

TechCon 2027 Dallas

**Sheraton Dallas Hotel
Dallas, Texas, USA**

May 1, 2027 – May 6, 2027

Extended Call for Papers

**Featuring Select Keynote and Invited Speakers &
Preview of the 2027 In-Person Tutorial Program**

Technical Program: May 3 - May 6, 2027

- Technical Sessions
- Interactive Networking Forums
 - + Technology Forums
 - + Colloquiums

Education Program: May 1 - May 6, 2027

- Problem-Solving Tutorial Courses

- ◆ Advanced Multifunctional Coatings: Integrating Vacuum and Electrochemical Deposition for Sustainable Energy, Surface Protection, and Biomedical Innovations (Joint Session with The Electrochemical Society - ECS)
- ◆ 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
- ◆ 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
- ◆ Large Area Coatings
- ◆ Optical Coatings
- ◆ Organic and Perovskite Electronics
- ◆ Photonically-Induced Transformations of Thin Films and Surfaces
- ◆ Plasma Processing and Diagnostics
- ◆ Process Monitoring, Control, and Automation
- ◆ Protective, Tribological, and Decorative Coatings
- ◆ **Substrate Cleaning & Preparation NEW!**
- ◆ 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

BOARD OF DIRECTORS

PRESIDENT

Lee Howell
Kurt J. Lesker Company
leeh@lesker.com

PAST PRESIDENT

Liz Josephson
INTELLIVATION LLC
ljosephson@intellivation.com

VICE PRESIDENT

David Sanchez
Thin Film Science LLC
thinfilmscientist@gmail.com

TREASURER

Albert Miranda
LightPath Technologies
amiranda@lightpath.com

SECRETARY

Hana Baránková
Uppsala University, Sweden
hana.barankova@angstrom.uu.se

DIRECTOR

Ralf Bandorf
Fraunhofer IST
ralf.bandorf@ist.fraunhofer.de

DIRECTOR

Christopher Jannuzzi
The Electrochemical Society
chris.jannuzzi@electrochem.org

DIRECTOR

Ton Hurkmans
IHI Ionbond Group
ton.hurkmans@ionbond.com

DIRECTOR

Christopher Muratore
University of Dayton
cmuratore1@udayton.edu

DIRECTOR

Christos Pernagidis
Avaluxe International GmbH
cpernagidis@avaluxe.de

DIRECTOR

Kyle Schuberger
Gentex Corporation
kyle.schuberger@gentex.com

DIRECTOR

Sarah Williams
Advanced Energy Industries, Inc.
sarah.williams@aei.com

EXECUTIVE DIRECTOR

Frank Zimone
frank.zimone@svc.org

SVC ADMINISTRATIVE OFFICES

P.O. Box 10628
Albuquerque, NM 87184
Telephone 505.897.7743
Fax 866.577.2407
E-mail svcinfo@svc.org
Website www.svc.org

TechCon 2027 Dallas

Technical Program
May 3 – May 6
Education Program
May 1 – May 6
Technology Exhibit
May 4 – May 5

70th Annual SVC Technical Conference • May 1 – May 6, 2027

Sheraton Dallas Hotel, Dallas, Texas, USA

Technical Program May 3 – May 6

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 May 4th and May 5th

Education Program May 1 – May 6

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

Technology Exhibition May 4 – May 5

Over 100 exhibiting companies dedicated to vacuum coating technologies

Plus! Free Exhibition Admission, Exhibit Hall Presentations, and Social Networking Events



Thin Films, Coatings and Surface Engineering

The 2027 SVC TechCon in Dallas, Texas, USA focuses on the essential role that Thin Films, Coatings, and Surface Engineering play in the products and services that drive our daily lives. 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)
- ◆ 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
- ◆ 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
- ◆ High-Powered Impulse Magnetron Sputtering (HIPIMS)
- ◆ Large Area Advanced Packaging and Integrated Photonics
- ◆ Large Area Coatings
- ◆ Optical Coatings
- ◆ Organic and Perovskite Electronics
- ◆ Photonically-induced Transformations of Thin Films and Surfaces
- ◆ Plasma Processing and Diagnostics
- ◆ Process Monitoring, Control, and Automation
- ◆ Protective, Tribological and Decorative Coatings
- ◆ Quantum Computing
- ◆ Substrate Preparation & Cleaning **NEW!**
- ◆ 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 Sheraton Dallas Hotel venue is a brand new location for the SVC TechCon, offering both professional networking as well as recreational value in a relaxed atmosphere. See you in Dallas!

[CLICK HERE](#) to submit an abstract to TechCon 2027

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

At the time of this writing, the TechCon program planning calendar has progressed to the stage where “game plan” development has been completed, and the Program Leadership Team is changing gears towards implementation and execution. The “game plan” period relies on an in-depth analysis of the 2026 TechCon performance, reading the barometer of the economic climate ahead, merging strategic goals into tactical initiatives, and reviewing and implementing “best practices”.

The SVC is fortunate to be able to combine an understanding of the underlying drivers of “attendee value” with an operational model that allows for nimble execution and creative implementation of innovative program characteristics. For the 2027 program planning cycle, this has resulted in a number of refinements that promise a superior attendee experience in Dallas:

- One additional session topic to extend the range in expertise.
- Acknowledging the SVC’s 70th anniversary with a “Past-Presidents Perspectives” panel.
- A significant “review and refresh” of the all-volunteer Program Leadership Team to promote ownership and active participation.
- Enhancing the attendee experience of the TechCon’s renowned interactive networking program elements by:
 - ♦ planning for an unprecedented number of eight Colloquia to expand interactive in-session experiences.
 - ♦ repeating the expansion of the Technology Forum program by adding afternoon “Technology Forum Sunset” blocks to the traditional “Technology Forum Breakfast” (TFB) offerings that allow to host a wider range of topics that attendees can attend more effectively.
 - ♦ offering Exhibitor Innovation Showcase (EIS) speaking block options in 10 or 20-minute duration.

Furthermore, we understand that the TechCon experience of our diverse stakeholders extends well beyond the technical program and covers education and the exhibit. Consequently, the Program Leadership Team coordinates with the Education Program to ensure an optimal match between tutorial offerings and program topics. The program schedule promotes and minimally competes with attending the exhibit, and we continue the successful “Exhibitor Innovator Showcase” session as an opportunity for our valued exhibitors to pursue their commercial interests by highlighting the value and innovation of their products.

Much of the SVC’s program content deserves “memorialization”, and the SVC’s publication options cater to a wide range of stakeholder interests – from a time-efficient publications of presentation PowerPoint sets, submission of a manuscript to the proceedings, to a fully peer-reviewed option in a high-impact Elsevier journal, and this year we particularly promote submission of manuscripts (regardless of peer review) for a richer memorialization experience. Also, the SVC has developed guidelines for the use of Artificial Intelligence (AI) for content creation that respect both the efficiencies AI can offer for certain tasks while ensuring rigorous standards for attribution and ownership of innovative intellectual content.

In summary, while we live in a time of uncertainty and a cloudy outlook on the future for many professional societies and conferences, the SVC leaves no idea untested and no opportunity unevaluated to offer our stakeholders the best experience to further their professional and personal goals. I hope the review of the extraordinary technical contributions highlighted in this issue of the Bulletin – most of it sourced from community member contributions to a past TechCon – and the planning and preparation that the all-volunteer Program Leadership Team invests in the 2027 TechCon convinces you to join us in Dallas next May.

Please consider submitting an abstract to highlight your recent scientific achievements or product innovation, network with colleagues and peers during a Colloquium or Technology Forum get-together, further your technical expertise with a tutorial, or meet with exhibitors to help solve process or equipment challenges. Now is a perfect time for you to commit to attending the most impactful and influential conference in our industry.

I look forward to welcoming you to Dallas next May!

