmonic and hyperbolic optical properties, and ferroelectric, ferromagnetic and multiferroic behaviors. In this talk, I will focus on introducing the recently explored oxide-metal and nitride-metal vertically aligned nanocomposite (VAN) thin films showing exotic optical and magnetic-optic coupling effect. Detailed transmission electron microscopy (TEM) and X-ray diffraction (XRD) characterization work revealed the film epitaxy and crystallographic lattice matching relation at metal/oxide (nitride) interfaces. The structure anisotropy of the nanocomposite films results in the corresponding anisotropic optical properties such as angular-dependent transmission and reflectivity, and plasmonic hyperbolic dispersion in the UV-Vis-NIR wavelength regimes. The novel physical properties and coupled functionalities render the VAN thin films to have great potentials in nanophotonic and optical sensing applications.

TAC Co-Chairs:

Jason Hrebik, *Kurt J. Lesker Company,* jasonh@lesker.com
Jacob Lee, *University of Texas at Arlington,* seunghyun.lee@uta.edu
Binbin Weng, *University of Oklahoma,* binbinweng@ou.edu

Atomic Layer Processing (ALP)

Over the last few years, atomic layer processes (ALPs), such as atomic layer deposition (ALD), atomic layer etching (ALE), molecular layer deposition (MLD), and atomic layer epitaxy (ALEp) have increased in importance, enabling many new products and applications. With excellent uniformity, nanoscale precision, and high versatility, ALPs have applications in sensing, optical coatings, energy storage, and microelectronics. Recent advances in low temperature processing make ALP methods attractive to the processing polymers, biomaterials, and other applications with low thermal budgets.

Sequential Infiltration Synthesis (SIS), alternatively called also Vapor Phase Infiltration (VPI) complements the above-mentioned layer-by-layer technologies by its ability to form 3D nanostructures by a bulk diffusion and selective chemical reactions of precursor with functional groups in polymers or block co-polymers (BCP). Highly selective reactions of precursors with e.g., carbonyl groups (C=O) in the polymer bulk allows integration of inorganic materials into the organic matrix, resulting in a hybrid material. A self-organized BCP film after the SIS will form 3D nanostructures.

The common feature of all those methods is the use of self-limiting reactions that can provide atomic-scale resolution in both vertical and horizontal directions: this property can also be complemented by selectivity in etching or deposition. Selectivity in deposition or etching may solve some of the processing challenges in the technology of nano-devices, e.g., alignment of nanometer-sized features. A high degree of control makes the selective atomic scale processes attractive for future nano-fabrication methods.

We are soliciting oral and poster contributions in areas including both established technologies and creative new developments. Advanced technologies which successfully cross over from early-stage feasibility studying to commercially viable industrial solutions are of particular interest.

Session topics will include:

- Innovations in methods for upscaling ALPs towards high-volume industrial applications,
- New business concepts or market perspectives that accelerate transfer of ALPs and selective atomic processes from the lab to commercial viability,
- Current commercial products using ALPs,
- Precursor synthesis,
- Fundamental aspects of ALP,
- Process development,
- Plasma enhanced processes,
- Challenges and applications of ALPs and selective atomic processes,
- Novel concepts for ALP process control, characterization, and monitoring,
- Applications of selective atomic processes, and
- Selective atomic processes in micro- and nanoelectronics.

Call for Papers

INVITED SPEAKERS:

Directional Atomic Layer Etching of Lithium Niobate Using Bromine Plasma Chemistry

Austin Minnich
California Institute of Technology, Pasadena, CA

Lithium niobate ($LiNbO_3$, LN) is a ferroelectric crystal of interest for integrated photonics owing to its large second-order optical nonlinearity and the ability to impart periodic poling via an external electric field. However, on-chip device performance based on thin-film lithium niobate (TFLN) is presently limited by propagation losses arising from surface roughness and corrugations. Atomic layer etching (ALE) could potentially smooth these features and thereby increase photonic performance. Previously, our group has reported the first isotropic ALE processes for lithium niobate. Here, we report a directional ALE process for x-cut MgO-doped LN using an HBr-containing plasma. At 0 degrees Celsius we report an 85% synergy ALE recipe with etch rate of 1.04 nm/cycle and surface roughening. At 200 degrees Celsius we report a reduced synergy at 30%, with an etch rate of 1.24 nm/cycle and no evidence of surface roughening. We also compare the surface roughness result of the HBr containing process with a chlorine-only process. Our ALE process could be to fabricate waveguide structures with nanometer precision without surface roughening or redeposition, thereby increasing the performance of TFLN nanophotonic devices and enabling new integrated photonic device capabilities.

Hydrazine-Enabled Atomic Layer Deposition of TiN for High Performance DRAM Electrodes

***Walter Hernandez*[1],** Adrian Alvarez[1], Lorenzo Diaz[1], Amy Ross[2], Andrew Kummel[2]
[1]RASIRC, Inc., San Diego, CA
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This presentation outlines a thermal Atomic Layer Deposition (ALD) process for titanium nitride (TiN) that leverages anhydrous hydrazine (N_2H_4) as a nitrogen source to achieve low-resistivity, conformal films suitable for advanced semiconductor applications. Unlike conventional ammonia-based processes, hydrazine enables deposition at lower temperatures while maintaining excellent film quality and uniformity in high aspect ratio structures.

The process uses hydrazine in combination with $TiCl_4$ and TEMATi (tetrakis(ethylmethylamino)titanium) in a plasma-free, halogen-free configuration, producing TiN films with reduced impurity levels and enhanced electrical performance. Experimental results demonstrate successful coating of high aspect ratio horizontal vias, with hydrazine contributing to improved conformality and reduced carbon contamination. We also address safety and delivery challenges traditionally associated with hydrazine, highlighting recent innovations in purification and vapor-phase transport systems. Collaborative work with academic and industrial partners has validated hydrazine's effectiveness across a range of substrates and deposition conditions.

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Characterization, Testing, and Failure Analysis of Thin Films, Coatings, and Engineered Surfaces

In support of innovations and continuous R&D, product and process improvements across SVC society stake holders and industries, a new session for the SVC TechCon has been added to this year's program. This new session focuses on thin film, coating, and engineered surface characterization, evaluation and failure analysis. The goal of the session is to provide a forum for attendees to present and exchange technical information related to characterization and evaluation of thin films, coatings and engineered surfaces made through vacuum coating processes. The importance and significance of this session are obvious. First, the various properties of thin films and coatings depend on several factors during preparation. Proper characterization is critical for understanding and further optimization. Second, characterization and testing are essential for intended applications, for meeting product-design specifications, and for ensuring desired interactions with service environments. Third, the lifetime estimates, and failure analysis of thin films and coatings are crucial for avoiding unexpected situations and for identifying root causes of failures.

There are a variety of techniques for analysis, characterization and testing of materials. This session will focus on techniques and applications suitable for thin films, coating and engineered surfaces, with an emphasis on the recent development of the new in-situ and

ex-situ capabilities, multi-technique approaches, automation, and AI assistance.

Presentation submissions in the following areas and topics are encouraged:

- Biological compatibility, toxicity, antimicrobial properties,
- Chemical composition, stability and interactions with environments,
- Lifetime estimation and life cycle assessment,
- Mechanical properties, super-hardness and stress evolution,
- Electric and magnetic properties,
- Microstructure, crystallinity, phase composition and porosity
- Nano/microscale phenomena, organized structures and nanocomposites,
- Optical properties, colors and emissivity,
- Surface and interfacial properties,
- Thermal properties, heat transfer and thermal stability, and
- Tribological properties, wear and adhesion.

This session, through a series of invited talks and contributed presentations, aims to address common questions and challenges faced by researchers, practitioners, and professionals who are in the SVC associated fields. It will provide new insights into the analysis, characterization and testing methods currently available, recently developed and under development for thin films, coatings and engineered surfaces.

INVITED SPEAKERS:

New Developments in Spectroscopic Ellipsometry

James N. Hilfiker, Nina Hong, Rafał Korlacki, Jeffrey S. Hale, Joel Mohrmann, Jeremy Van Derslice

J.A. Woollam Company, Lincoln, NE

For decades, spectroscopic ellipsometry (SE) has been a prominent technique for non-destructive and accurate measurement of thin film thicknesses and optical constants. To understand recent advances, we first need to consider the conventional SE measurement technology. Most SE tools probe the sample of interest using light with wavelengths from the ultraviolet (UV) to the near-infrared (NIR) or even the mid-infrared (IR). SE data are often collected in seconds. The data analysis has become routine for the thickness and refractive index of single-layer coatings, and with some effort, can be extended to more complex structures. Now, let's examine several new advances in instrumentation and software that are enhancing SE capabilities.

While SE performed at UV to NIR wavelengths is fast, SE measurements in the mid-IR can take hours to achieve an adequate signal-to-noise ratio. Recently, quantum cascade lasers (QCL), with many orders of magnitude more brightness than standard blackbody radiation sources, have been integrated into IR-SE. The extra light allows much faster measurements, which is particularly useful for dynamic data collection, anisotropic characterization requiring multiple sample orientations, and uniformity mapping.

Standard SE measurements describe the transformation of polarized light by the sample. A more complete description of light is considered by the Stokes-Mueller formalism. With this capability, both the cross-polarization and depolarization of light can be quantified. One such example is $LiNbO_3$, used in photonic applications, where the uniaxially anisotropic refractive index can be determined via sample-rotated Mueller matrix (MM) SE measurements. MM-SE is also used for chiral materials and non-symmetric crystal materials. MM-SE measurements have even found applications in many semiconductor processing steps, where critical dimensions (CD) can be determined via the specular scatter measured by MM-SE for 3D memory and logic device structures.

Finally, we will examine how machine learning is transforming the approach to SE data analysis. Will computers put us out of a job? Only time will tell, but maybe we had better start saving for an early retirement.

Surface Coating, Treatment, and Analysis of Materials for Medical Devices

Bernard Li

Medtronic Neuromodulation, Minneapolis, MN

Surface coating and treatment on medical device components are critical to enhance the performance of medical devices. Surface coatings and treatments have been used in medical devices for different functions, such as insulation, low friction, wear resistance, antimicrobials, etc. All coatings and surface treatments need to undergo surface characterization in order to understand their properties. This study investigates the application of Diamond-Like Carbon (DLC) and Tungsten Carbide-Carbon (WC-C) coatings for the Sychro-Med Infusion (SMII) drug pump, as well as Titanium Oxide (TiOx) coatings for a piston pump application. Advanced surface analysis techniques, including microscopy, nanoindentation and scratch tests, were employed to evaluate coating properties, adhesion, and surface morphology. These analyses, combined with wear resistance testing, demonstrate the effectiveness of the coatings to mitigate surface degradation and to extend the functional lifespan of critical components under demanding operational conditions. The study confirms that the coatings not only improve wear resistance, but they also offer significant improvement for the durability and reliability of medical devices.

TAC Co-Chairs:

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Coatings and Processes for Biomedical Applications

Coatings and surface treatments are essential to the advancement of both established and emerging biomedical technologies. Recent progress in the understanding of biological systems has accelerated the development of innovative coatings and surface engineering approaches. These technologies aim to improve osseointegration, enable neural interfaces, extend the operational lifespan of implanted devices, enhance biocompatibility, and reduce costs. These advances are not limited to implantable devices; they also support a wide range of applications such as energy harvesting for wearable health-monitoring systems, where flexibility and biocompatibility are essential.

To support continued innovation and address technical challenges in this rapidly evolving field, the Coatings and Processes for Biomedical Applications Technical Advisory Committee (TAC) welcomes paper submissions focused on coatings and surface modifications for biomedical applications. Submissions may cover material development, surface engineering techniques, characterization methods, performance evaluation, regulatory pathways, or emerging applications in the biomedical space.

Topics of interest include, but are not limited to:

- Orthopedic coatings and osseointegration,
- Cardiac rhythm management,
- Neurostimulation technologies,
- Cardiovascular interventions,
- Bio-corrosion resistance,
- Flexible and stretchable electronics,
- Biosensors, bioelectronics, and biochips,
- Antimicrobial surface treatments,
- Novel surface modification techniques (e.g., laser processing),
- High-throughput materials development,
- High-throughput and advanced characterization techniques,
- Regulatory approval strategies,
- Navigating evolving funding landscapes, and
- Market analysis and projections.

Submissions addressing other biomedically relevant topics related to coatings and surface engineering are also encouraged.

INVITED SPEAKER:

From Telecom to Biotech–Closing the Loop with Thin Films

Matthias Wagner

Cambridge, MA

As medicines shift from small molecules to proteins to cells, manufacturing challenges are mounting in biotech and pharma. Critically, the coming wave of regenerative cell and tissue therapies currently rely almost entirely on manual cell culture processes in dedicated clean rooms. Cellino Bio is building a scalable platform for autonomous manufacturing of personalized regenerative medicines. At the core of the platform is a laser-film interaction that enables precise closed-loop control of biology. Nanosecond laser pulses are partially absorbed by the thin film and cause rapid microbubble expansion and collapse, providing a tunable mechanical force on cells that are cultured on the surface. These forces may be used to temporarily porate cells for intracellular delivery, or to irreversibly porate them for destruction and removal from the cell culture. The thin film itself is subject to a set of stringent requirements including biological, environmental, optical, thermal, and regulatory. A significant number of iterations was required from the initial university laboratory proof-of-concept up to the clinical-ready film. Ultimately, work with an external expert and vendor capable of scaling manufacturing was required for repeatable, reliable results. Previous background in other thin film structures, notably ones for optical communications, served as a guide but also a contrast from a requirements standpoint. Finally, the effort required a significant amount of venture financing as well as government backing, which will be described in the talk, together with the productization path for the film and system.

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Coatings for Energy Conversion and Related Processes

This session provides a comprehensive forum for experts and researchers to discuss the latest developments and technologies in the field of energy conversion coatings. These talks cover a wide area of applications, however with a core focus on energy conversion, storage, and management. This session brings industry, research, and academics together in order to facilitate the transfer of technology and share new and upcoming ideas and technologies for the improvement of sustainable living.

The Technical Advisory Committee (TAC) welcomes papers in the following areas:

Solar and Ambient Light Energy Conversion:

- Thin-film and thin wafer as well as perovskite silicon tandem photovoltaics for space and terrestrial applications,
- Organic flexible photovoltaics (OPV),
- Semi-transparent photovoltaics, and
- Coatings for improved performance.

Energy Harvesting:

- RF harvesting,
- Piezoelectrics, and
- Kinetic harvesting through body movement.

Energy Storage:

- Thin flexible batteries,
- Flow batteries,
- Powder surface treatment (PVD, CVD, ALD) for Li-ion batteries, Na-batteries, or solid-state batteries (or other types),

- Super capacitors,
- Coatings for improved stability, graphene and carbon nanotubes, and
- Protective coatings for the prevention of e.g., hydrogen embrittlement.

Efficient Functional Coatings:

- Radiative cooling,
- Hydrophobic and hydrophilic,
- Self-cleaning catalytic coatings,
- Development of coatings for reduction of precious metal, and
- Anticorrosive coatings.

Other Traditional Subjects:

- Smart windows,
- Selective radiators,
- Fuel cells and electrolyzers (low temperature, high temperature, advanced types), and
- Large-scale energy conversion and storage.

INVITED SPEAKER:

Yttrium Oxyhydride-Based Photochromic Coatings for Window Applications: From Lab Scale Films to Large Scale Roll-to-Roll Production

S. Zh. Karazhanov

Institute for Energy Technology, Kjeller, Norway and University of Latvia, Riga, Latvia

Yttrium oxyhydride ($YH_{3-2x}O_x$, YHO) belongs to the emerging class of mixed anion systems—materials incorporating multiple anion species, potentially enabling unique properties not found in single-anion counterparts. First discovered in 2011, YHO is synthesized via reactive magnetron sputtering to deposit $YH_{2-\delta}$, followed by oxidation in air. It exhibits photochromic behaviour under ambient conditions, transitioning from a transparent state (transmittance T > 85%) to a dark state (T ≈ 20%) upon exposure to sunlight, with nearly uniform absorption across all wavelengths.