— Chris Stoessel, PhD
SVC Program Director



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 2027 Technical Program

WITHOUT PEER REVIEW

Submission Deadline:

September 10, 2027

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 10, 2027

Publication in a special edition of
Elsevier’s Surface and Coatings
Technology Journal
(ISSN: 0257-8972)

VIDEO PRESENTATIONS

Submission window open

April 15 - September 10, 2027

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 activities 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 Power-Point 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, 2026 (closed for 2027)



The SVC Foundation provides scholarships and/or stipends for travel expenses to attend the annual SVC technical conference. Scholarships are open

to well-qualified students planning to enter fields related to vacuum coatings as well as technicians already working in the field practicing the craft. The Society of Vacuum Coaters (SVC), the SVCF's founder, and ARC (formerly 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, 2026 (closed for 2027)

Industry Scholarship application deadline:
January 23, 2027

Student Travel Sponsorship application deadline: **October 4, 2026 (closed for 2027)**



Hybrid Plasma Deposition Methods for Protective Coating Growth

(Monday, May 3, 2027)

Andrey A. Voevodin

University of North Texas, Denton, TX

Physical Vapor Deposition (PVD) allows for arrangements for hybrid plasma deposition process with mixing plasma streams from various sources, such as magnetron sputtering, cathodic arc, pulsed laser ablation, ion beam, etc. Hybrid plasma deposition techniques facilitate a high degree of structural control, permitting growth of nanostructured materials, which are not possible to produce by other methods. Several examples of hybrid PVD methods are discussed for the growth of wear protective nanocomposite coatings. One was a hybrid of laser ablation and ion beam deposition, which was used for development $\text{Al}_2\text{O}_3/\text{MoS}_2$ nanocomposites. Another was a combination of laser ablation with magnetron sputtering, where highly energetic carbon plasma from laser ablation was intersected with a magnetron-generated plasma containing sputtered metal atoms. This hybrid process was used to prepare many nanostruc-

tured coatings, including WC/DLC, WC/DLC/ WS_2 , YSZ/Au, and YSZ/Au/ MoS_2 /DLC nano-composites for wear protection of engineering components. Several examples of hybrid PVD methods are reviewed for the growth of wear protective nanocomposite coatings. Examples of hybrids of magnetron sputtering, laser ablation, ion-beam, cathodic arc deposition techniques are discussed in production of "chameleon" and other adaptive wear resistant coatings.



Andrey Voevodin is a Professor of the Department of Materials Science and Engineering and Associate Dean of Research at the College of Engineering, University of North Texas. He holds Metallurgy Engineer and Materials Science PhD degrees. His research interests include tribology, surface engineering, plasma assisted deposition of thin films and coatings, electronic and high-temperature material processing, in-situ spectroscopic characterization methods, and additive manufacturing. Dr. Voevodin has authored over 300 technical publications, which have been cited over 20,000 times, including one book and ten book chapters, 16 patents and inventions. He is a Fellow-Mentor of the Society of Vacuum Coaters and Fellow of the American Vacuum Society.

The Enabling Power of Vacuum! From Global Coordination (IUVSTA) to Field-Deployable Quantum Innovations (NOAC)

(Monday, May 3, 2027)

Jay H. Hendricks

National Institute of Standards and Technology, Gaithersburg, MD

This keynote lecture explores how next-generation quantum and photonic vacuum standards are transforming measurement science from artifact-based standards to field-deployable sensors based on fundamental physics. Global coordination of vacuum standards and technology are core roles of IUVSTA, the International Union for Vacuum Science, Technique and Application. As President, a main priority for Dr. Hendricks is public outreach to highlight the impact of vacuum technology on everyday life. The NIST on a Chip Program (NOAC) and IUVSTA Divisions are making significant contributions to the development of faster, smaller, and more energy-efficient technologies, from computer chips to artificial intelligence systems, self-driving cars, energy-efficient systems, and let's not forget surface vacuum coatings, all major drivers for economic impact and growth for the future.

The redefinition of the International System of Units (SI) has opened up new avenues for realizing fundamental units, enabling the development of innovative measurement technologies that are quantum-based. The emergence of these quantum-based metrology systems has the potential to transform various fields, but also raises important questions about their miniaturization, deployment, and impact on the metrology ecosystem. This talk will explore the exciting possibilities and challenges arising from these advancements, with a focus on the role of metrology institutes in the new era of quantum-based measurement.

The technical core of the presentation will delve into recent breakthroughs in quantum-based vacuum measurement methods, including the Fixed Length Optical Cavity (FLOC) and the Cold Atom Vacuum Standard (CAVS) for vacuum metrology. These cutting-edge approaches leverage fundamental physics, quantum mechanics, and photonics to achieve high accuracy and precision. The use of photons for measurement readout enables the exploitation of the rapidly growing field of photonics, paving the way for the development of compact, field-deployable measurement systems.

The NIST on a Chip program (NOAC) will be highlighted as a key initiative driving the miniaturization of measurement technologies. By exploring the intersection of quantum-based metrology, photonics, and miniaturization, this talk aims to spark a discussion on the future of metrology and the role of metrology institutes in this new ecosystem where field-deployable systems are in use.



Dr. Jay H. Hendricks is a world-class expert in low-pressure and vacuum metrology serving as the Deputy Program Manager for the NIST on a Chip (NoAC) program at the National Institute of Standards and Technology (NIST). His pioneering work focuses on utilizing fundamental physics to develop quantum-based sensors and standards that shift calibration out of the national laboratory and onto the production line. Dr. Hendricks received his Ph.D. in Physical Chemistry from Johns Hopkins University and has authored over 115 publications on vacuum science, metrology, and technology. He is the President IUVSTA, fostering international standardizations that drive global vacuum-based industries.

Other awards and honors include: 6 US Patents in vacuum science and technology. Two US Department of Commerce Gold Medals, for an innovative quantum-based pressure standard and for the encasement of documents of historical significance, including the US Declaration of Independence and the US Bill of Rights.

Speakers for the 2027 TechCon

A Strategic Engine for Innovation: Unlocking the Power of University Partnerships

(Wednesday, May 5, 2027)

Dawn Mason

North Carolina State University, Raleigh, NC

Do you subscribe to the idea that innovation rarely occurs in isolation? Does your “wish list” include new ideas for coatings, process improvement or materials testing? Are you considering an external innovation strategy that includes university engagement to address that opportunity? If so, here is a chance to gain an academic and corporate perspective at the same time.

Strategic collaborations between industry and academia offer powerful opportunities to accelerate research, de-risk technology development, and strengthen long-term innovation ecosystems. Let's explore how organizations can leverage academic partnerships as a core component of their innovation strategy, highlighting the mutual value created when universities and companies work together to address challenges.

From the industry perspective, academic collaborations provide access to world-class research facilities, specialized expertise, and emerging technologies. Partnerships can also create pathways to public and consortium-based funding opportunities, support workforce development initiatives, and establish a robust recruitment pipeline for future employees. For universities, industry engagement helps ensure research remains relevant to pressing societal and market needs while creating opportunities for workforce development, technology commercialization, sponsored research funding, and entrepreneurial activity. There are established best practices which enable productive and sustainable

partnerships. Whether pursuing early-stage research, workforce development, or technology commercialization, participants will leave with insights for building productive university-industry partnerships that advance both organizational objectives and broader innovation goals.



As Assistant Vice Chancellor in the Office of Partnerships at NC State University, **Dawn Mason** leads the university's partnership engagement strategy, cultivating high-impact collaborations with more than 130 corporate, government, and nonprofit organizations. Many of these partners maintain a presence on campus, creating a vibrant ecosystem for innovation and engagement. She is also leading a university-wide initiative to strengthen, optimize, and expand NC State's partnership portfolio to accelerate impact across research, education, and economic development.

Prior to joining NC State, she served as Director of Innovation Excellence at Eastman Chemical Company, where she forged strategic connections between university researchers and business leaders to advance innovation and drive corporate growth. Her leadership responsibilities also included overseeing Library Information Services and directing the Centers of Excellence for Project Leadership and Innovation Process Management.

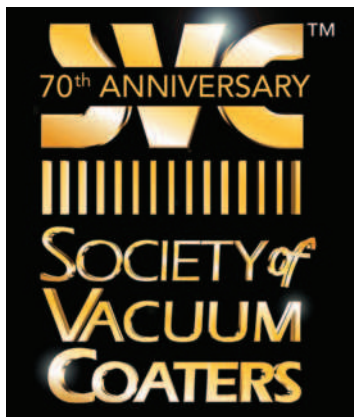
Over the course of her career with Eastman and DuPont, she held a variety of technical and leadership positions, guiding multidisciplinary R&D teams in catalysis, polymer modification, technical service, and process improvement. Her work has consistently focused on transforming scientific expertise into practical solutions, fostering collaboration, and delivering measurable results through innovation.

A Fellow of the American Chemical Society, she has advised numerous higher education institutions. She holds a B.S. in Chemistry from the University of Missouri-Columbia and a Ph.D. in Inorganic Chemistry from Texas A&M University.

2027 SVC 70th Retrospective

(Thursday, May 6, 2027)

The SVC is excited to be celebrating its 70th Anniversary in 2027. Founded in 1957 by a pioneering and forward-looking group of technologists and industrialists, the SVC has secured a vital place supporting the global thin film and surface engineering communities. We are delighted to announce that many former SVC Presidents have agreed to share their experience, vision, and thoughts for the future with the assembled stakeholders on Thursday, May 6, 2027. Stay tuned as the roster develops over the course of the build-up to the 2027 SVC TechCon.



The SVC welcomes contributions in the following areas. Each area is organized by a Technical Advisory Committee (TAC) or Session Organizing Committee.

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 the dynamic intersection between 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. 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 for a wide range of applications.

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,
- Novel vacuum deposition approaches to enhance stability in electrochemically active environments and extend the service life of components in aerospace, marine, and harsh environments, and
- Innovative analytical techniques that leverage electrochemical effects to investigate vacuum-deposited thin film structures.

INVITED SPEAKER:

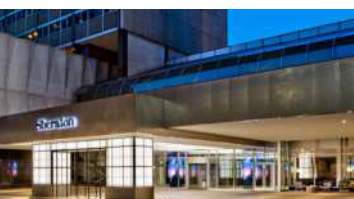
Challenges in Scale-up and Performance Optimization of Polymeric Electrochromic Cells



Marco Schott

Fraunhofer Institute for Silicate Research ISC, Würzburg, Germany

In the last decades, a wide range of electrochromic materials, in particular metal oxides, viologens, polymers, and metal coordination polymers, have been investigated and some of them have been successfully commercialized. Electrochromic materials reversibly change their color and transmittance in response to an electrical stimulus. The applications of electrochromic materials focuses on dynamic, low-power optical control, e.g., for smart windows, auto-dimming rear-view mirrors, sunroofs, and energy-efficient displays. While the properties and performance of novel electrochromic materials and small-scale devices are well developed, most research in this field does not address the scale-up and cell assembly important for the transfer into industrially relevant processes and applications. To commercialize (polymeric) electrochromic materials, they need to fulfill several requirements, such as excellent performance, cost-effective manufacturing, and long-term durability. Metal oxide and viologen based electrochromic systems have been available on the market for several years. However, the demand for alternative flexible electrochromic cells based on polymeric or hybrid materials is increasing. The main driving forces are the reduction of manufacturing costs, light weight, low power consumption, high color variety, and fast switching times. The challenges to be overcome for manufacturing an all-solid-state polymeric electrochromic cell for practical use are manifold, e.g., the assembly of the multi-layer electrochromic stack, device/system integration, and testing in



relevant environments. Remaining technological challenges and potential strategies for large-scale and high-throughput production of polymeric electrochromic cells will be presented with an outlook for future industrial applications.

Session Organizers:

ECS:

Luca Magagnin, *Politecnico Milano 1863*, luca.magagnin@polimi.it

Wei Tong, *Lawrence Berkeley National Laboratory*, weitong@lbl.gov

SVC:

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 addresses recent progress in thin film sensor technologies, with a focus on the relationship between functional materials, vacuum processing, design strategies, and application-specific performance requirements. As sensing demands expand across healthcare diagnostics, environmental monitoring, industrial automation, and wearable electronics, thin film sensors provide scalable solutions for achieving high sensitivity, selectivity, and integration in compact formats. Researchers and technologists from academia, industry, and government are encouraged to share innovations, challenges, and future directions.

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

- Advanced Sensing Materials: Novel nanostructured, hybrid, and 2D thin films,
- Deposition & Fabrication: Innovations in thin film growth (PVD, CVD, ALD) and micro/nano-processing,
- Sensor Design & 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.

INVITED SPEAKER:

Snowflake Patterns and Nano-/Micro-Prism Formation in Chemical-Bath-Deposited PbSe Thin Film Photoconductive Detector



Richard S. Kim, Seunghyun Lee

Laser Components Detector Group, Chandler, AZ
Chemically bath-deposited PbSe thin films are promising for low-cost, room-temperature infrared photodetectors, but their performance is strongly influenced by sensitization, doping,

microstructure, and defect states. In this work, we investigate the relationship between sensitization, iodine doping, and the distinctive snowflake-like morphology observed in PbSe photoconductive detectors. The snowflake patterns are associated with localized PbSe crystallization and the formation of nano- to micro-scale prism structures (or particles) within the PbSe matrix. Electrical measurements indicate that iodine doping and sensitization modify carrier transport by changing the concentration and distribution of electrically active defects. The observed conduction and photoconductive behavior are attributed to a combination of p-n junction like carrier separation, carrier transport through the PbSe network and trap-mediated conduction associated with grain boundaries and surface defects. These results help to establish a link between PbSe crystallization, snowflake/nano-prism formation, sensitization, iodine doping, and trap-controlled conduction, providing guidance for optimizing PbSe photoconductive detectors.

TAC Co-Chairs:

Jason Hrebik, *Kurt J. Lesker Company*, jasonh@lesker.com

Jacob Lee, *University of Oklahoma*, seunghyun.lee@uta.edu

Binbin Weng, *University of Oklahoma*, binbinweng@ou.edu

Veronika Červenková, *Polytechnique Montreal & Charles University*, veronika.cervenkova@matfyz.cuni.cz

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.

TAC Co-Chairs:

Sara Harris, *Forge Nano, Inc.*, sharris@forgenano.com

Matt Weimer, *Forge Nano, Inc.*, mweimer@forgenano.com

Sheng-Kuei Chiu, *National University of Tainan*, shengkuei@mail.nutn.edu.tw

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 nano-composites,
- 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:

Closing the Loop: In-Situ Process Control and Ex-Situ Characterization for Thin-Film Stress and Curvature



Heidi Olson

k-Space Associates, Inc., Dexter, MI

Thin-film stress and wafer curvature are principal determinants of yield attrition, delamination, and long-term reliability degradation across semiconductor, compound semiconductor, optical coating, and photovoltaic manufacturing. Ex post facto detection — at final test or following field deployment — imposes substantial cost and frequently precludes corrective intervention.



This presentation addresses in-situ metrology as the foundational architecture for closed-loop process control. Real-time multi-beam optical sensor (MOS) curvature measurement enables continuous feedback during molecular beam epitaxy, metal-organic chemical vapor deposition, physical vapor deposition, sputtering, and thermal processing, resolving stress via Stoney's equation concurrent with film growth. Integrated with non-contact band-edge pyrometry and reflection high-energy electron diffraction (RHEED), this architecture provides process engineers with a quantitative, real-time characterization of surface evolution rather than a retrospective account. Multi-parameter, integrated feedback is increasingly indispensable for high-mix production and emerging-materials development, where narrow process windows render post-hoc characterization insufficient.