YHO has strong potential for various technological applications, including smart windows, protective eyewear, helmet visors, and automotive roof glass. The commercialization of roll-to-roll deposited photochromic YHO has already begun through the SME Sunphade. Today, the study of YHO and other rare-earth metal oxyhydrides is an increasingly attractive research field.

This talk will highlight key research findings on YHO, focusing on its physical and optical properties, including photochromic behavior under visible and ultraviolet light exposure, tunable transparency, and high optical stability with minimal degradation over multiple cycles. The temperature-dependent dynamics of YHO's transition between transparent and opaque states will also be discussed. Additionally, the presentation will cover ongoing studies related to durability and chemical stability, ensuring long-term reliability in practical applications, as well as efforts to enhance response times, cycling stability, and energy efficiency for large-scale implementation.

Theoretical advancements will be explored, including predictions of crystal structures for oxidized yttrium hydride, hydrogen-induced band structure modifications that explain its distinctive optical effects, and phenomena such as light-induced lattice breathing and lattice contraction/expansion. Furthermore, deposition techniques for small- and large-area glass and flexible substrates, prototype development, and functionality assessments in both laboratory and outdoor environments will be presented, along with insights from roll-to-roll deposition studies.

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Digital Transformation through Artificial Intelligence, Machine Learning, Simulation, and Data Science in the Thin Film Industry

This session explores the transformative role of digital technologies in the domain of industrial thin film deposition, particularly within vacuum-based coating technologies. The focus is on leveraging physics-informed simulation, artificial intelligence, and data-driven methods to enhance process understanding, optimization, and control.

The session will include, but is not limited to, the following topics:

- ***Physics and Chemistry Simulations:*** Use of high-fidelity, multi-physics models to predict key process parameters like erosion and deposition profiles, film composition, ion bombardment, gas and plasma distributions, and substrate heating.
- ***Digital Twin Models:*** Real-time capable simulations that integrate equipment layout and operating parameters to forecast coating performance and variability.
- ***Machine Learning and Hybrid Approaches:*** Applications of AI for predictive maintenance, parameter tuning, and anomaly detection. Emphasis on combining limited experimental data with

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physical modeling for higher generalizability (greybox models).
- ***Data Infrastructure and Process Mining:*** Tools and methods for systematic data acquisition, storage, accessibility, and intelligent analysis across the coating process chain.

This session is intended for all stakeholders involved in the digital transformation: OEMs and system integrators in the vacuum coating sector, coating service providers and production engineers, developers of coater components and diagnostic tools, as well as providers of simulation software and digital services, and data mining platform providers.

INVITED SPEAKER

Navigating Digital Transformation in an Established Industrial Environment: Data, Simulation, and the Strategic Road Ahead

Alexander Ebner, *Stephan Trassl, Martin Egginger*

Hueck Folien GmbH, Baumgartenberg, Austria

In this presentation, we emphasize the importance of comprehensive data acquisition across an entire production site and demonstrate how advanced data analytics, in combination with physical simulations, can unlock significant efficiency gains. To this end, we provide insight into our company's technological evolution, outlining our digitalization roadmap along with the concrete implementation steps undertaken to put it into practice.

Our long-term objective is guided by the vision of a fully realized digital twin, which serves as both our strategic goal and design principle. We illustrate how this vision is being pursued through a series of targeted pilot projects, each designed to implement early digitalization elements while keeping the broader transformation in focus.

We then examine our current stage along this transformation path, exemplified by a pilot project aimed at optimizing a particular electron beam physical vapor deposition (EB-PVD) process. This case study demonstrates the synergistic use of data-driven analysis and physical simulation to deepen process understanding and enhance performance.

A variety of methodological approaches and practical examples from both domains are discussed in detail. These include the deployment of an advanced data acquisition system and the corresponding analytics, as well as reverse-engineered simulations to improve film homogeneity and particle-based modelling for process insight and optimization.

Finally, we offer a forward-looking perspective on the scalability of our approach and reflect on the potential challenges and opportunities ahead.

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Electron Beam Processes

The Electron Beam Processes Technical Advisory Committee (TAC) is a spin-off from the International Conference on High-Powered Electron Beam Technology, originally founded by Dr. Robert Bakish in 1983. Today, high-power electron beam technology is well established for coating, melting, and welding. The EB TAC focus is the development of new coatings and coating processes using electron beam technology as well as new ebeam components, such as power supplies and beam control systems to enhance material properties. Of particular interest are improvements to equipment that enable new applications such as additive manufacturing of turbine engine components and medical implants.

The TAC supports the technical and technological exchange of knowledge to promote electron beam technology especially for industrial applications and is looking for papers on the topics listed below:

- Advances in high-rate PVD by electron beam evaporation (EB-PVD), such as for thermal barrier coatings,
- Electron beam processes for the production of novel materials,
- Additive manufacturing with electron beam,
- Thermal processes (welding, hardening, refining, drilling),
- Non-thermal processes (curing, sterilization, crosslinking, gas conversion),
- New applications for PVD by electron beam evaporation for photovoltaics, concentrated solar, energy production (fuel cells), energy storage (batteries), and high efficiency lighting,
- Modelling of electron beam sources, processes, and systems,
- New components in electron beam technology (guns, power supplies, vacuum systems, plasma assist),
- Emerging technologies (electron generation, beam guidance, etc.), and
- Related and new applications of electron beam processes.

INVITED SPEAKER

Vacuum Barrier Coatings for Mono-Material Films: Developments in Equipment and Process Technology for SiO_x and AlO_x

Markus Piwko, *Jörg Faber, Carsten Deus, Andreas Steinbach*

VON ARDENNE GmbH, Dresden, Germany

Recyclable mono-materials are essential for enhancing sustainability in the packaging industry, making vacuum-coated barrier layers with minimal thickness increasingly significant. Among the various deposition technologies, Electron Beam - Physical Vapor Deposition (EB-PVD) stands out alongside thermal evaporation methods, providing complementary advantages for the deposition of SiO_x barrier layers at a high-volume, cost-effective scale. These SiO_x coatings are anticipated to facilitate new applications, such as retort and hot filling, due to their superior resistance to mechanical elongation and humidity.

Advanced and reliable vacuum equipment, combined with ap-

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propriate process development and control, is crucial for achieving specific layer properties while ensuring techno-economic benefits, requirements best met by experienced equipment manufacturers. This presentation will elucidate the distinctions and synergies between electron beam and thermal boat evaporation for SiO_x and AlO_x coatings, while also introducing key performance indicators for the resulting mono-material films. Moreover, insights into new developments in equipment and process technology, along with a techno-economic analysis, will be shared. This information will empower film makers, converters, and brand owners to better understand the opportunities and limitations of barrier coatings deposited via electron beam compared to thermal evaporation techniques.

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Emerging and Translational Technologies and Applications

This session welcomes presentations related to deposition and surface engineering technologies and applications that do not readily align with the classic session topics of the SVC TechCon program.

Modern market needs and application requirements continuously trigger innovation in the production and development of thin films and coatings. There are two trajectories that historically advance the field: (a) adjacent markets and applications expand by taking advantage of innovation in traditional technologies, and on the other side (b) established markets and applications that benefit from technical innovation in fields that previously were restricted to exterior "heritage" domains.

This session seeks to highlight new applications and markets that are enabled by advances in thin film and coating deposition, interface engineering, and surface processing. Contributed presentations may emphasize applications and markets, describe the role of enabling or cross-over technologies, as well as business topics such as market opportunity overviews, or new business and engineering concepts.

Market- and business-focused talks should generally relate to technology innovation within the SVC domain, and technology-focused talks should relate to a new market or application arena that SVC stakeholders should pay attention to.

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High Power Impulse Magnetron Sputtering – HIPIMS

High power impulse magnetron sputtering (HIPIMS) has moved from lab scale to industry. Today, a significant number of indus-

trial-scale HIPIMS processes exist as well as some commercial processes and products. Both fundamental understanding and application-oriented development are essential for exploiting the full potential of this technology.

The latest results from fundamental research, new and advanced approaches for simulation and modeling, and the combination of applied research from lab scale to industrial size cathodes and machines are the focus of this TAC. The session aims to provide a forum linking scientists, technologists, and industrialists to discuss all aspects of the HIPIMS technology.

Papers are solicited from, but not limited to, the following areas:

- Fundamental research on plasma, discharge, and coatings,
- Simulation and modeling of HIPIMS,
- New plasma sources and process modifications,
- Recent development in pulse generation and process and plasma diagnostics,
- Application oriented results: tribological, optical, medical, etc., and
- New coatings and products.

INVITED SPEAKER:

Towards Reactive-Gas-Less Sputtering of Functional Nitrides – The Role of Metal Ions in Plasma-Activated Reactive Environments

Tetsuhide Shimizu[1], *Caroline Hain*[2,3], *Yuji Oshida*[1,2], *Eva Vogt*[2], *Thomas Nelis*[2,3], *Johann Michler*[2]

[1]Tokyo Metropolitan University, Tokyo, Japan
[2]Swiss Federal Laboratories for Materials Science and Technology, Thun, Switzerland
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Nitride thin films are indispensable materials across diverse industrial sectors, including hard coatings, semiconductors, and optical devices, typically fabricated by reactive sputtering with nitrogen (N_2). Film stoichiometry and crystallinity are strongly governed by the N_2 partial pressure, but less attention has been given to the actual incorporation efficiency of nitrogen into the growing film. In particular, dissociation of N_2 molecules into atomic nitrogen within the plasma is expected to critically influence surface reaction kinetics. This study investigates the role of highly ionized metal ions of high-power impulse magnetron sputtering (HiPIMS) in the discharge with activated nitrogen species during nitride film growth, with a focus on AlN deposition by microwave (MW)-assisted reactive HiPIMS. In this approach, AlN thin films were synthesized at very low N_2 flow rates within the metallic regime, where enhanced deposition rates and improved process stability are advantageous for industrial application. To analyze discharge characteristics during the reactive mode transition, energy- and time-resolved mass spectrometry was performed using a time-of-flight mass spectrometer (E-ToFMS), enabling detailed analysis of ion dynamics under varying reactive gas conditions. The results demonstrate that highly crystallized, (0002)-oriented AlN films can be deposited at very low N_2 flow rates when MW plasma assistance is applied, whereas conventional HiPIMS under the same conditions yielded metallic Al films. Mass spectrometry revealed that even at reduced N_2 flows, high fluxes of atomic and molecular nitrogen ions were present, particularly during the pulse-off time, highlighting their decisive role in sustaining film-forming reactions. These findings clarify the mechanism of AlN growth under low N_2 pressures and emphasize the importance of dissociated nitrogen species to improve the incorporation efficiency of nitrogen duruing reactive sputtering. The insights gained not only improve process control for AlN but also provide broader implications for the synthesis of other transition metal nitrides by HiPIMS in industrially relevant conditions.

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Large Area Advanced Packaging and Integrated Photonics

The growing demand for high-performance computing, artificial intelligence, augmented/virtual reality, and advanced communication systems is driving unprecedented innovation in both large-area advanced packaging and integrated photonics. As the limits in transistor size and speed approach, the logical next steps to increase performance involve advancements in parallel computation and optimized communication between integrated components. To increase throughput, yields, thermal performance, and reduce cost, substantial focus and development effort have been put into large-area advanced packaging. As a foundational technology for these advancements, thin film deposition, a core area of expertise within the SVC community, plays a critical role in enabling the next generation of devices.

This session will explore the cutting-edge intersection of large-area manufacturing techniques for advanced packaging and integrated photonics. We encourage submissions that address challenges, present novel solutions, and showcase recent advancements in manufacturing equipment, processes, materials, and architectures.

Topics of Interest Include, but are not limited to:

Large Area Advanced Packaging:

- New process, equipment, performance, and yield requirements for advanced packaging,
- Large area packaging challenges and solutions,
- Wafer-level and panel-level packaging for integrated photonics,
- Advanced interconnects (e.g., through-silicon vias (TSVs) and through-glass vias (TGVs)), and
- Substrate technologies and interposer solutions for large-area integration.

Thin Film Deposition for Photonic Integration:

- Challenges and opportunities in scaling up integrated photonics manufacturing,
- Silicon photonics and other material platforms for integrated optics,
- Advanced dielectric and optical coatings for waveguides, filters, and resonators,
- Deposition of active photonic materials,
- The role of atomic layer deposition (ALD) and precise film control, and
- Large area physical vapor deposition (PVD) techniques for metallization and optical layers.

Manufacturing and Process Control:

- High-throughput manufacturing methods,
- Process control and in-situ monitoring for thin film deposition, and
- Yield enhancement and cost reduction strategies for large area integration.

We encourage submissions from academic and industrial researchers, engineers, and scientists working on all aspects of large area advanced packaging and integrated photonics, especially those with a focus on the underlying thin film and deposition processes. Join us to discuss the latest breakthroughs and future directions in this rapidly evolving field.

Invited Speaker

Optical Engines and Thin Film Nanophotonics

Mohamed ElKabbash

University of Arizona, Tucson, AZ

The exponential growth of artificial intelligence (AI) workloads has driven a paradigm shift in how information is moved and processed at scale. A central development in this domain is the rise of optical engines, which integrate light sources, modulators, and detectors to overcome the electronic SerDes bottleneck in data movement. I will discuss the motivation behind the push toward co-packaged optics, where photonic components are placed in close proximity to electronics to reduce energy consumption and increase bandwidth density. Particular emphasis will be placed on the challenges that hinder practical deployment, including the temperature sensitivity of semiconductor lasers and electro-optic modulators, the complexity of chip–fiber coupling at high channel counts, and the trade-offs between density, stability, and bit-error rate. Potential solutions such as temperature-stable integrated sources, efficient chip-coupling strategies, and athermal photonic designs will be highlighted.

The second part of the talk turns to thin-film nanophotonics, an emerging area that extends the traditional role of optical coatings beyond interference filters and structural coloring. By exploiting resonant and interference phenomena in multilayer stacks, thin-film coatings can mimic atomic-physics-like effects such as Fano resonances and be engineered for advanced energy applications, precision sensing, and photonic information processing. I will present our efforts on thin-film photonic computing architectures, where diffractive layers establish non-trivial spatial correlations for low-latency matrix operations, as well as photonic memory and edge sensing under low signal-to-noise conditions. Finally, I will discuss our ongoing work toward realizing transmissive extreme ultraviolet (EUV) lenses at 13.5 nm using Si/Mo multilayers, a long-standing challenge in nanolithography and imaging. Together, these directions illustrate how optical engines and thin-film nanophotonics are reshaping the future of information technologies and beyond.

TAC Chair:

Patrick Morse, *Arizona Thin Film Research LLC,* pmorse@azthinfilm.com

Large Area Coatings

Scaling up to high volume manufacturing (HVM) has enabled tremendous cost reduction in the production of architectural and automotive glass, flat panel displays, solar cells, and roll-to-roll.

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Scalability comes with unique challenges. To operate a plant at HVM scales, the selected deposition method and related processes must be stable and reproducible over long operation time. Chemical and physical layer properties at the nanoscale must be precisely controlled across the meter scale. The obtained layers serve later as optical interference stacks, diffusion barriers, hard or lubricating coating for scratch resistance, transparent conductors, decorative coatings, solid electrodes or electrolytes.

The Large Area Coating Session gives you an opportunity to meet with and to learn from leading industry and academic experts in the field, present and discuss cutting edge developments in the broad field of coating applications, highlight the newest materials, methods, processes, review required equipment and software, and also discuss market trends. Session topics will cover:

- Understanding and controlling process at nanoscale with homogeneity up to meter-scale: physics and chemistry of thin films and their interfaces, analytical equipment in-/ex-situ, in-/off-line,
- Human-assisting technologies: predicting and correcting materials and processes by physical simulations and machine learning,
- 2D and 3D coatings, processes, equipment, market trends and regulations for architectural, automotive, aerospace, and display applications,
- Manufacturing methods including surface preparation, etching, sputtering (magnetron, ion beam assisted), high power impulse sputtering (HiPIMS), evaporation, chemical vapor deposition (CVD), plasma enhanced CVD (PECVD), atomic layer deposition (ALD), plasma enhanced ALD (PEALD/PAALD), pulsed layer deposition (PLD), and
- Best practices: process engineering and transfer, quality control, upgrade of equipment, predictive maintenance, metrology, sustainability, testing and introducing new technologies, scale-up.