The presentation will further examine the trajectory of the field: application of machine learning and artificial intelligence to real-time metrology data streams, encompassing automated defect classification and predictive process control capable of anticipating drift prior to excursion beyond specification. Ongoing collaborative development between k-Space and key equipment and materials partners illustrates the evolving definition of closed-loop control within production environments.

Given that in-situ instrumentation cannot be universally retrofitted, and independent verification of stress and curvature specifications remains essential, the presentation concludes with the complementary function of ex-situ characterization: high-resolution scanning systems that map curvature, bow, tilt, and stress at ambient or elevated temperature (to 1000°C), supporting incoming/outgoing wafer qualification, materials research, and failure analysis.

Attendees will acquire a practical framework for delineating the respective roles of in-situ control, ex-situ characterization, and AI-driven analytics within their own process and characterization workflows.

Multimodal Surface and Depth Analysis of Vacuum-Deposited Coatings



Josh Pinder

SPECS Group, Berlin, Germany

Modern coating and device technologies increasingly rely on complex multilayer structures and functional deposited materials, creating a growing need for reliable chemical characterization of surfaces and buried

interfaces. In semiconductor metrology and other advanced materials applications, information on elemental composition, chemical state, layer thickness, and depth distribution is essential for understanding and optimizing these structures.

The EnviroMETROS platform combines automated XPS and HAXPES with multiple X-ray excitation energies and parallel angle-resolved XPS (PARXPS), providing complementary information depths for non-destructive depth-dependent chemical

analysis. By combining variable photon energies with emission-angle-dependent measurements, chemical information can be obtained from the surface through deeper buried layers without relying exclusively on destructive ion sputtering. Additional techniques—including UPS/IPES/REELS, small-spot XPS, SEM/SAM, LEIS, Raman, and IRRAS—provide complementary information on electronic structure, morphology, surface composition, and chemical bonding.

A key feature is an integrated multi-anode, monochromated X-ray source incorporating up to four excitation energies within a single Rowland-circle-based housing. Individually optimized optics enable automated switching between excitation energies spanning the soft to hard X-ray regime.

This presentation will introduce the capabilities and measurement approaches of the EnviroMETROS platform, using examples of deposited materials and multilayer structures to demonstrate information obtained from complementary excitation energies, emission angles, and analytical techniques. Applications will include chemical characterization, depth-dependent analysis, and semiconductor metrology, including measurements on 300 mm wafers. The platform can also be configured for cleanroom operation with FOUPEFEM integration, supporting automated wafer handling for process-development and advanced metrology applications.

Understanding Failure of Thin Films Using Nanomechanical Techniques



Kevin M. Schmalbach, Benjamin Stadnick, Eric D. Hintsala

Bruker, Eden Prairie, MN

The mechanical reliability of thin films and coatings is a frequent concern in many industries which employ them for a variety of electronic, optical, chemical, or mechanical reasons. Due to the intrinsic length scales of the films, techniques need to be capable of measuring properties at the micro- and nanoscales. One such case is in the microelectronics industry, where routinely-produced small



scale structures are expected to undergo high thermal and mechanical stresses without failure. Nanoindentation and nanomechanical tests are uniquely able to precisely measure local mechanical properties of areas of interest down to the nanoscale. Failure of films and structures can be tested in a variety of modes including indentation (measuring hardness or fracture toughness), scratching (measuring film adhesion), and wear testing (measuring wear resistance). These can additionally be coupled with in situ imaging techniques (such as scanning electron microscopy) for a comprehensive understanding of film failure. The addition of in situ imaging is especially important for testing of controlled focused ion beam (FIB)-machined geometries such as micropillar splitting and notched cantilever testing for fracture toughness testing. An overview of the nanomechanical testing capabilities will be presented along with case studies involving particular use cases across a spectrum of deposited films.

**When the XPS Spectrum Doesn't Tell the Whole Story:
Four Strategies for Revealing Hidden Chemistry**



Jennifer E. Mann, Kateryna Artyushkova

Physical Electronics, Chanhassen, MN

X-ray photoelectron spectroscopy measures the signal that reaches the analyzer—but that signal does not always tell the whole story.

Averaging the signal over an area can conceal localized particles, defects, patterned regions,

and contamination; conventional information depth can leave buried chemistry inaccessible; a single average thickness measurement can oversimplify non-uniform film growth; and prolonged acquisition times can alter beam-sensitive materials before the measurement is complete. This presentation introduces four practical strategies available with the PHI Genesis platform for recognizing and overcoming

these limitations. First, scanning X-ray imaging, small-area XPS, and spectral mapping are used to locate features before analysis, which reduces misleading conclusions caused by area averaging. Second, analysis of the same location using photon energies that provide different information depths such as conventional Al $2p$ XPS and Cr $2p$ HAXPES provide complementary depth sensitivity, revealing subsurface information without first relying on sputtering that may modify interfaces or chemistry. Third, angle-dependent acquisition combined with modeling of the surface coverage using StrataPHI distinguishes continuous thin films from thicker islands with incomplete substrate coverage. Finally, automated positioning and spectral mosaic integration distribute X-ray dose across multiple locations to preserve representative chemistry while maintaining acquisition quality. Together, these approaches demonstrate how changing where, how deeply, and for how long we measure can transform an apparently complete spectrum into a more accurate understanding of the sample.

TAC Co-Chairs:

Matthew Linford, Brigham Young University, mrlinford@chem.byu.edu

Dehua Yang, Ebatco, dyang@ebatco.com

Oleg Zabeida, Polytechnique Montréal, oleg.zabeida@polymtl.ca

**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,
- Neurostimulation technologies,
- Cardiovascular device coatings and surface modifications,
- Bio-corrosion resistance,
- Biocompatible films for medical injection mold fabrication,
- Biocompatible films for high energy laser processing,
- Flexible electronics, biosensors, and biochips,
- Antimicrobial coatings and surface treatments/modifications,
- Novel surface modification techniques (e.g., laser processing),



- High-throughput approaches,
- High-throughput and advanced characterization techniques,
- Screening and testing techniques for biomedical surface characterization,
- Hard coatings for OR tools/devices,
- Novel processing approaches and deposition tools,
- 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:

Materials Science and Development of Transformational Multifunctional Films for Biomedical Devices and Prostheses to Improve Quality of Life



Orlando Auciello

Distinguished Research Scientist, Texas State University, Electronic Engineering, USA
Founder/CEO, Original Biomedical Implants (OBI-USA and OBI-México)

This talk will describe materials science and characterization of physical, chemical, me-

chanical, electronic, biocompatible properties of transformational multifunctional low-cost production oxides and Ultrananocrystalline Diamond (UNCDTM) films, enabling new generations of biomedical devices and prostheses to improve quality of life. The multifunctional films address critical materials and technological issues related to most topics of the 2027 SVC TechCon. Materials science and technologies to be discussed include:

1) Synthesis of biocompatible piezoelectric films (BiFeO_3) and transformational piezoelectric-, UNCD films Integration, enabling new generation MEMS biosensors and implantable energy generation devices; 2) Synthesis and characterization of new generation super high-k (~ 1100) dielectric films based on biocompatible $\text{TiOx}/\text{Al}_2\text{O}_3$ nanolaminates, enabling next generations CMOS and energy storage super-capacitors for biomedical devices; 3) Synthesis and characterization of UNCD films, with smallest (3-5 nm) grains, exhibiting unique mechanical, tribological, chemical, electrical, thermal, best biocompatible (because made of Carbon atoms-element of life) properties, for wide range of biotechnologies, namely: a) UNCD-coated metal pump seals and bearings with lowest friction, no wear and NO biofouling for mixing chemical for pharmaceutical drugs, b) UNCD-MEMS biosensors and energy generation biomedical devices, c) Electrically conductive Nitrogen doped N-UNCD-coated electrodes, enabling new generation Li-ion batteries with $> 10\times$ stable energy and safer than current LIBs, for new generation longer performance defibrillator/pacemakers. d) UNCD hermetic-biocompatible, eyes fluid corrosion resistant coating, encapsulating Si microchip implantable on eyes' retina, to restore partial vision to blind by gene-induced photoreceptors death (retinitis

pigmentosa), e) Corrosion resistant-biocompatible UNCD-coated Ti-alloy dental implants, eliminating failure of uncoated metal DIs (clinical trials on 51 patients, demonstrated UNCD-DI revolutionary technology), f) Electrically conductive N-UNCD-coated scaffolds, enabling superior stem cells growth-differentiation into human cells, to treat biological human conditions. The UNCD coating technology is marketed by three companies co-founded by Auciello and colleagues: Advanced Diamond Technologies; Original Biomedical Implants (OBI-USA and OBI-México).