INVITED SPEAKER:

Mass Production of Inorganic and Organic Coatings for Display Cover Glass

Brian S. Holsclaw

Corning, Inc., Corning, NY

As automotive displays become central to modern vehicle design, it is critical for cover glass coatings to meet certain optical performance, durability, and manufacturability requirements. This presentation will discuss anti-reflective (AR) and organic coatings designed for mass production processes. AR coatings will be discussed that have specific optical attributes for automotive displays including low reflectivity, high transmission, neutral color, and minimal color shift at high-viewing angles. These AR coatings must be scalable to a large-area process and manufacturable with precision. Durability requirements must also be considered for real-world use cases for such AR coatings. From a production point of view, cost of manufacturing will depend on effective integration of an appropriate coating system within a streamlined factory flow with best-practice processing and manufacturing improvements. Such a flexible and forward-looking manufacturing strategy will allow new products and coatings to be efficiently mass produced.

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Optical Coatings

Exciting developments in optical coatings are stimulated by the latest trends in optics, optoelectronics, photonics, optical data processing, mobile devices, displays, biomedical, sensors, energy and photovoltaics, architectural, aerospace, astronomical, and other technologies. The optical coatings session will bring together these different aspects for technical interchange in the field of optical interference coatings.

To build a well-rounded optical coatings session, abstracts are solicited to cover topics including coating design, development of practical manufacturing techniques, characterization methods, and a wide range of applications.

Specific areas may include:

- Novel optical coating materials, including metamaterials and metasurfaces,
- New fabrication processes for optical coatings,
- Novel optical interference design software and design techniques,
- Production issues common to the industry – including lessons learned or serendipitous discoveries that came from problems or disasters,
- Metrology of optical films (new instrumentation and software developments, inline or in-situ approaches, etc.),
- Real-time process monitoring and control with optical coating processes,
- Industrial scale-up,
- Preconditioning and cleaning issues; refurbishment approaches for optical coatings,
- Coatings on sapphire, polymers or other special substrate materials, coatings for complex 3-D optical devices,
- Applications in non-traditional wavelengths, from EUV to IR (e.g., IR thermal imaging),
- Optical coatings for mobile electronics (e.g., fingerprint sensors, cameras, displays, touchscreens, etc.),
- Optical coatings for wearable technology, including AR/VR,
- Coatings for LIDAR/driverless vehicles,
- Optical coatings for biomedical applications,
- Optical coatings for energy control and solar power,
- Optical coatings for laser applications, including femto-second lasers,

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- Optical coatings for display and integrated photonic device applications,
- Optical coatings for astronomy and aerospace, and
- Optical coatings for quantum optics.

State of the Art of Amorphous IBS Coatings Improvements for the Gravitational Wave Detectors and Other Applications

L. Pinard, *C. Michel, B. Sassolas, J. DeGallaix, D. Forest, M. Granata, L. Mereni, J. Teillon*

Laboratoire des Matériaux Avancés – CNRS, Villeurbanne, France

For the first time in September 2015, a direct detection of gravitational wave occurred in the LIGO interferometers. These advanced detectors need large fused silica mirrors (34-35 cm diameter, 20 cm thick) having optical and mechanical properties never reached up to now. LMA has developed and optimized these IBS (Ion Beam Sputtering) coatings on the mirrors of the Fabry-Perot arm cavities of the LIGO or Virgo gravitational wave detectors to get:

- the lowest optical losses (0.3 ppm absorption at 1064 nm, around 5 ppm of scattering)
- the lowest mechanical losses (thermal noise reduced by the use of Ti:Ta_2O_5 as high index layer)
- the best coating uniformity (<0.1 % on 150 mm diameter).

To improve the detector sensitivity, the laser power has increased during the following scientific runs and a problem appeared in the high reflective coating: some very high absorbing points (several hundreds of ppm) can be present. Some investigations were done to understand and find their origin, and a solution was found to suppress them. This optimization was helpful for other projects using high finesse cavities.

The other noise limiting the detector performances in the 100 Hz region is the coating thermal noise, coming from the high index layer. Some R&Ds started at LMA (Working Group between LIGO and Virgo) to find a new material able to reduce this noise by a factor of 2. The best candidate is the Ti:GeO_2. Some final results will be presented.

Recent Innovations in Optical Coating Design Software

Michael Trubetskov[1,2]

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[2]Max Planck Institute of Quantum Optics, Garching, Germany

Modern software packages in the field of multilayer optical coatings cover many classes of different problems, including analysis and synthesis of multilayers, characterization of monolayers, reverse-engineering of produced multilayer coatings, real-time control of deposition processes using broadband or quasi-monochromatic optical monitoring, and computer simulation of multilayer production. This wide coverage of various classes of problems is essential to achieve high-quality multilayer coatings, addressing new challenges in science and technology.

Various aspects of innovative software support are considered, including efficient ways to solve direct problems of multilayer coating evaluation involving vectorization and parallelization of computations. Efficient methods of solving synthesis problems are discussed, including classic and deep search needle synthesis, gradual evolution, and multi-start optimization. The choice and correct specification of targets—ranging from spectral and integral values, absorptance, and electric field to stress and thickness—are critical. For ultrafast optics, specialized targets include group delay (GD) and group delay dispersion (GDD), and multi-coating configurations for dispersive mirror compressors are involved.

Recent innovations integrate deep search methods able to provide solutions with excellent performance on the one hand and production-friendly tools, such as design cleaner, bound-trap, thick layer reduction, and robust synthesis.

Characterization determines optical parameters of substrates and layer materials, while reverse engineering identifies and compensates for repeatable production errors. Special adaptations support large area manufacturing in automotive, architectural, and wafer applications. Real-time characterization and re-optimization mitigate non-repeatable deposition errors.

Insights from recent Optical Interference Coatings (OIC) design challenges underscore the progress and creativity in tackling these complex problems, illustrating the interplay between theory, computation, and manufacturing realities in modern multilayer optical coating technology.

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Organic and Perovskite Electronics

Organic and organometal-halide perovskite materials have emerged in recent years as important alternatives to traditional inorganic materials for optoelectronic devices. These novel materials provide huge potential benefits such as reduced-cost processing, compatibility with nonconforming and flexible substrates, and tunable color properties, allowing for a range of interesting applications. Organic light-emitting diodes (OLEDs) have become widespread commercially in displays, with improvements in brightness and contrast ratios, as well as interesting form factors such as thin and flexible devices. Perovskite-based photovoltaic devices are attracting considerable interest as a potentially disruptive energy technology, with power conversion efficiencies similar to or in excess of those seen in current panels but with simpler processing requirements.

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Like any interesting and fast-growing field of technology, the achievements and benefits in the field of organic/organometallic electronics and optoelectronics don't come without their own challenges. The inherent properties of these materials make them challenging to deposit using a vapor-phase technology:

- The materials are typically prone to decomposition at relatively lower temperatures which has led to development and use of evaporation sources with a complex set of features and temperature control mechanisms.
- Additionally, some of the active films in the device architecture require precise rate control algorithms to achieve the required host-dopant compositions, which in turn also require critical hardware considerations.
- Materials are mostly sensitive to moisture and oxygen, so the protection from these elements during and post-fabrication is critical.

These factors require a deep understanding of material properties, study and treatment of substrates and interfacial properties of layers, considerations of the bottlenecks towards device fabrication, encapsulation techniques and thin-film deposition system solutions, and combined they result in an exciting process in this field of study.

This session welcomes papers addressing materials and processing challenges related to these technologies involving vacuum and vapor-based techniques such as evaporation, sputtering and ALD. We encourage submissions on practical approach towards fabrication of organic devices and emphasizing key parameters to consider during the design and building steps. Discussion on challenges and opportunities in scaling up processes for industrial production will be integral to the session.

The session will include discussions on research on the following device types:

- Organic and perovskite light-emitting diodes (OLEDs and PLEDs),
- Organic and perovskite photovoltaics (OPV and perovskite PV),
- Hybrid inorganic/perovskite tandem photovoltaics,
- Organic thin film transistors (OTFTs and OFETs),
- Organic memory devices and spintronics,
- Organic sensors,
- Flexible and wearable electronics, and
- Building-integrated photovoltaics (BIPV).

2026 SPEAKER:

Achieving Compositional Tunability in Perovskite Thin Filmsby Physical Vapour Deposition

Jay B. Patel

King's College London, London, United Kingdom

Metal halide perovskites have rapidly emerged as a highly adaptable class of optoelectronic materials, recognised for their defect tolerance, straightforward processing, and impressive performance in photovoltaic and light emitting applications. A major strength of these materials is their intrinsic bandgap tunability, which comes from the ease of substituting halides or metal cations within the ABX_3 lattice. This compositional freedom enables smooth and continuous tuning of optical and electronic properties across the visible spectrum, something that is far more accessible in perovskites than in most conventional semiconductors.

Physical vapour deposition, PVD, offers several advantages for perovskite thin film growth, including excellent uniformity, compatibility with industrial vacuum systems, and tight control over film purity. However, achieving reliable bandgap tuning using PVD is challenging because controlling the fluxes of the different precursors is not straightforward. Variations in vapour pressure, thermal stability, and evaporation behaviour can restrict the accessible composition range or make growth conditions unstable. This has limited how effectively PVD can be used to tune perovskite composition.

In this talk, I will show how we overcome these limitations and achieve the full compositional range of mixed halide perovskites using PVD. I will discuss the resulting structural, optical, and electronic properties of the films, and demonstrate how precise compositional control leads to predictable bandgap shifts, phase stability, and strong optoelectronic performance. These results highlight PVD as a fully tunable and industrially relevant route for high quality perovskite thin films.

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Photonically-Induced Transformations of Thin Films and Surfaces

Lasers, flash lamps, and other highly energetic illumination sources enable rapid thermal processing of surfaces and thin films for scaled, low-cost materials and technologies in areas of high economic, societal and environmental impact. Realization of surface-selective rapid thermal annealing coupled with high-throughput are especially attractive features of photonic materials engineering.

This session provides a forum to discuss pioneering technological applications bound by the common thread of photonically-based methods for surface and thin film annealing, materials synthesis and surface patterning.

We welcome submissions addressing the following key areas:

- Surface selective annealing of bulk materials and thin films with light typically in the <100 ms range,
- Wafer based and large area in-line applications,
- Laser and flash-lamp-based conversion and synthesis of high quality, crystalline materials (transparent and conductive layers, energy harvesting, sensor material, low-power computing, multifunctional 'More than Moore' electronic device technology, large area photocatalysts and smart materials for window applications),
- Rapid patterning of microelectronic devices without photolithography (sensors, medical implants, and hardware for experiments and IoT devices),
- Control of nano-micro scale surface morphology (cell adhesion, directed fluid flow),
- Photonically-induced chemical activation of surfaces for antipathogenic, anti-smudge, (de)wetting properties, and
- Novel photonic illumination processes and devices.

INVITED SPEAKERS:

Additive Nanomanufacturing and Dry Printing Electronics and Functional Devices

Masoud Mahjouri-Samani

Auburn University, Auburn, AL

Additively manufactured electronics (AMEs) have gained significant momentum in recent years due to their low-cost fabrication, reduced electronic waste, and ability to support multifunctional, conformal devices. As demand grows for lightweight, customizable, and scalable consumer and industrial products, the need for advanced printing methods has become increasingly clear. Yet most existing fabrication approaches still rely on ink-based technologies such as inkjet and aerosol jet printing, which face persistent limitations, including contamination, complex and costly ink formulations, and restricted material compatibility. These constraints hinder the creation of pure, multimaterial, and high-performance electronic systems. In this work, I introduce a laser-based additive nanomanufacturing (ANM) technique that enables dry, ink-free, and solvent-free printing of electronics and functional devices on a broad range of substrates. The method generates pure nanoparticles of metals, semiconductors, and insulators, such as silver, copper, zinc oxide, and aluminum oxide, in situ and on demand inside a mini chamber. These nanoparticles are then sent to the printing nozzle, where they are laser-sintered in real time to form precise patterns and devices on planar or three-dimensional structures. Mechanical and electrical characterization, including bending, cycling, and adhesion testing, demonstrates the robustness and exceptional performance of the printed devices. This work highlights the transformative potential of dry ANM for next-generation printed sensors and flexible hybrid electronic systems.

Photonic Post-Processing of Printed Inks on Flexible Substrates

Mark Poliks

SUNY Binghamton University, Binghamton, NY

Additive and hybrid electronics require highly conductive printed materials on various substrates. Achieving high electrical conductivity on thermally sensitive substrates is challenging when using conventional oven-based sintering methods. Advanced sintering methods, including pulsed photonic and laser direct write methods provide an effective means to improve printed material properties with rapid, high-energy annealing without thermally damaging the underlying substrate. In this talk a variety of applications that use either particle or particle-free inks will be described.

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Plasma Processing and Diagnostics

This session welcomes contributions focused on the development, understanding, and application of plasma-based techniques for thin film coatings and surface modification. The scope includes both established and emerging approaches for plasma-enhanced deposition and treatment, emphasizing the underlying physical and chemical processes, diagnostics, and modeling strategies that enable performance optimization and scalability in industrial environments.

Topics of interest include:

- Physical vapor deposition (PVD) including magnetron sputter-deposition in conventional and non-conventional arrangements,
- Plasma-enhanced chemical vapor deposition (PECVD) both on process and application side,
- Plasma-based etching in the semiconductor industry and other applications,
- Development of novel plasma sources for materials processing (e.g., mid-pressure, atmospheric pressure, nanosecond-pulsing, micro plasmas, etc.),
- Hybrid systems and hybrid processes integrating different plasma technologies,
- Atmospheric-pressure plasma processing, including dielectric-barrier discharges and plasma jets,
- Plasma diagnostics for understanding plasma dynamics and plasma-material interaction,
- Modelling and simulation of plasma and plasma-surface interactions, and
- Novel plasma processing methods such as treatment of nanoparticles, nanomaterials, and liquids, as well as plasma catalysis.

This session is particularly relevant for industry practitioners, researchers, and scientists:

- Working on the design, scale-up, and implementation of advanced plasma sources and coating technologies,
- Developing novel plasma-based processes or deposition techniques, and
- Engaged in the experimental diagnostics of laboratory or industrial plasma systems.

By fostering a technical exchange among these communities, the session aims to advance both the fundamental science and practical applications of plasma processing in thin film technologies.

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Process Monitoring, Control, and Automation

As the fourth industrial revolution transforms manufacturing, the demand for intelligent, automated vacuum processing systems is rapidly growing. This session explores the forefront of automation technologies reshaping thin film deposition, plasma processing, and surface engineering.

Achieving high repeatability, reproducibility, and yield levels requires robust solutions for real-time process monitoring and control. While the benefits - such as increased throughput, reduced material and energy waste, and lower operational costs - are well recognized, the path to reliable automation remains complex. Challenges include sensor and actuator integration in harsh environments, data fusion across different systems, the development of adaptive, autonomous control algorithms and cybersecurity.

This session focuses on practical solutions while highlighting the latest advances in:

- Embedded real-time sensors and actuators,
- Cyber-physical monitoring and control systems,
- Digital twins for process control,
- Automation and digitalization,
- AI and machine learning for predictive and adaptive automation,
- Robotic systems for material handling and process execution, and
- Autonomous materials discovery and optimization platforms.

We welcome contributions from researchers, engineers, and solution providers that address these challenges through innovative technologies, case studies, or system-level implementations. Presentations that demonstrate practical applications, integration strategies, or lessons learned from deployment are especially encouraged.

Join us to explore how automation and digitalization enable the next generation of intelligent vacuum processing systems.

Invited Speakers:

Beyond Ion Gauges: Wide-Range, Maintenance-Free Vacuum Sensing for Modern Coating Systems

Caspar Ask Christiansen, *Ole Wenzel*

Sens4 A/S, Hellebaek, Denmark

Precise and reliable vacuum measurement is essential to achieving consistent, high-quality results in modern vacuum coating processes. Traditionally, this has required a combination of sensors—including ionization gauges—to cover the full vacuum range. However, recent advancements in sensor design and materials now make it possible to significantly extend the functional range and durability of thermal and mechanical gauges, challenging long-standing dependencies on fragile, high-maintenance technologies.

This talk presents recent breakthroughs in vacuum gauging that enable wide-range, gas-independent measurement without the need for ionization gauges. Central to this development is the integration of MEMS-based Pirani sensors with high-resolution piezo resistive diaphragm sensors and capacitance diaphragm gauge sensors, enabling seamless pressure coverage across six

decades. The inclusion of automatic zero-offset adjustment of the diaphragm type sensors further reduces drift and eliminates the need for frequent manual zero adjustment, offering huge savings.

To address the challenges of harsh process environments, advanced protective strategies have been implemented. Conformal coatings—such as high-purity Al_2O_3 applied by atomic layer deposition (ALD)—provide exceptional resistance to corrosive gases, while preserving sensor sensitivity and response time. Novel replaceable baffle designs, further increase the resilience towards sensor contamination. These innovations dramatically extend sensor lifespan and reduce maintenance intervals, lowering total cost of ownership.

Finally, the talk will explore the role of modern digital interfaces, including EtherCAT, in enabling faster, more reliable integration of vacuum gauges into coating system control architectures. Together, these advancements represent a new generation of vacuum sensing solutions—robust, low-maintenance, and fully aligned with the demands of high-throughput, precision coating operations.

Transforming Process Innovation through Advanced Chamber Pressure Control

Pedro Reyero Santiago, *Preston Ernst, Dominic Mayrhofer*

VAT Vakuumventile AG, Haag, Switzerland

New processes and applications in the vacuum industry, especially in semiconductor manufacturing, require faster and more precise control of the conditions in the vacuum chamber. VAT has developed a new pressure control solution to optimize performance on each process individually by leveraging auto-learning and feed-forward control strategies. This is achieved by training VAT's pressure control algorithms specifically on the actual process of interest, instead of using a universal control strategy. Through this new approach, it is possible to achieve better raw pressure control performance, resulting in higher process efficiency, as well as on-wafer performance improvements. Furthermore, it opens the door to new process innovation in vacuum manufacturing by enabling new process control strategies that are challenging to achieve with state-of-the-art pressure control technology, such as stable control of highly dynamic pressure changes or maintaining a stable chamber pressure during fast gas pulses in Atomic Layer processing. Coupling these new control strategies with high-end control devices (sensors, drives, gas inlet systems, …) allows to push the performance to the system's physical limits for each particular process. Lastly, VAT is targeting higher run-to-run process repeatability and improved chamber-to-chamber matching with this new pressure control solution.

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Protective, Tribological, and Decorative Coatings

The Protective, Tribological and Decorative Coatings Technical Advisory Committee (TAC) encourages speakers to submit presentations dealing with design, research, development, applications, and production of coatings deposited with vacuum processes, the characterization of their properties related to wear, friction, and corrosion, and to assess their protection of the receiving components, such as cutting and forming tools, engine components, as well as decorative parts.

The use of such coatings is typically driven by performance requirements, reduction of life-cycle cost, environmental consideration, and durable cosmetic and aesthetic designs. These end-user motivations lead to dedicated coating and technology developments, vacuum coating equipment concepts, new testing procedures and methods, and production quality standards. Therefore, successful coating solutions in the marketplace require strong co-operation between market specialists, universities, suppliers, manufacturers, and end-users.

The TAC encourages speakers to present on the subjects of new emerging technologies. Developing and scaling up from laboratory to high volume production at high production yields is also of high interest of the participants in this session.

Today's global landscape is changing rapidly and will drive many new application developments that will include new coatings on new applications. Environmental pressure on CO_2 emissions and electroplating as well as fast moving communication technologies are well known examples of such change. Electrification of transportation and moving away from the combustion engine are daily news.

Topics of interest for this session include, but are not limited to:

Applications:

- Hydrogen economy related components,
- Coatings for high-performance engines, including hydrogen and e-fuels combustion,

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- PVD and CVD coatings for cutting, forming and molding tools,
- Coatings for the reduction of friction and exhaust gas emissions,
- Low- and high-temperature coatings for aerospace applications,
- Decorative components and large area prefabricated sheets,
- Corrosion protective coatings (e.g. Zn:Al) on large-area surfaces, and
- Electroplating replacements by vacuum deposited coatings.

Development:

- Super-lubricity coatings,
- Corrosion protection,
- New colors,
- Hydrogen embrittlement barriers,
- Testing and evaluation of coating performance,
- Scale-up of vacuum coating processes for industrial demands,
- Failure analysis of coatings,
- Assessment, control and management of residual mechanical stress,
- Duplex coatings and thin-on-thick systems, and
- Modelling approaches to performance analysis and prediction.

Production Related:

- Reliability and life of coated parts and systems,
- Upscaling from laboratory to production,
- Scrap rates from percentages to ppm levels, and
- Integration of Industry 4.0 in vacuum coating plants.

INVITED SPEAKERS:

PVD Coatings for Tribological Applications – Known Paths and New Perspectives

K. Bobzin, ***C. Kalscheuer***

RWTH Aachen University, Aachen, Germany

Physical Vapor Deposition (PVD) technology and coatings are integral part of today's products and production routes. Efficient process development, coatings tailored to specific applications, and performance prediction of coated components are crucial topics. Regarding process and coating development, experimental and iterative approaches are still common. However, synergies between experiment and simulative capabilities gain increasing importance. Regarding performance prediction of coated components, the interplay between experiment and simulation becomes even more important.

Within this presentation, tribological nitride, oxide and oxynitride coatings as well as self-lubricating coatings for tools and components are addressed. The deposition technologies span from magnetron sputtering over arc-PVD to gas flow sputtering. The field of applications reaches from cutting and forming tools until machine elements such as gears and chains.

Prediction of coating properties and coating performance in applications cannot be solved solely by physics-based approaches up to now. Within this context, approaches to determine coating properties from process parameters by data-driven methods are shown. Regarding performance prediction, greybox models that combine physics-based models and data-driven methods are very promising. Current research on greybox models for wear prediction of cutting tools is presented.

Effect of Si Content on the Mechanical Properties of $[Al_xSi_{(1-x)}]_{0.5}N_{0.5}$ Coatings Deposited MF Magnetron Sputtering

Christos Pernagidis[1]*, Anas Ghailane*[1]*, Fabian Seifried*[2]

[1]Avaluxe Coating Technologies GmbH & Co KG, Fürth, Germany

[2]Notter GmbH, Ölbronn, Germany

In this work, $[Al_xSi_{(1-x)}]_{0.5}N_{0.5}$ will be deposited using middle frequency magnetron sputtering (MF). To find the optimal chemical composition of the alloy $Al_xSi_{(1-x)}$, a target composed of two halves of right-angle triangles, composed each of 99,99% Si and Al respectively, was designed.

This approach allows efficient experimental screening of the chemical composition. In fact, in one run, coatings with x values in the range [0 – 1] can be obtained.

The coatings obtained by MF, at different bias voltages, will be characterized in terms of mechanical properties with nanoindentation to determine hardness and young's modulus. Adhesion strength will be determined with scratch test. The ratio H/E indicative of fracture toughness will then be evaluated. A chemical composition determination, an XRD analysis, and SEM imaging will be performed for the sample that have shown the highest hardness and H/E ratio.

The manufacturing process used to produce the targets is going to be introduced and its working principle explained, and the target surface quality delivered by each technique will be explained and how does it lead to more efficient magnetron sputtering process.

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Quantum Computing

Quantum computing promises to harness the power of quantum mechanics to solve problems unfathomable for classical computers to resolve. Quantum computing, once a theoretical dream, is now experiencing an unprecedented surge of progress. Driven by intense research efforts, substantial investments, and collaboration across academia and industry, quantum computing technology is rapidly approaching reality with a promise to revolutionize fields ranging from materials science and drug discovery to finance

and artificial intelligence. The quantum computing session aims to explore the current state and prospects of this transformative technology.

The session welcomes researchers, academics, and industry leaders to explore the cutting edge of quantum computing and share their insights on its remarkable emergence. We seek submissions on a range of topics, including:

Quantum Hardware and Software:
- Progress and challenges in superconducting qubits, trapped ion, topological, and other platforms,
- Novel device architectures and fabrication techniques,
- Algorithmic breakthroughs, development frameworks, and their practical applications,
- Error correction and fault-tolerance techniques, and
- Benchmarking and performance analysis.

Scalability Challenges:
- Bridging the gap between quantum and classical systems, and
- Architectures for large-scale quantum computing.

Applications:
- Emerging applications in materials science, drug discovery, and encryption,
- Quantum-enhanced machine learning and artificial intelligence, and
- Financial modeling and risk analysis.

Impact:
- The ethical implications and impact of quantum computing on society,
- Educational initiatives and talent development for the quantum workforce, and
- Commercialization and industry trends in quantum technology.

FEATURED SPEAKER:

Complete Hamiltonian Control with Multi-Mode Superconducting Circuits

Vivek Maurya, Daria Kowsari, Kumar Saurav, Rajamani Vijayaraghavan, Daniel Lidar,
Eli Levenson-Falk

University of Southern California, Los Angeles, CA

High-fidelity multi-qubit control is essential for quantum processors to achieve practical advantage over classical computers. For analog quantum simulation, it is especially useful to have general control over a multi-qubit Hamiltonian. However, most processor architectures have a limited multi-qubit gate set to work with, meaning that arbitrary operations may require many gates, reducing fidelity. Multi-mode superconducting circuits provide a possible solution, as their strong couplings and mode hybridization allow a wide variety of control techniques. We present results on the trimon 3-mode circuit, a ring of 4 Josephson junctions with 4 capacitor pads implementing 3 modes of oscillation, all similar to transmon qubits. The modes all have strong dispersive interactions, leading to native 3-qubit gates. We demonstrate how we can implement a wide variety of canonical 2-qubit and 3-qubit gates with the trimon. We use ordinary microwave drives and 2-tone Raman drives to achieve arbitrary Hamiltonian control in the 2-qubit space, and discuss simple modifications of the device to achieve arbitrary 3-qubit control. We discuss possible integration of trimons into large scale architectures and the possibility for compact error suppression encodings.

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Thin Film Contributions for the Hydrogen Economy

This session is focused on the role of physical vapor deposition (PVD) and related thin film and surface engineering technologies in the emerging hydrogen economy. This session aims to bring together experts, researchers, and industry professionals from around the world to share their knowledge and insights on the application of PVD thin film coating techniques in advancing the use of hydrogen as a clean energy source.

Participants will have the opportunity to present their research findings, case studies, and innovative approaches in utilizing PVD thin film coating technology for various aspects of the hydrogen economy. The topics of interest include but are not limited to: PVD coatings for hydrogen storage materials, PVD methods for fuel cell catalyst preparation, thin film coating-based hydrogen production and purification techniques, and advancements in thin film coating processes for the manufacturing of hydrogen-related devices and components. Specific industrial implementation of solutions is of critical importance to the SVC's international stakeholder base.

The SVC TechCon provides a unique platform for scientists, engineers, and industry leaders to collaborate, exchange ideas, and explore the potential of thin film coating technology in shaping the future of the hydrogen economy. We encourage interested individuals and organizations to submit their abstracts showcasing their contributions to this rapidly evolving field. Together, let us uncover the transformative capabilities of thin film coating technology and pave the way for a sustainable and efficient hydrogen-powered future.

FEATURED SPEAKER:

Hydrogen: Boon or Bane? Opportunities and Challenges in Coating Solutions for Industrial Scale-Up

Nazlim Bagcivan

Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

The industrialization of coating solutions plays a pivotal role in enabling the large-scale production of green hydrogen, a cornerstone of the global energy transition.

Call for Papers

As societies strive toward sustainability, the transformation of manufacturing processes becomes essential—not only to reduce carbon emissions but also to support the development of resilient and environmentally friendly technologies. Coatings are critical in hydrogen production systems, particularly in electrolyzers, where they enhance efficiency, durability, and corrosion resistance.

Research and development efforts have focused on creating advanced functional coatings that meet the demanding requirements of green hydrogen applications. These include catalytic coatings, protective layers for bipolar plates, and surface treatments that improve conductivity and longevity. However, transitioning these innovations from laboratory-scale prototypes to industrial-scale production presents significant challenges. These range from material scalability and process integration to cost-effectiveness and regulatory compliance.

Industrializing coating technologies requires interdisciplinary collaboration and robust processes to ensure reproducibility and quality at scale. Moreover, the integration of sustainable materials and energy-efficient deposition techniques is vital to align with the broader goals of a climate-neutral society.

This presentation uses proton exchange membrane (PEM) electrolysis and PEM fuel cells as examples to showcase the latest developments and discuss the challenges and opportunities involved in scaling these solutions from the perspective of an industrial company. By addressing these aspects, it contributes to the ongoing transition to a sustainable industrial landscape and supports the realization of a hydrogen-based energy economy.

TAC Co-Chairs:

Ralf Bandorf, *Fraunhofer IST,* ralf.bandorf@ist.fraunhofer.de
Herbert Gabriel, *PVT Plasma und Vakuum Technik GmbH,* h.gabriel@pvtvacuum.de
Lucia Mendizabal, *Tekniker,* lucia.mendizabal@tekniker.es

WebTech Roll-to-Roll Technologies and Innovation

WebTech is the forum for flexible web and roll-to-roll (R2R) processing at the SVC. It is the podium to present new achievements in processing of flexible substrates such as polymer, textile or glass. The session scope encompasses materials, manufacturing techniques, products, applications, market developments and economical aspects of this versatile high-volume manufacturing method.

The WebTech TechCon session typically features presentations on materials, deposition processes, manufacturing techniques (including "best practices"), use cases / application examples, market analysis and business perspectives in all areas related to R2R processing.

Some pertinent topic focus areas are:

- Substrate materials and technologies (polymer, flexible glass, fabrics and non-wovens, etc.),
- Deposition sources and deposition modalities specific to R2R processing,
- Inline process diagnostics and control (particularly for non-transparent coatings),
- Modeling and simulation of R2R processes,
- Examples and approaches to utilize artificial intelligence (AI), machine learning, and other "Industry 4.0" modalities in R2R,
- Aspects of progressing R2R coatings from concept demonstration to commercial scale,
- Coatings under harsh conditions,
- Interfacing with non-vacuum/atmospheric pre- and post-processing, including cleaning,
- Low-cost/high-performance barrier coatings, and,
- R2R processing for electronics, semiconductor and energy conversion applications.

Optimizing Barrier Performance in Formed Flexible Bags

Todd Fayne

Pepsi Co, Plano, TX

Barrier performance in formed bags remains a critical determinant of product shelf-life and consumer safety in flexible packaging. This performance is strongly influenced by the interplay between base film properties and aluminum metallization techniques. Conventional high-barrier substrates such as biaxially oriented polypropylene (BOPP) and polyethylene terephthalate (PET) offer dimensional stability and surface characteristics conducive to uniform metallization, resulting in low oxygen and moisture transmission rates. However, the forming process introduces thermal and mechanical stresses that can compromise metallization integrity through pinholes or cracks, reducing barrier effectiveness.

As global regulations increasingly restrict traditional plastics and mandate sustainable alternatives, metallization technology must evolve to accommodate more diverse materials such as bioplastics and polyethylene. These substrates present unique challeng-

Call for Papers

es, including lower thermal resistance, variable surface energy, and reduced stiffness, which can hinder metal layer adhesion and continuity. Addressing these challenges requires innovations in surface pretreatment, deposition control, and hybrid barrier systems to maintain performance without sacrificing recyclability or compostability.

This paper explores the implications of film property variability and metallization process parameters on formed bag barrier performance, highlighting strategies for adapting metallization to emerging materials. Emphasis is placed on optimizing adhesion, minimizing defect formation, and integrating metallization with sustainable packaging design. Future directions include plasma-enhanced deposition and nanocoating technologies to deliver high-barrier functionality while meeting regulatory and environmental objectives. These advancements are essential for ensuring packaging integrity in a rapidly evolving market landscape.