TAC Co-Chairs:

Christopher Cook, Edmund Optics, ccook@edmundoptics.com

Jeff Hettinger, Rowan University, hettinger@rowan.edu

Natalie Page, Lila Sciences, npage@lila.ai

Gregory Taylor, Lawrence Livermore National Laboratory, taylor275@llnl.gov

Chinmay Trivedi, IHI Hauzer Techno Coating B.V., ctrivedi@hauzer.nl

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:**How Thin Films Can Contribute as Barrier Layers in Future Fusion Power Plants**

V. Weihnacht¹, A. Manhard², F. Kaulfuss¹, M. Zawischa¹

¹Fraunhofer Institute for Material and Beam Technology IWS, Dresden, Germany

²Max Planck Institute for Plasma Physics IPP, Garching, Germany

The realization of future fusion power plants places numerous demands on the materials used in breeding blanket systems. Among the key enabling technologies are protective PVD-based barrier coatings that serve a dual function: minimizing tritium permeation through structural materials to reduce fuel losses and radiological risks, while simultaneously providing protection against corrosion induced by aggressive breeder and coolant environments.

The operational conditions experienced by such coatings are exceptionally challenging. In service, barrier layers must withstand elevated temperatures, repeated thermal cycling, and mechanically induced stresses arising from thermal gradients and operational loads. In addition, intense neutron irradiation can

significantly affect microstructure evolution, defect formation, and long-term coating performance. Beyond these functional requirements, practical deployment in fusion reactors demands coating technologies that are scalable and capable of uniformly coating large and geometrically complex components.

This presentation will discuss the role of PVD coatings as multifunctional barrier systems for advanced breeding blanket concepts and highlight the major scientific and technological challenges associated with their development. Particular emphasis will be placed on current efforts to adapt and further develop established PVD coating technologies originally designed for high-performance automotive and mechanical engineering components. These mature industrial processes provide a promising foundation for the development of fusion-relevant coating systems with enhanced tritium permeation resistance, corrosion protection, and durability under coupled thermal, mechanical, and irradiation loading.

TAC Co-Chairs:

Volker Sittinger, Fraunhofer IST, volker.sittinger@ist.fraunhofer.de

Roel Bosch, IHI Hauzer Techno Coating B.V., RBosch@hauzer.nl

Ric Shimshock, MLD Technologies, LLC, ric.shimshock@ga.com

Stefan Saager, Fraunhofer FEP, stefan.saager@fep.fraunhofer.de

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 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:



Data-Driven Process Optimization Using Specialized Plasma Diagnostics Methods

Moritz Oberberg¹, Geoffrey Mellar¹, Thomas Schütte², Jan-Peter Urbach², Felix Asanger³, Holger Gerdes⁴, Ingmar Bialuch⁴

¹House of Plasma GmbH, Bochum, Germany

²PLASUS GmbH, Mering, Germany

³deeplify GmbH, Duesseldorf, Germany

⁴Fraunhofer IST, Braunschweig, Germany

Industrial plasma-assisted coating processes, such as physical and chemical vapor deposition, are widely used to tailor functional and protective thin-film properties, yet establishing a direct, quantitative link between the transient plasma state and the resulting coating quality remains a persistent challenge. Closing this gap requires diagnostic methods capable of resolving key plasma parameters in situ, together with data-processing strategies that can translate high-dimensional, multi-modal measurement streams into actionable process knowledge.

This contribution presents a technical framework for combining specialized plasma diagnostics, including Multipole Resonance Probes for electron density and Optical Emission Spectroscopy for species-resolved plasma chemistry, with data-driven and machine-learning-based analysis methods in a physical vapor deposition process. We discuss the synchronized acquisition of plasma-state and process-parameter data, approaches to data preprocessing and feature extraction under limited-data conditions, and strategies for correlating diagnostic signals with ex-situ film characterization results. Particular attention is given to inverse modeling approaches that infer plasma conditions from accessible process parameters, and to the design of modular data infrastructures capable of integrating heterogeneous sensor and control-system inputs in real time.

Building on this foundation, we outline pathways toward predictive and, ultimately, closed-loop process control, in which machine-learning models derived from correlated diagnostic and process data inform adaptive adjustments during operation. Results illustrating the applicability of this approach to an industrial-scale coating process are presented, alongside a discussion of the methodological challenges involved, and their implications for the broader goal of intelligent, self-optimizing plasma processing.

TAC Co-Chairs:

Holger Gerdes, Fraunhofer IST, holger.gerdes@ist.fraunhofer.de

Paul Nizenkov, boltzplatz - numerical plasma dynamics GmbH, nizenkov@boltzplatz.eu

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:

Ray-Tracing and Molecular Dynamics Tool for Predicting the Coating Thickness, Quality, and Micro-Structure for Electron Beam Physical Vapor Deposition Processes**Tamer M. Wasfy**

Advanced Science and Automation Corp.,
Indianapolis, IN

The Electron Beam Physical Vapor Deposition (EBPVD) coating process is mainly used to apply ceramic and metallic thin films to critical components which require precise control over the coating thickness and physical properties. The process is primarily used in jet and gas power turbines to coat blades, vanes, and other components that are subjected to high temperature and wear. It is also used in other industries such as electronics, photonics, and medical industries, to provide coatings with specific electric conductance, optical properties, and biocompatibility properties, respectively. EBPVD is performed in a vacuum chamber with the parts moving (rotating and translating) with one or more electron-beam-melted sources emitting the coating molecules. In this talk, I will present a software tool that is used to predict the main coating attributes, namely thickness, quality, and microstructure, over parts of complex geometry. The tool includes two main modules: (1) A ray-tracing module which calculates the coating thickness over the parts by integrating the coating intensity on a part's surface over the exposure to the source rays by taking into account the part geometry, shadowing

from parts and/or masks, source angular intensity distribution, and the part motion relative to the source. This module also calculates the coating quality based on degree to which the coating is deposited by rays normal to the surface. (2) A molecular dynamics module emits millions of molecules from the sources to predict the coating microstructure including column angle, intercolumnar porosity, and feathering. A graphical-post processor allows viewing animations of colored surfaces, colored particles, and cross-section graphs of the coating attributes. The tool also includes a design-of-experiments (DOE) capability which allows performing many simulations with various motion programs and masking fixture designs to optimize the coating attributes. A user-friendly spreadsheet-based preprocessor allows setting up the simulations and the DOE.

TAC Chair:

Stefan Saager, *Fraunhofer FEP*, Stefan.Saager@fep.fraunhofer.de

Assistant TAC Chairs:

Luis Isern Arrom, *Cranfield University*, l.iser narrom@cranfield.ac.uk

Koldo Almandoz Forcen, *Cranfield University*, k.almandoz@cranfield.ac.uk

Kevin Meisner, *Honeywell*, kevin.meisner@honeywell.com

Jack Mershon, *PGT*, jack.mershon@linde.com

Asim Mirza, *boltzplatz-numerical plasma dynamics GmbH*, mirza@boltzplatz.eu

Matthias Neumann, *VON ARDENNE GmbH*, neumann.matthias@vonardenne.com

Sergio Pace, *CRM Group*, sergio.pace@crmgroup.be

Chris Punshon, *Cambridge Vacuum Engineering*, cpunshon@camvaceng.com

Jason Van Sluytman, *Honeywell*, Jason.VanSluytman@honeywell.com

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 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 & 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.