TAC Chair:

Chris Stoessel, *Stoessel Consulting,* cstoessel@stoesselconsulting.net

Assistant TAC Chairs:

Hazel Assender, *University of Oxford (Begbroke),* hazel.assender@materials.ox.ac.uk
Corinne D'Ambrosio, *NPB Technology Group,* corinne@npbtech.com
Wolfgang Decker, *Kurt J. Lesker Company,* wolfgangd@lesker.com
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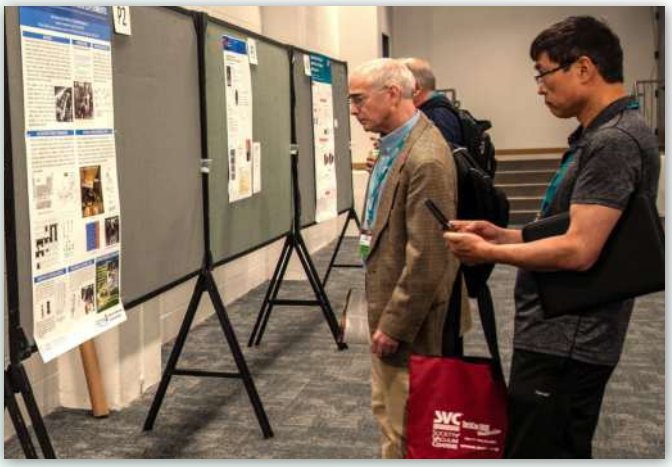
Michael Mücke, *Bühler/Leybold Optics,* michael.muecke@buhlergroup.com
Joe Papalia, *Deposition Technology Innovations,* jpapalia@dtifilms.com
Jerry Wu, *Enpack Composite,* wufujw@163.com



Technical Poster Session

Poster Presentations serve as an important component of the Technical Porgram by providing a format for extended discussions of the results in a casual environment.

The Program Committee encourages poster presentations on all topics covered in the Call for Papers. A $200 USD cash award for the Best Poster will be offered. This year the SVC Young Members Committee will be offering an additional $200 USD prize for the best Student/Young Member poster presented at the session. **Submit an abstract for your presentation in the Poster Session before February 14, 2026.**

Conference Calendar

Start planning now for your trip to TechCon 2026

SUNDAY April 26	MONDAY April 27	TUESDAY April 28	WEDNESDAY April 29	THURSDAY April 30

Education Program

30+ Tutorial Courses

TechCon Registration Counter Hours:

Sunday, April 26	7:00 a.m. – 10:00 a.m. and 4:00 p.m. – 7:00 p.m.
Monday, April 27	7:00 a.m. – 6:00 p.m.
Tuesday, April 28	7:00 a.m. – 5:30 p.m.
Wednesday, April 29	7:00 a.m. – 5:00 p.m.
Thursday, April 30	7:00 a.m. – 12:00 p.m.

Technical Program

Exhibit

Exhibit Open Hours

11 a.m. – 6 p.m. Tuesday

10 a.m. – 4 p.m. Wednesday

Conference Registration Open

Long Beach Convention Center

CONFERENCE REGISTRATION FEES*

Back AGAIN for 2026!

All paid conference registrations will include one free SVC in-person tutorial at the TechCon and a 30% discount on additional courses.

Attendee Registration

(through March 1, 2026/after March 1, 2026)

- ❑ Full Conference ..... $995.00/$1095.00
- ❑ Media Personnel $0.00
- ❑ Student Conference ..... $400.00/$500.00
- ❑ Young Members Group Conference ..... $400.00/$500.00
- ❑ Exhibit Visitor Only ..... FREE

Exhibitor Registration

(through March 1, 2026/after March 1, 2026)

- ❑ Exhibitor Booth Personnel and Manufacturer's Representative $0.00
- ❑ Exhibitor with Full Conference Registration ..... $995.00/$1095.00

Special Events at the TechCon

- ❑ SVC Foundation 5K Run $40.00
- ❑ Awards Ceremony (Tuesday Morning) and Welcome Reception (Tuesday Evening) ..... No Fee
- ❑ SVC Foundation Casino Night Fundraiser (Monday Evening) ..... 1 Ticket Included with Full Conference Registration (additional tickets $75.00)
- ❑ Farewell Social (Thursday Evening) ..... No Fee

**Pricing contingent on making hotel accommodations at the Hyatt Regency Long Beach/Hyatt Centric Long Beach*

On-Locat
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Processing Cluster

- C-103 An Introduction to Physical Vapor Deposition (PVD) Processes
- C-201 Electron Beam Evaporation for Thin Film Deposition
- C-204 Basics of Vacuum Web Coating
- C-207 Evaporation as a Deposition Process
- C-208 Sputter Deposition for Industrial Applications
- C-210 Introduction to Plasma Processing Technology
- C-212 Troubleshooting for Thin Film Deposition Processes
- C-214 Thin Film Deposition Optimization
- C-240 Fundamentals of Ion Beam Sputtering
- C-245 Industrial Broad Beam Ion Sources
- C-250 Introduction to Pulsed Laser Deposition
- C-280 Thermal Spray Technology
- C-304 ITO and Other Transparent Conductive Coatings: Fundamentals, Deposition, Properties, and Applications
- C-306 Non-Conventional Plasma Sources and Methods in Processing Technology
- C-307 Cathodic Arc Plasma Deposition
- C-308 Tribological Coatings
- C-310 Sputtering
- C-314 Plasma Modification of Polymer Materials and Plasma Web Treatment
- C-316 Introduction to Atomic Layer Deposition (ALD) Processes, Chemistries, and Applications
- C-323 Fundamentals of High Power Impulse Magnetron Sputtering (HIPIMS)
- C-324 Atmospheric Plasma Technologies (half day)
- C-332 Zinc Oxide-Based and Other TCO Alternatives to ITO: Materials, Deposition, Properties and Applications
- C-334 Manufacture of Precision Evaporative Coatings
- C-336 Transparent Gas Permeation Barriers on Flexible Substrates
- C-337 ITO and Alternative TCO: From Fundamentals to Controlling Properties
- C-343 From Basic Aspects to Industrial Components and Applications in HIPIMS Technology
- C-333 Practice and Applications of High Power Impulse Magnetron Sputtering
- C-338 Application of Reactive Sputtering
- M-120 Design of Experiments for R&D
- M-150 Cleaning Fundamentals for Coating Applications
- M-240 Basics and Applications of Electron Beam Technology for Manufacturing Processes
- VT-230 Design and Specification of Vacuum Deposition Systems

Optical Cluster

- C-205 Introduction to Optical Coating Design
- C-218 Advanced Design of Optical Thin Films
- C-216 Practical Design of Optical Thin Films
- C-217 Practical Production of Optical Thin Films
- C-340 Plastic Optics - Coatings and Antireflective Structures
- C-341 Processing on Flexible Glass - Challenges and Opportunities
- M-205 The Craftsmanship of Ophthalmic Coatings

Vacuum Technology Cluster

- M-140 Mass Flow Controllers: Fundamentals, Troubleshooting, and Calibration
- VT-201 High Vacuum Systems and Operations
- V-202 Vacuum System Gas Analysis
- VT-203 Residual Gas Analyzers and Analysis
- V-204 Vacuum Systems Materials and Operations
- V-207 Operation and Maintenance of Production Vacuum Systems
- V-208 Basic Ananlysis of Mass Spectrometer Spectra
- V-209 Fundamentals of Vacuum Technology and Vacuum Gauging
- V-210 Pumps Used in Vacuum Technology
- V-211 Vacuum Hardware and Vacuum Leak Detection
- V-212 Vacuum System Design
- VT-220 Practical Guide to Vacuum System Operation Using a Trainer System
- VT-230 Design and Specification of Vacuum Deposition Systems
- VT-240 Practical Elements of Leak Detection
- VT-245 Hands-on Helium Mass Spectrometer Leak Detection

Course Catalog (September 2025)

ion Tutorial
gram

Characterization Cluster

- M-102 Introduction to Ellipsometry
- M-103 In Situ Spectrascopic Ellipsometry
- M-110 Introduction to X-ray Photoelectron Spectroscopy
- M-130 Scanning Electron Microscopy Sample Preparation, Image Optimization, and Microanalysis
- M-230 Nanoscale Heat Transfer in Thin Films and Interfaces
- M-250 Deposition Process Simulation
- C-322 Characterization of Thick Films, Thin Films, and Surfaces

PVD Cluster

- C-103 An Introduction to Physical Vapor Deposition (PVD) Processes
- C-201 Electron Beam Evaporation for Thin Film Deposition
- C-207 Evaporation as a Deposition Process
- C-208 Sputter Deposition for Industrial Applications
- C-212 Troubleshooting for Thin Film Deposition Processes
- C-214 Thin Film Deposition Optimization
- C-240 Fundamentals of Ion Beam Sputtering
- C-250 Introduction to Pulsed Laser Deposition
- C-307 Cathodic Arc Plasma Deposition
- C-310 Sputtering
- C-323 Fundamentals of High Power Impulse Magnetron Sputtering (HIPIMS)
- C-333 Practice and Applications of High Power Impulse Magnetron Sputtering
- C-334 Manufacture of Precision Evaporative Coatings
- C-338 Application of Reactive Sputtering
- C-343 From Basic Aspects to Industrial Components and Applications in HIPIMS Technology
- M-240 Basics and Applications of Electron Beam Technology for Manufacturing Processes
- M-250 Deposition Process Simulation

Application Cluster

- C-220 Introduction to Two-Dimensional Materials
- C-230 PVD Processing of Plastics for Better Protection, Reflection, and Decoration (half day)
- C-260 Organic Electronics - The Future is Bright
- C-270 Coatings, Thin Films and Surface Solutions for Biomedical Applications: An overview of market trends, synthesis and characterization
- C-304 ITO and Other Transparent Conductive Coatings: Fundamentals, Deposition, Properties, and Applications
- C-320 Diamond Like Carbon Coatings-From Basics to Industrial Realization
- C-329 Properties and Applications of Tribological and Decorative Coatings
- C-330 Introduction to Thin Film Photovoltaic Technologies (half day)
- C-332 Zinc Oxide-Based and Other TCO Alternatives to ITO: Materials, Deposition, Properties and Applications
- C-336 Transparent Gas Permeation Barriers on Flexible Substrates
- C-337 ITO and Alternative TCO: From Fundamentals to Controlling Properties
- C-339 Mechanical Heart Valve Thrombosis: An Introduction and Review (half day)
- C-340 Plastic Optics - Coatings and Antireflective Structures
- C-341 Processing on Flexible Glass - Challenges and Opportunities
- C-342 Thin Film Photovoltaic Solar Cells
- M-140 Mass Flow Controllers: Fundamentals, Troubleshooting, and Calibration
- M-201 Flexible Electronics
- M-205 The Craftsmanship of Ophthalmic Coatings
- M-210 Introduction to Solid-State Thin Film Batteries
- M-220 Thin Film Superconductor Tapes
- M-240 Basics and Applications of Electron Beam Technology for Manufacturing Processes
- M-250 Deposition Process Simulation

Business Cluster

- B-101 Creating a Business from your Idea, Product or Service
- B-110 Getting the Most Value out of Marketing without Spinning your Wheels
- B-120 Introduction to Patents and Trademarks
- B-130 Doing Business in the U.S.A.

Networking Opportunities at the 2026 TechCon

Make Connections

The TechCon is packed with networking events designed to connect vacuum coating and surface engineering professionals with the global SVC community. Each technical and social networking event provides a different forum for invaluable face-to-face interactions and the opportunity to collaborate with technical experts.

Technology Forum Breakfasts

Vacuum coating technology spans multiple applications and processes. Join a discussion group focused on a topic that's important to you. Enjoy the conversation over breakfast before the start of the technical program Monday, Tuesday and Thursday. Late afternoon sessions are currently under development for Monday and Thursday.

To all of our SVC Stakeholders:

The **Technology Forum Breakfasts** have emerged as one of the most significant networking events at the TechCon. These breakfasts, held from 7:00 a.m. to 8:30 a.m. during the TechCon are "loosely" organized around a specific topic where we provide a moderator, a continental breakfast, plenty of seating, and an opportunity for free form discussion to take place. In the TFBs problems are solved, new ideas are vetted, relationships are made and rekindled; all in the spirit of camaraderie that has made the SVC the most unique technical conference in our field. This year we are expanding the program even further with early evening Sunset sessions under development for Monday, April 27 and Thursday, April 30. Please be sure to check the daily schedule (the TFBs are offered on Monday, Tuesday, and Thursday of the TechCon) to find those topics that interest you! And remember, we are always looking for new topics as well as moderators to get the discussion going in the mornings. Good luck and have fun!

– Frank Zimone, Executive Director

Exhibit Networking

Enjoy more opportunities than ever to visit the Exhibit Hall.

- Welcome Lunch and Cocktail Hour are two separate events held in the exhibit hall during the first day of the technical exhibition.
- Poster Session ■ Beer Blast

Additional Networking:

- Technical Program Keynote Presentations
- Exhibitor Innovator Showcase
- Colloquium Round Table Discussions

SVC Foundation Networking Events

CASINO NIGHT

Come and join us for an evening of fun and networking, all to help a great cause at the Annual SVC Foundation Casino Night on Monday, April 27, 2026.

RUN FOR A CAUSE!

Register for the Annual 5K Fun Run and support the scholarship efforts of the SVC Foundation. Bib pickup is tentatively scheduled for 5:30 a.m. on Wednesday, April 29, 2026, outside the Convention Center entrance.

Back by Popular Demand: FREE Technical Conference Admission for April 28th & 29th

Networking Opportunities at the 2026 TechCon

2026 SVC TechCon Farewell Social

Date: **Thursday, April 30, 2026**

Everyone is invited to attend

The **Farewell Social** will be the last networking event of the TechCon and will commemorate what promises to be the most successful TechCon yet! Come join us as we celebrate our Young Members and all the new connections that were made after a densely packed four day program.

Job Board

There will be a Job Board in the exhibit hall adjacent to the poster session. Open positions as well as resumes of those looking for a position can be posted. Messages for interested parties, either potential employer or employee, can also be posted on the board.

2026 SVC Awards Ceremony and Welcome Reception

Date: **Tuesday, April 28, 2026**

Everyone is invited to attend

The **Awards Ceremony** will introduce and recognize the Nathaniel Sugerman Memorial Award recipient, SVC Fellow-Mentor Award recipients, and Sponsored Student awardees.

The **Welcome Reception** is a popular networking event at the TechCon. It offers a relaxed venue to meet friends and colleagues and provides the opportunity to make new connections. In 2026 the Welcome Reception will be broken into a lunch at 1:00 p.m. and a cocktail hour at 5:00 p.m; all held in the exhibit hall.

Back by Popular Demand: FREE Technical Conference Admission for April 28th & 29th

Education Program

FROM THE **EDUCATION DIRECTOR**

Certainly the 2026 TechCon in Long Beach feels like an eternity from now, but you can rest assure that planning is well underway! Since we all said goodbye in Nashville, we spent time assessing the program and thinking about new courses to offer. We learned that our offerings in Nashville continued to be well subscribed, with an average course enrollment that was comparable to the last few years. Several of our courses did quite well. For example, "Troubleshooting for Thin Film Deposition Processes" (C-212), taught by Mike Miller; "Diamond Like Carbon Coatings-From Basics to Industrial Realization" (C-320), taught by Lars Haubold, Christian Stein, and George Savva; "Application of Reactive Sputtering" (C-338), taught by Ralf Bandorf and Holger Gerdes; "Deposition Process Simulation" (M-250) taught by Dennis Barton; and "Materials for PVD Applications" (C-110) taught by Christos Pernagidis and Anas Ghailane all had outstanding attendance. The latter was a new course offering this year, which makes its large enrollment great to see. As for new courses in Long Beach, we are actively developing courses on topics that will help our members develop the skills needed to excel in our craft. The current education schedule of 37 tutorials for TechCon 2026 begins on page 36.

Since some of you reading this might have missed us this year, we remind you that most of our courses are offered in our "on-site" program, where the instructors come to teach their course in the comfort of your own facilities. Alternatively, we have a portfolio of "on demand" educational videos as well. So, if you have new employees who need training or "seasoned" ones who need a refresher, contact us to see how we can help meet your needs.

Whether you want to add to your skills or refresh your old ones, understand the technology or the science behind it, or look into emerging science and technology, I'm sure we have a course that satisfies your needs. To see a listing of all the courses and offering platforms, please visit the SVC website and follow the "education" link.

If you have some questions, please ask. We are always happy to help!

— Scott Walton, SVC Director of Education
scott.walton@svc.org

All paid TechCon conference registrants receive one complimentary seat in any tutorial and a 30% discount for any additional tutorials purchased.

About Our Venue

Long Beach Convention Center, Long Beach, California, USA

The 2026 TechCon will be held in the "Center" of Southern California... the Long Beach Convention & Entertainment Center. Located in the heart of Long Beach, the Convention Center is an urban waterfront destination. The building has an impressive architectural design, modern enhancements, and eye-catching décor. The glass dome of the Atrium provides illumination by sunlight in daytime and by colorful LED lights in the evening. The exhibit hall and meetings rooms are perfectly suited for the TechCon and our emphasis on networking and technical exchange. Overlooking bustling Rainbow Harbor, Queensway Bay, and Pacific Ocean beachfront, the Center sits in the middle of Long Beach's downtown waterfront, within walking distance to first-class accommodations, shopping, dining, attractions, sightseeing along picturesque bays, and 5 1/2 miles of sandy beach. Long Beach is convenient to Los Angeles International, Long Beach, and Orange County Airports.

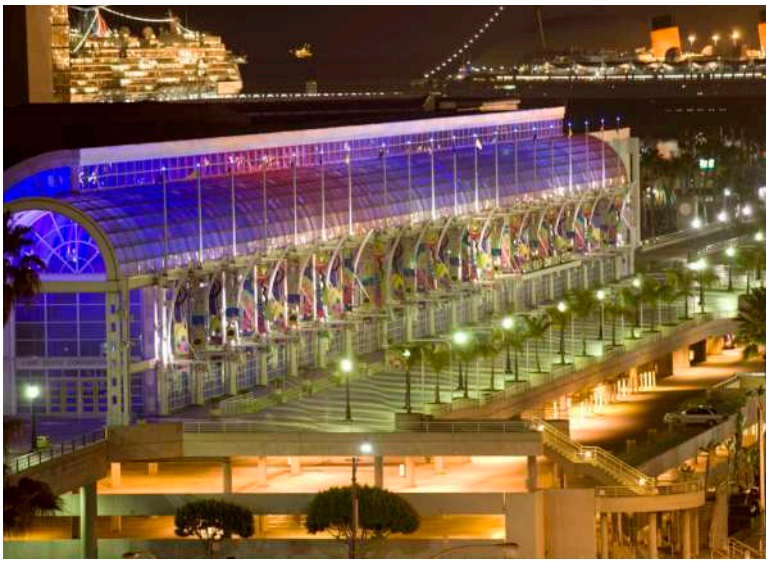
Room blocks and discounted rates have been organized for TechCon attendees. These accommodations are available at:

- $309 USD (double occupancy) - Hyatt Regency Long Beach Hotel, 200 S. Pine Avenue, Long Beach, CA 90802

  Located on a premier waterfront spot in the heart of downtown, Hyatt Regency Long Beach is the only 4 Diamond Award-winning Long Beach, California, hotel with all 531 rooms and suites offering ocean or harbor views. The Hyatt Regency Long Beach is connected directly to the Long Beach Convention Center and will house the majority of the TechCon's social events as well as meeting space/classrooms for the TechCon TFB and tutorial programs.

- $319 USD (double occupancy) - Hyatt Centric The Pike Long Beach Hotel, 285 Bay St, Long Beach, CA 9080

  Hyatt Centric The Pike Long Beach pays homage to the fascinating history of The Pike, an amusement park founded in 1902 that was a thriving destination for its bathhouse, wooden roller coaster, arcades and exciting family fun until 1979. This luxe hotel possesses a rooftop pool and bar with 360° panoramic views, places you in the middle of the neighborhood action so you can explore Long Beach's bustling shopping areas, non-stop nightlife and the rolling surf of California's Pacific Ocean. The hotel is a two-minute walk from the Long Beach Convention Center.



Important note! Discounted room rates are available **exclusively** on the dedicated hotel pages that will be accessible on the SVC 2026 TechCon registration site. ***The SVC does not engage with any third-party companies to provide hotel accommodations.*** Be aware that in all cases, organizations representing themselves as affiliated with the SVC when it comes to hotel accommodations for the TechCon are likely to have malicious motives leading to a nefarious outcome if you rely on them.

TUTORIAL COURSES SCHEDULE

TECHCON EDUCATION SOLVES VACUUM COATING PROBLEMS!

The TechCon Education Program complements the technologies and applications featured in both the Technical Program and the Exhibit, presented by highly-respected professionals in the vacuum coating industry.

SVC Tutorials provide problem-solving and practical knowledge of vacuum coatings and processes. Return to work with solutions to your everyday vacuum coating challenges.

You do not have to register for the conference or be an SVC Member to take a Tutorial Course.

Note: All paid conference registrations include a free tutorial as well as a 30% discount on all additional tutorials that are purchased.

Full Day Course times:
9:30 a.m. – 5:00 p.m.

Half Day Course times:

AM 9:30 a.m. –1:00 p.m.
PM: 1:30 p.m. – 5:00 p.m.

All courses are full day unless specified AM or PM

Sunday, April 26, 2026

B-140 Level Up: Career and Commercial Skills for Emerging Talent in the PVD Industry — 6:30PM – 10:00PM
Hurkmans/Sanchez/Wäckerlin — Professional: $0 | Student/Young Member: $0

C-103 An Introduction to Physical Vapor Deposition (PVD) Processes — 9:30AM – 5:00PM
Morse — Professional: $690 | Student/Young Member: $280

C-110 Materials for PVD Applications — 9:30AM – 5:00PM
Pernagidis/Ghailane — Professional: $690 | Student/Young Member: $280

C-230 Processing of Plastics for Better Protection, Reflection, and Decoration ***AM*** — 9:30AM – 1:00PM
Soper/Vergason — Professional: $470 | Student/Young Member: $180

C-310 Sputtering — 9:30AM – 5:00PM
Bandorf — Professional: $690 | Student/Young Member: $280

C-323 Fundamentals of High Power Impulse Magnetron Sputtering (HIPIMS) — 9:30AM – 5:00PM
Ehiasarian — Professional: $690 or Student/Young Member: $280

M-102 Introduction to Ellipsometry ***PM*** — 1:30PM – 5:00PM
Hilfiker — Professional: $470 | Student/Young Member: $180

M-150 Cleaning Fundamentals for Coating Applications ***AM*** **New!** — 9:30AM – 1:00PM
Wheeler — Professional: $470 | Student/Young Member: $180

M-250 Deposition Process Simulation ***PM*** — 1:30PM – 5:00PM
Gerdes/Barton — Professional: $470 | Student/Young Member: $180

VT-201 Vacuum Systems, Materials and Operation — 9:30AM – 5:00PM
O'Hanlon — Professional: $690 | Student/Young Member: $280

C-201 Electron Beam Evaporation for Thin Film Deposition ***AM*** **New!** — 9:30AM – 1:00PM
Belan — Professional: $470 | Student/Young Member: $180

C-220 Introduction to Two-Dimensional Materials ***AM*** — 9:30AM – 1:00PM
Muratore — Professional: $470 | Student/Young Member: $180

M-110 Introduction to X-Ray Photoelectron Spectroscopy ***AM*** — 9:30AM – 1:00PM
Linford — Professional: $470 | Student/Young Member: $180

M-120 Design of Experiments for R&D — 9:30AM – 5:00PM
Grace — Professional: $690 | Student/Young Member: $280

M-201 Flexible Electronics ***PM*** — 1:30PM – 5:00PM
Muratore — Professional: $470 | Student/Young Member: $180

M-230 Nanoscale Heat Transfer in Thin Films and Interfaces ***PM*** — 1:30PM – 5:00PM
Hopkins — Professional: $470 | Student/Young Member: $180

VT-203 Understanding and Using Residual Gas Analyzers — 9:30AM – 5:00PM
O'Hanlon — Professional: $690 | Student/Young Member: $280

SCHEDULE CONTINUED

Tuesday, April 28, 2026

C-205 Introduction to Optical Coating Design — 9:30AM – 5:00PM
Sargent — Professional: $690 | Student/Young Member: $280

C-210 Introduction to Plasma Processing Technology ***AM*** — 9:30AM – 1:00PM
Baránková/Bárdos — Professional: $470 | Student/Young Member: $180

C-245 Industrial Broad Beam Ion Sources ***AM*** **New!** — 9:30AM – 1:00PM
Rubin — Professional: $470 | Student/Young Member: $180

C-306 Non-Conventional Plasma Sources and Methods in Processing Technology ***PM*** — 1:30PM – 5:00PM
Baránková/Bárdos — Professional: $470 | Student/Young Member: $180

C-337 ITO and Alternative TCO: From Fundamentals to Controlling Properties — 9:30AM – 5:00PM
Bright — Professional: $690 | Student/Young Member: $280

VT-230 Design and Specification of Vacuum Deposition Systems — 9:30AM – 5:00PM
Belan — Professional: $690 | Student/Young Member: $280

VT-240 Practical Elements of Leak Detection — 9:30AM – 5:00PM
Deluca — Professional: $690 | Student/Young Member: $280

Wednesday, April 29, 2026

C-212 Troubleshooting for Thin Film Deposition Processes — 9:30AM – 5:00PM
Vohra — Professional: $690 | Student/Young Member: $280

C-316 Introduction to Atomic Layer Deposition (ALD) Processes, Chemistries, and Applications — 9:30AM – 5:00PM
Biyikli — Professional: $690 | Student/Young Member: $280

C-320 Diamond-Like Carbon Coatings – From Basics to Industrial Realization ***PM*** — 1:30PM – 5:00PM
Savva/Haubold/Keunecke/Stein — Professional: $470 | Student/Young Member: $180

C-322 Characterization of Thick Films, Thin Films and Surfaces — 9:30AM – 5:00PM
Christensen — Professional: $690 | Student/Young Member: $280

Wednesday, April 29, 2026 *continued*

C-329 Properties and Applications of Tribological Coatings — 9:30AM – 5:00PM
Doll/Matthews — Professional: $690 | Student/Young Member: $280

C-338 Application of Reactive Sputtering — 9:30AM – 5:00PM
Bandorf/Gerdes — Professional: $690 | Student/Young Member: $280

M-103 In Situ Spectroscopic Ellipsometry ***PM*** **New!** — 1:30PM – 5:00PM
Pribil — Professional: $470 | Student/Young Member: $180

M-240 Basics and Applications of Electron Beam Technology for Manufacturing Processes ***AM*** — 9:30AM – 1:00PM
Saager — Professional: $470 | Student/Young Member: $180

M-260 Advanced Packaging ***PM*** **New!** — 1:30PM – 5:00PM
Banerjee — Professional: $470 | Student/Young Member: $180

VT-245 Hands-On Helium Mass Spectrometer Leak Detection – Session 1 ***AM*** **New!** — 9:30AM – 11:30AM
Deluca/Ridenour — Professional: $470 | Student/Young Member: $180

VT-245 Hands-On Helium Mass Spectrometer Leak Detection – Session 2 ***PM*** **New!** — 12:00PM – 2:00PM
Deluca/Ridenour — Professional: $470 | Student/Young Member: $180

Thursday, April 30, 2026

C-204 Basics of Vacuum Web Coating ***AM*** — 9:30AM – 1:00PM
Simmons — Professional: $470 | Student/Young Member: $180

M-140 Mass Flow Controllers: Fundamentals, Troubleshooting, and Calibration ***AM*** — 9:30AM – 1:00PM
Lewey — Professional: $470 | Student/Young Member: $180

M-210 Introduction to Solid-State Thin Film Batteries ***AM*** — 9:30AM – 1:00PM
Gaines — Professional: $470 | Student/Young Member: $180

Tutorial Classification

V/VT- VACUUM TECHNOLOGY
C - VACUUM COATING DEPOSITION PROCESSES AND TECHNOLOGY
M - MISCELLANEOUS TOPICS
B - BUSINESS TOPICS

The tutorial number indicates the level of topic specialization. Lower numbers are basic or introductory in nature, and higher numbers are a more specialized treatment of a specific topic.

Registration for Tutorial Courses

- Use the On-line TechCon resgistration system. All paid conference registrations include a free tutorial as well as a 30% discount on all additional tutorials that are purchased.
- You do not have to register for the TechCon to attend tutorial courses
- Tutorial course fees include entrance to the Exhibit Hall and all Exhibit Visitor privileges

Times

FULL-DAY COURSE TIMES: 9:30 a.m. - 5:00 p.m.
HALF-DAY COURSE TIMES: **AM** (9:30 a.m. - 1:00 p.m.) and **PM** (1:30 p.m. - 5:00 p.m.)
*All courses are full-day unless specified **AM** or **PM**.*

Discounts Offered to Multiple Registrants from One Organization

Receive 25% off each tutorial course registration for the second or more employee from the same company, enrolling in the same tutorial as the first employee. (Does not apply to the student tutorial course fee). Send an E-mail to **svcinfo@svc.org** and request the discounted fee. Discounts will be refunded after the TechCon.

Tutorial Course Cancellation Policy

Tutorial course cancellations received on or before March 25, 2026 will be refunded. Refunds will be made upon receipt of a written notice, less a $25 service fee for each cancelled tutorial course. No refunds will be made after March 25, 2026. Please send your written cancellation request to **svcinfo@svc.org**.

SVC INSTRUCTORS

Ralf Bandorf

born 1973, studied Physics at Friedrich-Alexander University Erlangen/Nuremberg, Germany and received his diploma in 1998. His work focused on preparation of metastable ironsilicides and phase characterization by LEED. In 1998 he joined Fraunhofer IST for his PhD thesis. Ralf Bandorf received his PhD in Mechanical Engineering in 2002 from Fraunhofer IST / Carolo-Wilhelmina Technical University Braunschweig, Germany. His thesis focused on sub-micron tribloogical coatings for electromagnetic microactuators. Ralf continued at Fraunhofer IST as a scientist, specifically as Project leader in Group Micro and Sensor Technology with a Focus on PVD and PACVD coatings. He worked in the field of plastic metallization for flexible circuits, piezoresistive materials (especially based on DLC), electrical conductive and insulating coatings as well as magnetic thin films. In 2007, he became Head of Group "Sensoric Functional Coatings" and since 2015 he has been Head in Group "PACVD and hybrid processes" at Fraunhofer IST. His focus is on PACVD with different excitation, plasma sources, hollow cathode processes, especially gas flow sputtering, and HIPIMS.

Ralf Bandorf is internationally recognized expert in the field of HIPIMS. He was session chair of the HIPIMS session at ICMCTF, US from 2009-2012. He has served as assistant TAC Chair at the Society of Vacuum Coaters since 2009. Ralf is the conference Chairman of the International Conference on Fundamentals and Applications of HIPIMS and Action Chair of the COST Action MP0804: Highly ionized pulse plasma processes (HIPP processes, 2009-2013), a European scientific networking activity gathering experts worldwide in the field of HIPP plasmas, especially HIPIMS.

Koushik Banerjee

has spent his career in semiconductor manufacturing focusing on developing advanced microelectronic packaging. He has a master's degree in mechanical engineering from Georgia Institute of Technology. Koushik worked at Intel Corporation for thirty-three years where he was a Vice President in the Technology Development Group. He has deep expertise in successfully developing transformative advanced packaging technologies. He holds over a dozen patents in this field. Koushik is passionate about technology and leadership development. He has written a book on business strategy setting, titled "Strategy Setting Fundamentals: Translate strategic thinking into results", available on Amazon.com. For leisure, he enjoys reading both fiction and non-fiction and traveling with his family.