INVITED SPEAKER:

**From Laser Pulses to Process Control:
Thermoreflectance Metrology for Thin Films and Coatings**



John Gaskins

Laser Thermal, Charlottesville, VA

Thermal conductivity is among the most process-sensitive properties of a thin film or coating, and among the least often measured. The same composition deposited by sputtering, evaporation, ALD, or plasma-enhanced

CVD can differ substantially in thermal conductivity depending on density, porosity, grain structure, stoichiometry, and interface quality. In optical coatings, that property influences laser damage resistance and thermal lensing. In hard, protective, and barrier coatings, it governs how heat moves through a part in service. Handbook values rarely describe a film as deposited, and most conventional thermal techniques were built for bulk samples.

This talk traces how laser-based thermometry grew from a specialized laboratory method into a practical tool for film and coating characterization. I will start with the principles of thermoreflectance and with time-domain thermoreflectance (TDTR), the ultrafast pump-probe technique that opened up nanoscale thermal measurement but relies on complex optics and on knowing a film's heat capacity. Frequency-domain thermoreflectance (FDTR) replaces the ultrafast laser with a modulated continuous-wave source, and sweeping the modulation frequency tunes how deeply heat penetrates, separating near-surface films, buried layers, and interfaces. Steady-state thermoreflectance (SSTR), developed at the University of Virginia, takes the low-frequency limit and extracts thermal conductivity directly from Fourier's law, independent of heat capacity. Comparing these approaches, I will cover what each resolves, where measurement uncertainty originates, and why pairing FDTR and SSTR on the same sample gives a more complete and better constrained picture of a coating than either alone.

Examples will include oxide optical films, nitride and metal layers, barrier coating materials, and semiconductor film stacks, with emphasis on connecting deposition conditions to thermal performance. The broader aim is to show how thermal conductivity can become a routine process diagnostic for the vacuum coating community rather than a one-time specialty measurement.

TAC Chair:

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

Assistant TAC Chairs:

Ladislav Bardos, *Uppsala University*, ladislav.bardos@angstrom.uu.se

Clark Bright, *Bright Thin Film Solutions (3M retired)*, brightcrewllc@gmail.com

Jörg Neidhardt, *Fraunhofer FEP*, joerg.neidhardt@fep.fraunhofer.de

Frank Papa, *GP Plasma*, frank@gpplasma.com

High Power Impulse Magnetron Sputtering – HIPIMS

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

TAC Co-Chairs:

Ralf Bandorf, *Fraunhofer IST*, ralf.bandorf@ist.fraunhofer.de

Arutun P. Ehasarian, *Sheffield Hallam University*, a.ehasarian@shu.ac.uk

Frank Papa, *GP Plasma*, frank@gpplasma.com

Assistant TAC Chairs:

Ju-Liang He, *Feng Chia University*, jlhe@fcu.edu.tw

Ivan Shchelkanov, *Starfire Industries*, ishchelkanov@starfireindustries.com

Brian Jurczyk, *Starfire Industries*, bjurczyk@starfireindustries.com

Ivan Fernandez, *Nano4Energy*, ivan.fernandez@nano4energy.eu



Large Area Advanced Packaging and Integrated Photonics

The transition from 300 mm wafers to large-format panel packaging and Glass Core Substrates is critical to meeting the density, bandwidth, and scaling demands of next-generation AI accelerators and Co-Packaged Optics (CPO). However, vacuum equipment engineers face a fundamental architecture dilemma: legacy semiconductor-style cluster systems maintain exceptionally low defect rates by keeping substrates stationary, but they struggle to scale strict film uniformity across massive rectangular formats. Conversely, adapting traditional Flat Panel Display (FPD) or inline configurations provides superior large-area process uniformity via substrate motion or scanning, but inherently introduces higher defect and particle rates due to substrate transport mechanisms.

This session focuses exclusively on the in-vacuum engineering, hardware, and materials science solutions required to bridge this gap. We invite papers addressing the challenges of processing large-format substrates (e.g., 515 mm × 510 mm, 600 mm × 600 mm, or larger) entirely within the vacuum chamber, specifically focusing on the engineering compromises and hybrid approaches that combine the ultra-low defect rates of stationary processing with the superior uniformity of dynamic inline systems for both electrical interconnects and optical communication pathways.



Topics of interest include, but are not limited to:

- **Defect Mitigation vs. Process Uniformity:** Vacuum hardware and process innovations that bridge the gap between ultra-clean stationary architectures and moving/scanning inline configurations for large-area scaling.
- **Deposition of Photonic Communication Materials:** In-vacuum deposition (PECVD, ALD, Sputtering) of low-loss optical thin films (e.g., SiN, SiO₂, SiON, LiNbO₃) for integrated waveguides, optical interposers, and Co-Packaged Optics (CPO).
- **Refractive Index & Optical Uniformity Control:** Vacuum process engineering to achieve wafer-level precision in film thickness, stoichiometry, and refractive index across large-area, panel-sized footprints.
- **Conformal Deposition in Vias:** Vacuum metallization step-coverage challenges, focusing on highly conformal adhesion, barrier, and seed layer deposition (e.g., Ti/Cu, Ta/Cu) in high-aspect-ratio Through-Glass Vias (TGVs) for 2.5D/3D integration.
- **Thermal Management & Outgassing Mitigation:** In-situ vacuum degas strategies, low-temperature plasma deposition, and etch processes tailored for highly outgassing organic laminates and hybrid glass-polymer build-up stacks (operating <120°C).
- **Advanced Substrate Handling & Vacuum Etching:** Large-area Electrostatic Chucking (ESC) for dielectric glass panels, CTE mismatch warpage mitigation, and uniform plasma etching/ashing for fine-pitch RDL and TGV profiles.

TAC Chair:

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

TAC Co-Chair:

Manuela Junghänel, Fraunhofer Institute for Reliability and Microintegration IZM, manuela.junghaehnel@assid.izm.fraunhofer.de

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. 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,
- Process data analytics and predictive methods: multi-physics

simulations, digital twins, closed-loop process control, machine learning, and artificial intelligence (AI) applied to high volume manufacturing of coatings,

- 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:

Closed-Loop Manufacturing: Improving Quality and Efficiency through Data-Driven Production



Lukas Epprecht

Helbling Technik AG, Zurich, Switzerland

Increasing product and process complexity is creating growing challenges for demanding industries such as semiconductors, coating, medtech and pharma: quality, stability, efficiency and regulatory requirements must

increasingly be mastered together. At the same time, consistent digitalization, new methods of quality measurement, advanced automation and ML/AI-based analytics are opening up new ways of dealing with this complexity.

Closed-loop manufacturing connects requirements, development results as well as process and quality data from ongoing production within a continuous digital framework. The captured data is systematically analyzed and fed back through closed feedback loops into further development and production optimization. The talk shows what is already technically possible today and makes it tangible through concrete real-world examples – from data acquisition at the equipment and inline quality measurement through to automated process control. The focus is on the practical path to implementation and the measurable benefits: faster industrialization, more stable processes and greater transparency across the entire lifecycle.

TAC Chair:

Aneliia Wäckerlin, Glas Trösch AG, a.waeckerlin@glastroesch.ch

Assistant TAC Chairs:

Brent Boyce, Guardian Industries Corp., bboyce@guardian.com

Marcus Frank, Bühler Group, marcus.frank@buhlergroup.com

Brian Holsclaw, Corning Inc., holsclawb@corning.com

Ken Nauman, SCI/Bühler, knauman@sputteringcomponents.com

Kyle Schuberger, Gentex, kyle.schuberger@gentex.com

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

INVITED SPEAKERS:

Applications of Low-Angle-Shift and Angle-Engineered Interference Filters in the Visible to Near-Infrared Range



Georg Ockenfuss

VIAVI Solutions, Santa Rosa, CA

Optical interference filters exhibit an inherent blue-shift in center wavelength as the angle of incidence increases, driven by the design's effective refractive index (n_{eff}). This angle-shift broadens the required filter bandwidth,

degrades signal-to-noise performance, and constrains use in wide field-of-view or low-f/# optical systems. We present several complementary filter technologies that address this angle dependence together with application examples spanning consumer electronics, automotive, and biomedical sensing.