Hana Baránková

is Professor at the Uppsala University and Research Leader of the Plasma group at the Angstrom Laboratory. She has been director and manager of several energy related projects and programs. She received her PhD in Electronics and Vacuum Technique from the Czech Academy of Science. Her primary interests are development of plasma sources and processes, innovation in coating technology, and plasma treatment of surfaces, gases and liquids. She has published over 160 scientific papers and conference contributions and holds several industrial patents on plasma systems. She is an inventor of metastable assisted deposition and co-inventor of the Linear Arc Discharge (LAD) source, the Magnets-in-Motion concept in plasma sources and Fused Hollow Cathode and Hybrid Hollow Electrode Activated Discharge (H-HEAD) cold atmospheric plasma sources. Hana Baránková has been serving 6 years on the SVC Board of Directors, and as TAC Chair of Emerging Technologies and organizer of Atmospheric Plasma Technologies session over the years. She is Secretary of SVC, Chair of the Student Sponsorship Committee, TAC Co-Chair of the Coatings for Biomedical Applications, and member of the Education and International Outreach Committees. Hana is 2006 Mentor Award recipient for the development of numerous novel plasma sources. She acts as a consultant and is a co-founder of two companies, BB Plasma HB and BB Plasma Design AB. She teaches several courses at the Uppsala University and abroad, for example, she has taught annual courses for SVC since 1997.

Ladislav Bárdos

is Professor at Uppsala University in Sweden and Research Leader of the Plasma group at the Angstrom laboratory. He received his PhD in Applied Physics from the Czech Acad. Sci. and a Doctor of Science degree from Charles University in Prague. He was awarded the Czechoslovak State Prize for outstanding research results in the plasma deposition of thin films. He has more than 35 years of experience in the field of applied plasma physics and thin films. He has published over 200 scientific papers and conference contributions, designed several plasma sources for industry and has 15 Czech, 7 Swedish and several international patents. His primary interests are microwave plasmas, including downstream ECR and surface-wave generation, and particularly the radio frequency generated hollow cathodes and hybrid sources at both low and atmospheric pressures. Lad Bardos was Program Chair for 2009 and 2010 SVC TechCons, has been serving 6 years on the SVC Board of Directors and is member of the SVC Education and Awards Committees and Co-Chair of International outreach Committee. Ladislav is 2010 Mentor Award recipient for leading research in plasma processes. He is a co-founder of two companies, BB Plasma HB and BB Plasma Design AB. He teaches several courses at the Uppsala University and abroad, for example, he has taught annual courses for SVC since 1997.

Dennis Barton

has studied Mathematics, Engineering and Chemistry at the Universities of Magdeburg, Braunschweig and Münster. In 2013 he received his master's degree at the Institute for Physical Chemistry at TU Braunschweig. In the following years, he worked on modelling of on-surface coupling processes and the development of embedding methods to combine periodic and non-periodic quantum chemistry frameworks for which he received his PhD from the University of Münster in 2017 ("Quantum-chemical investigation of on-surface reactions and the foundation of periodic density embedding"). Afterwards he moved to the University of Luxemburg for a two-year Postdoc position, where he implemented semi-empirical methods to describe Vander-Waals interactions in different quantum chemistry codes. From 2020 to 2022, he worked in industry in the field of simulation data management. In August 2022, Dennis joined the group of Andreas Pflug at the Fraunhofer Institute for Surface Engineering and Thin Films (IST), where he is working on development and application of the PICMC code for the simulation of thin film coating processes.

EDUCATION PROGRAM

SVC INSTRUCTORS

Rob Belan
graduated from Rutgers University with a BS in Physics and took graduate courses in Physics at City College of NY. Has worked in Vacuum Science since 1982 specializing in magnetron sputtering and other PVD techniques. He is currently the Technical Director at the Kurt J. Lesker Company and has lectured at many universities and companies across the world in PVD techniques and thin film growth.

Necmi Biyikli
was born in Utrecht, The Netherlands, in 1974. He received the B.S., M.S., and Ph.D. degrees in Electrical & Electronics Engineering from Bilkent University, Ankara, Turkey in 1996, 1998, and 2004 respectively. Dr. Bıyıklı's Ph.D. research concentrated on GaN/AlGaN-based ultraviolet and solar-blind photodetectors. Afterwards, during his postdoctoral research at the Virginia Commonwealth University, he worked on the MOCVD growth of AlGaN/GaN hetero-structures for various applications including high-performance transistors. Dr. Bıyıklı also worked as a research scientist at the Cornell Nanoscale Science and Technology Facility (CNF) where he developed RF-MEMS integrated multifunctional reconfigurable antennas. At the end of 2008 he joined UNAM – Materials Science & Nanotechnology Institute at Bilkent University, leading the "Functional Semiconductor Materials and Devices Research Group". After spending one year at Utah State University, in 2017 he joined the Electrical & Computer Engineering Department at University of Connecticut, where he leads the Atomic Layer Engineering Laboratory within the Center for Clean Energy Engineering (C2E2). His current research interests include atomic layer deposition of III-nitride, metal-oxide, and metal thin-films and nanostructures, selective atomic-scale processing, III-Nitride opto-electronics, piezo-electric thin-films for chemical and biological sensing, photovoltaics, and smart RF-antenna architectures. Dr. Biyikli is the recipient of EU-Marie Curie International Reintegration Grant Award in 2010 and METU-Parlar Foundation Research Incentive Award in 2013. Dr. Biyikli is a member of American Vacuum Society (AVS) and Materials Research Society (MRS) and has contributed to 300+ journal and conference publications.

Clark Bright
has worked in thin film technology for more than 45 years including research, development, and new product introduction. He co-founded the R&D department at Sierracin Corporation (now PPG Aerospace) and led the development of metallic thin film transparent conductive coatings (TCC) for aircraft windshields and canopies. He joined Xerox Electro-Optical Systems in 1972, to create and direct the Electro-Optical Device Technology Center (EODTC) for R&D and fabrication of EO devices used in Xerox products. In 1975, he founded Optical & Conductive Coatings (OCC) to perform R&D and production of TCC for military, industrial and scientific applications. OCC designed and manufactured (over 3000) M1 Tank windows with TCC heater deicing/defogging, EMI shielding and high transmittance in 3 wavebands: visible, NIR, and 1.06 μm laser range finder. He also led what is believed to be the first development of continuous thin film TCC for the mid-infrared (3μm - 5μm) waveband. Another OCC unique development was a patterned metallic coating for heating infrared windows with transmittance at visible through Far-IR wavelengths. OCC was acquired by Southwall Technologies (now Eastman Chemical) in 1992, and he became Director of Product Development. He led R&D and played a critical role in 2 production scale-ups of a durable 4-layer (ITO/SiO_2) AR/antistatic coating, magnetron sputter deposited, roll-to-roll on plastic film used by display manufactures (e.g., Sony). He was Vice President at Presstek, Inc., and its Delta V Technology subsidiary in 1998, where he directed the R&D of transparent conductive oxides (TCO), polymer multilayer (PML) technology, and transparent vapor barrier coatings, including the first barrier coatings using a TCO, (ITO). 3M acquired Delta V in 2000. As Senior Staff Scientist and Group Technical Leader with the 3M Corporate Research Laboratory he developed roll-to-roll coated, vacuum deposited, organic and inorganic multilayer thin film products for optical, transparent conductive, barrier and other applications. Retiring in 2013 after 13 years at 3M, he founded his current consulting practice - Bright Thin Film Solutions LLC. He served 12 years on the SVC Board of Directors and was President in 2004. In 2009, he received the SVC Fellow-Mentor Award, and in 2012 the Nathaniel Sugerman Award. He has been an invited, keynote and plenary speaker at many domestic and foreign conferences. He has published numerous papers on optical thin films, and transparent conductive coatings, including book chapters on transparent conductors in "Transparent Electronics: From Synthesis to Applications" (Wiley, 2010), and "Optical Thin Films and Coatings, from Materials to Applications" (Woodhead, 2013), (2nd edition, Elsevier, June 2018). He is inventor or co-inventor on at least 28 U.S. patents in the field.

Tom Christensen
is a Professor Emeritus in the Department of Physics at the University of Colorado at Colorado Springs. He received his B.S. in physics from the University of Minnesota in 1979 and his M.S. and Ph.D. degrees in Applied Physics from Cornell University. After several years at Sandia National Laboratories in Albuquerque he joined the University of Colorado faculty in 1989 where he has served as Department Chair, Dean and Provost. He has worked with vacuum technology, thin film technology and surface characterization since 1980 and has taught local AVS or SVC short courses since 1992. He is the author of "Understanding Surface and Thin Film Science" (CRC Press, 2023).

Jean-Pierre Deluca
retired from LACO Technologies in 2019, he recently started his own consulting Company (www.bdlredwood.com). Jean-Pierre holds a bachelor's degree in science (Electrical Engineering) from Century University NM and has over 39 years of experience in the leak testing afield (helium mass spectrometry, hydrogen, pressure decay, vacuum decay and mass flow). He has worked in numerous roles for leak instrument and leak testing equipment manufacturers, specifically as a product manager, applications engineer, international leak detection director and finally vice president of sales. Jean-Pierre has extensive experience and expertise in many industries including, automotive, medical, pharmaceutical, refrigeration and air conditioning, semiconductor, aerospace and defense, vacuum industry and assisted thousands of customers with their leak testing applications and projects. Additionally, he has audited hundreds of leak testing equipment/systems and helped customers to improve functionality, reliability, test quality and reduced cycle time. Jean-Pierre has written many technical articles and contributed to many others. He has presented over 500 training classes at customers' facilities and trade shows.

SVC INSTRUCTORS

Gary Doll
is the Timken Professor of Surface Engineering at the University of Akron. Prior to joining the University of Akron, Dr. Doll was the Chief Technologist of Tribology at the Timken Company, and Staff Scientist of Physics for General Motors Research Laboratories. Dr. Doll was elected as an ASM Fellow in 2009, and as an STLE Fellow in 2016 for his contributions to the field of Surface Engineering. He is a member of the SVC, STLE, ASME, and the ASM International organizations, and is an associate editor for Tribology Transactions. In 2016, he was awarded a Distinguished Fellowship by the Royal Academy of Engineering. Over his career, Dr. Doll has published over 300 articles and book chapters, edited numerous proceedings, and received more than 25 US Patents.

Arutiun P. Ehiasarian
joined the Nanotechnology Centre for PVD Research at Sheffield Hallam University, UK in 1998 where he obtained his PhD in Plasma Science and Surface Engineering. His research within NTCPVD has concentrated on development of plasma PVD technologies for substrate pretreatment prior to coating deposition to improve adhesion, deposition of coatings with dense microstructure, low-pressure plasma nitriding and hybrid processes of plasma nitriding/coating deposition. He has experience with cathodic vacuum arc discharges, dc and pulsed magnetron discharges, and radio-frequency coil enhanced magnetron sputtering. He utilizes plasma diagnostics such as optical emission spectroscopy (OES), electrostatic probes, energy-resolved mass spectroscopy and atomic absorption spectroscopy. Materials characterization includes high-resolution TEM, STEM, STEM-EDS, SEM, and XRD as well as mechanical testing available at NTCPVD. Arutiun is one of the pioneers of high power impulse magnetron sputtering (HIPIMS) technology and his work in the field has been acknowledged with the R.F. Bunshah Award (2002), the TecVac Prize (2002) and the Hüttinger Industrial Accolade. In 2011 he received the AVS Peter Mark Memorial Award as a top young investigator, and in 2012 he received the SVC Mentor Award. He is an author of more than 50 publications, 10 invited lectures, 3 patents and 1 book chapter in the field of PVD and HIPIMS.

J.R. Gaines
is the Technical Director of Education for the Kurt J. Lesker Company (Jefferson Hills, PA). The Lesker Company is a global scientific equipment manufacturer supplying materials and tools for vacuum-enabled innovation. Gaines has more than 40 years of experience in the research, development and commercialization of advanced materials technologies including superconductivity, semiconductors, cryogenics, space simulation, energy generation, energy conversion and storage. His experience includes vacuum systems, thin film deposition, inorganic chemistry, nanotechnology and advanced ceramic processing. He currently develops and delivers the Company's many educational programs through Lesker University teaching events.

Holger Gerdes
graduated from the Technical University in Braunschweig with a diploma in Physics in 2004. Afterwards, he was Research Fellow at the Institute of Micro Production Technology (IMPT) at the Leibniz University, Hannover. Since 2008, Holger has worked as a project leader in the group "Highly Ionized Plasmas and PECVD" at the Fraunhofer Institute for Surface Engineering and Thin Films IST. One of his main topics is the development of reactive processes especially in combination with HIPIMS (High Power Impulse Magnetron Sputtering).

Anas Ghailane
started his career in 2014, the year at which he received a Master of Science and Engineering degree from Saarland University, Germany; and EEIGM – University of Lorraine, France; respectively.

From 2014 – 2016, as a materials engineer, he occupied research and development engineer positions in corrosion of steel as well as metal forming. Then in 2017, Anas started a PhD in physics focusing on development of corrosion and wear resistant coatings using HiPIMS and dcMS. The PhD degree was received from University of Koblenz, Germany and did his experimental work at NTTF coatings GmbH, Germany, and University Mohammed 6 Polytechnique, Morocco.

Since 2022, Dr. Anas Ghailane works as a physical vapor deposition (PVD) consultant at Avaluxe Coating Technology GmbH & Co KG (ACT), Fürth, Germany.

Jeremy M. Grace
is currently a principal engineer at Idex Health & Science | Semrock, where he works in the area of thin-film interference filters for life sciences and other applications. Prior to his position at Semrock, he was a senior principal scientist at the Eastman Kodak company, where he worked in the areas of plasma surface modification, thin-film adhesion, sputter deposition, and organic vapor deposition. As a young scientist at Kodak, Jeremy learned DOE principles, and he has applied them in his work for the past 25 years. His experience has provided him knowledge and perspective that have helped him to mentor scientists and engineers in the application of DOE principles. Most recently, he presented a tutorial on DOE to fellow engineers at Idex Health & Science. Jeremy has written several patents and journal articles in the area of plasma modification of polymers. He is a member of the Society of Vacuum Coaters and the American Vacuum Society, and served as chair of the Upstate New York Chapter of the AVS (UNY-VAC) from 1998-2000.

Lars Haubold
graduated in Manufacturing Engineering at the University of Applied Sciences Dresden, Germany in 2002. For more than 15 years he does contract R&D at Fraunhofer USA in the area of vacuum thin film deposition and diamond-like carbon materials in particular. His projects cover the entire range from feasibility studies to industrial commercialization. His current position is Manager of Coatings Technology Group at Center for Coatings and Diamond Technologies. He has been a SVC member since 2007 and instructor at the annual conference since 2017.

EDUCATION PROGRAM

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James N. Hilfiker

graduated from the Electrical Engineering Department of the University of Nebraska in 1995, where he studied under John Woollam. His graduate research involved in-situ ellipsometry applied to both sputter-deposition and electrochemical reactions, and optical characterization of magneto-optic thin films. He joined the J.A. Woollam Company upon graduation, where his research has focused on new applications of ellipsometry, including characterization of anisotropic materials, liquid crystal films, thin film photovoltaics, and Mueller matrix optical characterization. He has authored over 50 technical articles involving ellipsometry, including Encyclopedia articles and four book chapters on topics as varied as Vacuum Ultraviolet Ellipsometry, In-Situ Spectroscopic, and Dielectric Function Modeling. In 2015, James co-authored a book titled "Spectroscopic Ellipsometry: Practical Application to Thin Film Characterization."

Patrick Hopkins

is the CSO and co-founder of Laser Thermal, Inc, a company in based in Charlottesville, Virginia that has commercialized thermal conductivity measurement systems that provide non-contact metrologies for thermal properties of thin films, coatings and bulk materials. The mission of Laser Thermal is to provide accessible thermal measurements of materials, focusing on thin-film thermal conductivity with nanoscale resolution. By utilizing optical technologies, Laser Thermal provides simple, accurate, and rapid measurements of thermal properties, leading to increased customer knowledge of material properties.

Patrick is also a Professor in the Department of Mechanical and Aerospace Engineering at the University of Virginia, with courtesy appointments in the Department of Materials Science and Engineering and the Department of Physics. Patrick has been on the faculty of UVA since 2011, following a Harry S. Truman Postdoctoral Fellowship at Sandia National Labs. Patrick's current research interests are in energy transport, laser-material processes and nanoscale and ultrafast processes in condensed matter, soft materials, liquids, vapors and plasmas. Patrick's group at the UVA uses various optical thermometry-based experiments to measure the thermal conductivity, thermal boundary conductance, thermal accommodation, strain propagation and sound speed, and electron, phonon, and vibrational scattering mechanisms in a wide array of bulk materials and nanosystems.

In the general fields of nanoscale heat transfer, laser interactions with matter, and energy transport, storage and capture, Patrick has authored or co-authored over 275 technical papers (peer reviewed), and has been awarded 5 patents focused on materials, energy and laser metrology for measuring thermal properties. Patrick has been recognized for his accomplishments in these fields via an Air Force Office of Scientific Research Young Investigator Award, an Office of Naval Research Young Investigator Award, the ASME Bergles-Rohsenhow Young Investigator Award in Heat Transfer, the ASME Gustus L. Larson Memorial Award, and a Presidential Early Career Award for Scientists and Engineering, for which Patrick met President Barack Obama in 2016. Patrick is a fellow of ASME and a recipient of an Alexander von Humboldt Fellowship for Experienced Researchers.

Martin Keunecke

joined in the Fraunhofer Institute for Surface Engineering and Thin Films (IST) in Braunschweig, Germany in 1998, after university studies in physics and mechanical engineering. He completed his thesis on the development and application tests of tool coatings 2007. He is responsible for new coating and process development with PVD and PECVD technologies and other surface treatment technologies in the field of friction reduction, hard and wear resistant coatings for tools and components for industrial applications, e.g. diamond-like carbon coatings for automotive applications. From 2012 till 2015 Martin Keunecke was the head of the department "New Tribological Coatings" at the Fraunhofer IST. Since 2016 he is the head of the group "Tribological Systems" in the "Center for Tribological Coatings" at the Fraunhofer IST.

Wayne Lewey

is the Product Line Manager of Vacuum and Flow Products at Teledyne Hastings Instruments in Hampton, Virginia. He holds a BS in Chemical Engineering from North Carolina State University. He has worked at Teledyne Hastings Instruments for over 20 years, and most of that time was spent as their International Sales Manager.

Matthew Linford

graduated with a B.S. in chemistry from Brigham Young University in 1990 and received M.S. and Ph.D. degrees in materials science and chemistry, respectively, from Stanford University in 1996. While at Stanford he published the first two papers on monolayers on hydrogen-terminated silicon with his adviser Chris Chidsey. By Google Scholar these papers have been cited ca. 800 and 1300 times. After a post-doc at the Max Planck Institute of Colloids and Interfaces in Germany with Helmut Möhwald studying polyelectrolyte multilayers, he worked in industry for three years – one year with a large chemical company and two years with two start-up companies. In 2000, he became a faculty member at Brigham Young University and is now a full professor there. While at BYU, Linford has studied thin film deposition and characterization, new materials for separations science, statistical methods for data analysis, new materials for long-term digital data storage, and the chemomechanical functionalization of silicon. His work in separations science led to the launch of the Flare chromatography column that was sold by Diamond Analytics. His work in data storage led him to co-found Millenniata (now Yours.co), which sells a DVD disc that lasts 1000 years and a Blu-ray disc that will last at least 300. Linford has more than 350 publications, which include peer-reviewed papers, conference proceedings, book chapters, peer-reviewed contributions to Surface Science Spectra, commercial application notes, tutorial articles, and more than 40 patents. He is an editor for Applied Surface Science, an Elsevier journal with an impact factor of ca. 5.0. He is a contributing editor for Vacuum Technology & Coating (VT&C) for which he writes a ca. monthly column on surface and material characterization. He has been an associate editor for Surface Science Spectra since 2003. In 2014 he was made a fellow of the American Vacuum Society (AVS). In 2015 he was named an Alcuin Fellow at Brigham Young University (an award for excellence in teaching). By Google Scholar, his h-index is 40, his i10-index is 118, and his total number of citations is more than 9200.

SVC INSTRUCTORS

Allan Matthews
is a Fellow of the Royal Academy of Engineering and is Professor of Surface Engineering and Tribology in the School of Materials at the University of Manchester, UK. He is also Director of the BP-sponsored International Centre for Advanced Materials (ICAM). He spent his early career in the aerospace industry and carried out research into ion plating processes at the University of Salford before moving to the University of Hull, where he built up the Research Centre in Surface Engineering as Director for over 20 years. He moved the Centre to the University of Sheffield in 2003 and then to Manchester in 2016. His group researches plasma assisted processes, mostly for tribological coatings and diffusion treatments. He is Editor-in-Chief of the Elsevier journal Surface and Coatings Technology, a former member of the SVC Board of Directors and a former Chair of the British Vacuum Council and the AVS Advanced Surface Engineering Division Executive Committee.

Patrick Morse
is a seasoned expert with 20 years of experience in plasma physics and thin film deposition. With a strong track record of solving complex sputtering challenges and optimizing vacuum-based processes, Patrick specializes in creating Digital Twin simulations that bridge the gap between experimental results and theoretical predictions. He also shares his extensive knowledge as an Adjunct Instructor at the University of Arizona, teaching thin film deposition.

His career began at Advanced Process Technologies (later General Plasma Inc.), where he gained foundational knowledge in plasma-material interactions and magnetic confinement. At Sputtering Components Inc., he expanded his expertise to include molecular gas flow and electrical simulations, leading to the development of patented magnet bar designs used in numerous rotary cathode applications today.

Patrick's problem-solving acumen is evident in his successful resolution of challenging production issues, including a notable case where he drastically improved reactive sputtering uniformity by optimizing a gas manifold design through COMSOL Multiphysics simulations. His ability to diagnose and address undocumented phenomena, such as plasma spokes and interactions between plasma development and process zone geometry, further underscores his expertise.

Patrick's areas of expertise include large-area sputtering, PECVD sources, ion-beam etching, and Digital Twin simulations. He finds particular satisfaction in utilizing COMSOL Multiphysics to replicate and optimize real-world vacuum processes.

As a consultant with Arizona Thin Film Research LLC, Patrick leverages his extensive experience to help clients improve process efficiency and adapt to evolving industry challenges. He is passionate about sharing his knowledge and mentoring newcomers in vacuum coating technology, actively participating in events like TechCon and contributing to the Society of Vacuum Coaters (SVC).

Driven by a lifelong curiosity and a commitment to innovation, Patrick Morse continues to advance the field of vacuum coating through his analytical skills, practical experience, and dedication to continuous learning, now also through educating the next generation of thin film deposition experts at the University of Arizona.

Christopher Muratore
is the Ohio Research Scholars Endowed Chair Professor in the Chemical and Materials Engineering Department at the University of Dayton. Prior to joining the University, Professor Muratore spent 10 years as a staff member at the Air Force Research Laboratory and still works closely with multiple flexible electronics groups there. In 2013, he also founded m-nanotech Ltd., a consulting company specializing in thin film materials processing and characterization. Throughout his 20 year research career, Christopher's work has focused on developing an understanding of how to control structure and properties of thin films and surfaces for diverse applications, and their impact on properties and performance. His research group currently focuses on novel large-scale synthesis of materials for flexible, wearable electronic devices. He has 4 patents, published over 80 peer-reviewed articles and has served as guest editor for Surface and Coatings Technology and Thin Solid Films for five years.

John F. O'Hanlon
is Professor Emeritus of Electrical and Computer Engineering, the University of Arizona. He retired from IBM Research Division in 1987, where he was involved in thin-film deposition, vacuum processing, and display technology. He retired from UA in 2002, where he directed the NSF Ind./Univ. Center for Microcontamination Control. His research focused on particles in plasmas, cleanrooms, and ultrapure water contamination. He and Tim Gessert are co-authors of "A Users Guide to Vacuum Technology", 4th Edition, John Wiley and Sons, 2023

Christos Pernagidis
a materials science graduate, began his career in 1993 as part of the R&D group of major German producer of coating materials. His initial role involved overseeing and ramping up the production of TiAl for Oerlikon Balzers.

After three years of leading the production of coating materials, Christos transitioned into a sales role, becoming the sales manager with world-wide responsibility. In 2004, Christos and his partner co-founded Avaluxe International GmbH. This new venture focused on coating materials while also establishing strong partnerships with leading companies for magnetrons and power supplies. Under Christos's leadership, Avaluxe expanded

EDUCATION PROGRAM

SVC INSTRUCTORS

its services to include thin film consulting and hands-on development of coatings with both decorative and functional properties.

Throughout his career, Christos has demonstrated expertise in materials science, particularly in the field of coatings and thin films. His experience spans research and development, production management, sales, and entrepreneurship, showcasing his versatility and comprehensive understanding of the industry.

Greg Pribil
graduated from the Electrical Engineering Department of the University of Nebraska-Lincoln. His graduate research included the development of a hollow cathode reactive sputtering UHV system with magnetic field confinement. His research focused on the deposition of a-Si:H, a-Ge:H and a-SiGe:H thin films for use in solar cells. He has been an applications engineer at the J.A. Woollam Company since January 2002, where he specializes in real-time process monitoring and control via in situ spectroscopic ellipsometry.

Mike Ridenour
With over 45 years of experience in vacuum technology and leak detection, Mike Ridenour brings deep technical expertise and industry insight. An Electrical Engineer by training, Mike has been with Leybold since 1980, where he has held leadership roles across Engineering Systems, Sales, Product Support, Marketing, Service, and Quality.
Today, as Sr. Product Sales Development Manager, Mike leads initiatives in leak detection, dry multistage roots pumps, and vacuum gauges–helping customers solve complex challenges with precision and innovation.

Binyamin Rubin
holds a PhD in Aerospace Engineering and has developed and characterized ion thrusters for space propulsion. In 2011 he transitioned to Veeco Instruments, where he currently serves as the Technology Manager for the Ion Beam Product Group. He has extensive experience in developing ion sources, ion beam deposition, and ion beam etch systems. Binyamin has published and presented numerous papers on ion beam sputtering, plasma diagnostics, and optical coatings.

Stefan Saager
studied physics at the Technical University Dresden with specialization to semiconductor physics. In 2015, he graduated to PhD in the topic of deposition and crystallization of silicon thin films by using e-beam technology. Since 2010 he is a research fellow at the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP in Dresden. Since 2023 he leads the group Coating Metal & Energy Applications. His research interests include the development and the optimization of new vacuum-based deposition methods such as electron beam physical vapor deposition (EB-PVD) as well as the simulation of related thermal processes.

David Sanchez
has been a Chemical Engineer and Materials Scientist for 29 years. He was motivated by firsthand use of advanced thin film optics and technologies in the US Marine Corps. He completed his dual BS degree in California and went to work at OCLI/Flex in 1996 as a Process Engineer. He was classically trained in thin film technology from the best in the emerging field. David has since leveraged his experience and built a wide range of skills as a materials and applications scientist and engineer. For more than 28 years he has led many efforts to develop key materials and now supports the complete line of specialty inorganic materials, precious metals and rare metals for Materion Electronic Material's PVD, energy and semiconductor customers.

Robert Sargent
received his BA in Physics from UC Berkeley and his PhD in Optical Sciences from the University of Arizona. He has nearly 40 years of experience in optical coatings, including 10 years with Optical Coating Laboratory, Inc. and 24 years with Viavi Solutions (formerly JDSU). His industrial experience has included the development of deposition processes and filter designs for applications such as aerospace, biomedical instrumentation, and fiber-optic telecommunications. He currently leads R&D projects focused on the development of new thin film deposition processes.

George Savva
obtained his Ph.D. from McMaster University, Canada where he studied ceramic/metal interface structures and diffusion paths related to high temperature oxidation. He has also worked in the area of materials for electrical vehicle batteries. His present position is Engineering Manager for Ionbond North America.

SVC INSTRUCTORS

Michael Simmons
is President of Intellivation, LLC, a vacuum coating equipment manufacturing company he founded in 2009. Since 2009, Intellivation has grown into one of the leading companies providing Roll to Roll vacuum coating systems and process support. Mike's extensive background in plasma processing and equipment continues to be enhanced by the installation of a R2R Lab system at Intellivation which has enabled Mike and Intellivation to become vacuum process knowledge leaders in the industry. Process knowledge includes a wide range of sputtering technologies as well as other PVD techniques. Mike is responsible for designing, manufacturing and installing a wide variety of equipment over the past 15 years, from production vacuum deposition R2R tools to R&D systems, and automation machinery. Roll to roll vacuum deposition is the primary focus for Mike and his team, as exemplified by Intellivation's innovative R2R series product line. He is a member of the Board of Directors of the Society of Vacuum Coaters (SVC), SVC Instructor for Web Coating, past Chair of AIMCAL's Vacuum Web Coating Committee, an active member of AVS and continuously supports the vacuum community through multiple initiatives. Mike earned his mechanical engineering degree (BSME) from the University of Idaho where he graduated with honors, and is a licensed Professional Engineer. Mike has published multiple technical papers and presented at global conferences on Vacuum Coating Processes, including but not limited to Vacuum Technology and State of the Art Roll to Roll Equipment and Processes.

Josh Soper
graduated from the United States Military Academy with a BS in Mechanical Engineering and from Norwich University with an MS in Organizational Leadership. He currently serves as the VP of Operations for Vergason Technology, Inc. He has been with VTI since 2015 and oversees all PVD equipment builds and coating services. He is responsible for developing coating recipes (PVD and PECVD) for new applications at VTI including thin films on plastic and painted substrates, and tribological coatings on metal substrates, using sputtering, PECVD, thermal evaporation, cathodic arc and HiPIMS deposition technologies.

Christian Stein
is a researcher at the Fraunhofer Institute for Surface Engineering and Thin Films in Braunschweig, Germany. He studied physics at the Philipps-University Marburg and graduated in 2008 with a diploma thesis on surface science. Fascinated in transferring research results to application, he completed his doctoral thesis on the development of tool coatings at the Technical University Braunschweig in 2015. His main research interests are hard and wear resistant multifunctional coatings for industrial tools and components and their deposition by PVD and PECVD processes.

Gary Vergason
has been working in the PVD industry for over 38 years, from engineering and operations to executive management. His cathodic arc source designs, developed while he was employed by Multi-Arc (IonBond), are still used around the world today. Gary founded Vergason Technology, Inc. (VTI) in 1986 and under his leadership the company has become a leading international supplier of innovative rapid-cycle PVD coating equipment and toll coating services. Gary has served as an SVC instructor, a member of the Board of Directors, served as President from 2016 to 2018 and chaired its first Topical Conference in 2009. He holds several patents in the PVD field and continues to influence this industry.

Akhil Vohra
is a Product Manager at Angstrom Engineering Inc. in Kitchener, Ontario, Canada. He received his M.Sc. in Chemistry from Guru Nanak Dev University in India in 2008. Upon completion of his Master's degree, he joined Lyallpur Khalsa College as a lecturer of chemistry teaching advanced organic and inorganic chemistry to undergraduate students. In 2011, Akhil moved to Canada to pursue his Ph.D. in Chemistry at University of Windsor. Akhil's research work was in the field of materials and surface chemistry with special focus on Stretchable and Flexible Organic Electronics. After graduation in 2016, Akhil joined Angstrom Engineering Inc. as a Test and Process Specialist before moving onto his current position in 2018.

Anellia Wäckerlin
is the Deputy Head of R&D at Glas Trösch AG. She holds Ph.D. degree in Nanoscience from University of Basel, Switzerland and engages herself in research and development of high-precision vacuum deposited nano-coatings for the last 17 years. The developments are published in over 20 scientific papers, for which she holds 3 patents. She joined Glas Trösch in 2017 as a project manager, during 2023 was a team lead, and since 2024 manages multiple development activities for the coating factories of Glas Trösch Group. The scope covers development of coating technology and processes, product- and software development, transfer to production, as well as support during the whole product/process/deployment lifetime.

Tyler Wheeler
is the Product Management/Sales/Product Line Manager for Ecoclean Inc. in Southfield Michigan. After his completion of the Manufacturing Engineering Technologies program, Mr. Wheeler has contributed in many capacities during his 15 year tenure with Ecoclean, from Mechanical Engineering to Applications Manager and served on the Global Ecoclean Product Line Development Committee. Mr. Wheeler regularly presents to industry and association groups on new technologies and the evolution of equipment designs needed to meet current and future cleanliness requirements.