First, Low-Angle-Shift (LAS) and Hyper-LAS technologies raise n_{eff} by replacing conventional high-index materials (Nb_2O_5 , TiO_2 ;

$n \sim 2.3\text{--}2.4$) with hydrogenated amorphous silicon (a-Si:H, $n \sim 3.8$), reducing measured $0^\circ\text{--}30^\circ$ AOI shifts from a typical 30–34 nm to as little as 6–13 nm, while also enabling thinner coatings. A patent-pending angle-selective filter architecture instead exploits the same angle-dependent optical path length deliberately, engineering a controlled angular transmission profile rather than minimizing it, of interest for angular gating and stray-light rejection.

Silver-based (metal-dielectric) filters achieve near angle-independent performance over very large fields of view ($0^\circ\text{--}85^\circ+$), suitable for RGB-IR sensor arrays and continuous glucose monitoring. We present solutions on how environmental durability issues can be overcome. Absorption-based designs, combining absorbing glass or a-Si coatings with dielectric stacks, offer a further route to angle-insensitive blocking for fluorescence-based sensing such as low-cost DNA sequencing.

We compare measured filter data across these approaches and discuss their trade-offs and suitability for consumer electronics (gesture and face recognition), automotive LIDAR, and biomedical applications including continuous glucose monitoring and PCR.

High-Performance Optical Coatings for Industrial Applications: Developments and Current Challenges in Magnetron Sputtering



Michael Vergöhl, Stefan Bruns, Thomas Melzig, Philipp Farr

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

The development of optical coating technologies has been driven by increasingly stringent requirements on spectral performance, thickness accuracy and uniformity across application-specific substrate geometries. While thermal and electron-beam evaporation dominated optical coating production during much of the twentieth century, plasma-assisted deposition and sputtering technologies gained importance with increasing demands on layer density, process stability and reproducibility. Advances in pulsed sputtering further extended the accessible parameter range for reactive magnetron sputtering.

Since 2010, we have developed the EOSS® (enhanced optical sputtering system) precision optical coating platform based on cylindrical rotatable magnetrons. Initially implemented by companies in Germany, it subsequently advanced towards the second-generation OPTA X system by Von Ardenne with the simultaneous double-sided coating capability. This contribution discusses the technological evolution of this platform with emphasis on current challenges in precision optical coating manufacture.

A central challenge is the deposition of coatings with tailored lateral properties. The RAINBOW gradient filter provides a demanding example, combining multiple structured linear variable bandpass filters on a single substrate. Its manufacture requires precise control of local gradient shape and transition positions, together with spatially resolved optical characterization. Micro-



structured narrow-band filters for camera-based detection of vegetation fluorescence illustrate a second approach towards spatially functional coatings.

Mechanical properties impose additional constraints. Coating-induced stress can alter substrate curvature and degrade the wave-front performance of precision optics. We therefore consider double-sided coating for stress compensation and in-situ curvature measurements to assess stress evolution during deposition. Finally, model-based optical monitoring is discussed as an approach for controlling simultaneous double-sided deposition. Together, these examples illustrate how spatial control, process monitoring and mechanical effects increasingly need to be considered jointly in advanced magnetron-sputtered optical coatings.

TAC Chair:

Jay Anzellotti, *IDEX Health & Science*, janzellotti@idexcorp.com

Assistant TAC Chairs:

Astrid Bingel, *Fraunhofer IOF*, astrid.bingel@iof.fraunhofer.de

Vivek Gupta, *Meta/Facebook*, guptavivek23@meta.com

Rajiv Pethe, *Retired, (Vital Chemicals USA)*, rajiv.pethe@gmail.com

Binyamin Rubin, *Veeco*, brubin@veeco.com

David Sanchez, *thinfilmscientist@gmail.com*

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.

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).

INVITED SPEAKERS:

Lessons Learned from Vacuum Thermal Evaporation in Perovskite-Silicon Tandem Solar Cells



Zhaoning Song

The University of Toledo, Toledo, OH

Perovskite-on-silicon tandem solar cells have rapidly exceeded the efficiency ceiling of single-junction silicon photovoltaics, with power conversion efficiencies exceeding 35%.

As commercialization advances, the need for scalable, manufacturing-compatible deposition methods is growing. Vacuum thermal evaporation (VTE) and related vapor-phase techniques are particularly promising because they provide precise thickness control, solvent-free processing, compatibility with industrial production, and uniform coating of textured silicon surfaces. This presentation reviews recent advances in vapor-deposited perovskite-silicon tandem solar cells, with emphasis on vacuum processing, interface engineering, crystal growth control, and scalable manufacturing. Collectively, these studies clarify the roles of vapor transport, adsorption kinetics, nucleation, crystallization pathways, and interface formation in determining film quality. The talk will also summarize our efforts to develop vacuum-deposited perovskite absorbers and tandem device architectures, including key lessons from VTE experiments. It will conclude by examining the remaining challenges and opportunities for integrating VTE into high-throughput photovoltaic manufactur-

ing, offering a practical perspective on how vacuum processing can accelerate the commercialization of next-generation tandem solar technologies.

Evaluating Radiation Tolerances in Solar Cells Using Dynamic Space Environment Simulated with Multiple Stressors



Bibhudutta Rout¹, Mohin Sharma¹, Charles T. Bowen¹, Tingting Zhu², Haoran Chen², Mritunjaya Parashar¹, Darshpreet Kaur Saini¹, Todd A. Byers¹, Vincent R. Whiteside³, Ian R. Sellers³, Zhaoning Song²

¹University of North Texas, Denton, TX

²University of Toledo, Toledo, OH

³University at Buffalo, Buffalo, NY

Space photovoltaic (PV) systems play a crucial role in sustaining spacecraft, satellites, and emerging space infrastructure. However, their long-term reliability is challenged by the simultaneous effects of energetic particle radiation, high vacuum, illumination, and extreme temperature variations. These combined stressors can lead to defect generation, interface degradation, and ion migration within the solar cells. Typically, these PV devices are evaluated against individual stressors in independent laboratories, usually after particle irradiation. When the devices are exposed to radiation, the incident energy is transferred to the target atoms through non-ionizing energy loss (NIEL) via elastic collisions with the nuclei of atoms and through ionizing energy loss (IEL) due to collisions with surrounding electrons. The ratio between NIEL and IEL varies depending on the energy range of the particle radiation, and some of the damage may recover over time. However, this recovery process can be quite dynamic. This recovery is particularly important for emerging metal-halide perovskite solar cells (PSCs), as their metastable defects, ion migration, and self-healing behavior can evolve rapidly after irradiation. At the University of

North Texas Ion Beam Laboratory, we have established an in-situ measurement facility, which allows us to monitor the PV characteristics of the devices during irradiation and afterward, without removing them from the vacuum chamber.[1] We will present the results of our studies on various solar cells and highlight their recovery dynamics as well as performances under various levels of vacuum.

[1] M. Sharma et al., "Flux-dependent proton irradiation effects in metal halide perovskite solar cells: decoupling the distinct effects of thermal-, photo-, and radiation-induced degradation," *ACS Energy Lett.*, 2026, doi: 10.1021/acsenergylett.6c00926.

TAC Co-Chairs:

Mike Miller, Angstrom Engineering, mmiller@angstromengineering.com

John Naylor, Kurt J. Lesker Company, johnn@lesker.com

Paul Sullivan, Kurt J. Lesker Company, paulsu@lesker.com

Akhil Vohra, Angstrom Engineering, avohra@angstromengineering.com

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, multi-functional '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.

TAC Chair:

Christopher Muratore, University of Dayton, cmuratore1@udayton.edu



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.

INVITED SPEAKER:

Relating Plasma Potential and Bias to the Microstructure of Coatings



André Anders

Plasma Engineering LLC, El Cerrito, CA

It is widely known that substrate temperature and ion bombardment are the key parameters in tuning the microstructure of coatings, and microstructure affects the performance of a coating in its application. While substrate

heating is critically important, there are limits to temperature, which makes plasma effects so relevant. In this presentation, I will dwell deeper into plasma effects using a holistic approach that not only includes substrate heating and bias but pays attention to the role of the local and dynamic plasma potential, the reference for the sheath voltage. The sheath is the plasma boundary where space charge is linked to an electric field which governs fluxes of charged particles (ions, electrons) and energy delivered to the surface of the growing coating. Numerous effects can be associated with sheath formation, primarily the tuning of a coating's microstructure, but also unwanted arcing, hollow cathode effects, "fireballs" at anodes, changes of discharge modes, and plasma guiding in filters. Knowing and controlling the dynamic plasma potential and sheath voltage is therefore important to plasma-based deposition processes. This holistic approach will be illustrated with examples from cathodic arc deposition and HiPIMS, including bipolar HiPIMS.

TAC Co-Chairs:

Hana Baránková, Uppsala University, hana.barankova@angstrom.uu.se

Oleg Zabeida, Polytechnique Montréal, oleg.zabeida@polymtl.ca

Assistant TAC Chairs:

Lenka Zajíčková, Central European Institute of Technology & Masaryk University, lenkaz@physics.muni.cz

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 levels of repeatability, reproducibility, and yield 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. Key challenges include sensor and actuator integration in harsh environments, data fusion across heterogeneous systems, development of adaptive and autonomous control algorithms for closed loop and self-optimizing processes, and cybersecurity in connected manufacturing environments.

This session emphasizes practical, deployable solutions while highlighting recent advances in:

- Embedded real-time sensors and actuators,
- Cyber-physical systems and digital twins for monitoring and control,
- Advanced data integration and edge analytics,
- Automation and digitalization strategies,
- AI and machine learning for predictive and adaptive control,
- Robotic systems for material handling and process execution, and
- Autonomous materials discovery and optimization platforms.

We invite contributions from researchers, engineers, and solution providers that address these challenges through innovative technologies, case studies, or system-level implementations. We particularly encourage presentations demonstrating measurable impact, integration strategies, and lessons learned from industrial deployment.

Join us to explore how automation and digitalization are driving the transition from monitored processes to truly autonomous vacuum manufacturing systems.

INVITED SPEAKER:

Modular Autonomous Experimentation: From Thin Films to Bulk Materials



Taro Hitosugi

The University of Tokyo, Tokyo, Japan

Autonomous experimentation, the closed-loop integration of robotics and machine learning, is transforming how materials are discovered. By executing experimental workflows without human intervention and

searching high-dimensional parameter spaces far more efficiently than manual design, such systems compress discovery and process-optimization campaigns from months to days.

Here, we present a modular autonomous experimental system for solid materials and thin films. The platform closes the full experimental cycle, sample transfer, synthesis, characterization, and iterative optimization. Under a single control layer, a standardized data format links interchangeable modules. The samples are characterized using X-ray diffraction, scanning electron microscopy, Raman spectroscopy, and optical transmittance measurements. Bayesian optimization drives the search by selecting each successive condition from the accumulated results.

We demonstrate the system on the autonomous synthesis of TiO_2 and LiCoO_2 thin films, and show that the same workflow, without redesign, uncovers new ionic conductors. Together, these cases indicate that autonomous experimentation generalizes across material classes rather than being tuned to a single target. The current work extends the system to bulk-material synthesis, with the goal of unifying thin-film and bulk exploration in one autonomous framework.

TAC Chair:

Martynas Audronis, Nova Fabrica Ltd., martynas@novafabrica.biz

TAC Co-Chairs:

Gun-Hwan Lee, Korea Institute of Materials Science, ghlee@kims.re.kr

Edmund Schuengel, VAT Vakuumventile AG, E.Schuengel@vat.ch

Brad Tinkham, BTM Engineering LLC, btinkham@btm-eng.com

Protective, Tribological, and Decorative Coatings

The Protective, Tribological and Decorative Coatings Technical Advisory Committee (TAC) encourages speakers to submit abstracts to highlight their work about coatings used to enhance wear resistance or modify friction characteristics in tribological components,

such as those in machining and forming processes or in automotive and aeronautical applications.

The second topic covered in this session is corrosion resistance. We welcome contributions highlighting the developments in this field that play an important role in enhancing lifetime of metallic components. Examples are fuel cells where the performance and lifetime are enhanced by reducing corrosion rate.

The third topic is coatings used in decorative sector, where mostly PVD coatings are used for enhanced surface finish. These PVD coatings enhance aesthetics appeal along with wear and corrosion resistance.

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 new emerging technologies. Developing and scaling up from laboratory to high volume production at high production yields is also of high interest to the participants in this session.

Today's global landscape is changing rapidly and will drive many new application developments that will include new coatings for new applications. Environmental considerations for reducing CO2 emissions in electroplating and fast-moving communication technologies are well-known examples of such changes. Electrification of transportation and diversifying beyond the internal combustion engine are regular developments

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
- 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
- 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
- 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
- Integration of Industry 4.0 in vacuum coating plants

INVITED SPEAKERS:

Surface Engineering by Plasma Treatments and PVD Coatings: From Surface Modification to Protection Performance



Jones Alami

Mohammed VI Polytechnic University, Benguerir, Morocco

Corrosion, wear, and friction are among the main challenges limiting the durability of metallic materials in demanding industrial environments. Advanced surface engineering

offers effective strategies to address these challenges by tailoring the composition, structure, and properties of the surface to meet specific performance requirements. Among the most promising technologies, plasma-assisted treatments and physical vapor deposition (PVD) coatings show considerable potential for the development of high-performance protective surfaces.

This presentation will address recent advances in plasma surface treatments, including plasma nitriding, PVD-deposited thin films, and their combination as duplex surface engineering strategies. Plasma nitriding enables controlled modification and hardening of the near-surface area, while PVD coatings based on nitrides, carbides, and multilayer architectures offer increased hardness, improved wear resistance, corrosion protection, and reduced friction. The focus will be on the strategic integration of plasma treatments and PVD coatings to meet the complex and sometimes conflicting requirements of corrosion protection and tribology. The presentation will explore how surface modification, coating architecture, and interface engineering can be combined to enhance durability and resistance to wear, corrosion, and tribocorrosion under severe service conditions. The discussion will also focus on future research directions and the potential for translating these surface engineering approaches into solutions for a wide range of applications, including automotive and industrial manufacturing sectors.

Coating Solutions for the Electric Drive Train - a New World or Yesterday's News?



Nazlim Bagcivan

Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

The electrification of powertrains is the major transformative force shaping all developments in powertrain technology. As a result of this transformation, established technical

solutions are disappearing, while new solutions and products are becoming necessary. In powertrains with purely internal combustion engines, mechanical components, their movements, and the associated load spectra determined the required solutions. In hybrid-electric powertrains, these components play a subordinate role, while in fully electric powertrains they are no longer relevant. These changes present major challenges and opportunities at the same time.

The electrification of powertrains is often associated with the electrification of powertrains in the mobility sector, particularly in passenger cars and trucks. However, electric powertrains have been established for decades in both mobile and stationary applications. In these areas, robust and extensively proven technical solutions are already available.

Coatings in powertrains with purely internal combustion engines have been established over many years and play a decisive role in their success in many respects, for example, by increasing efficiency and extending service life.

What role do coatings play in hybrid-electric and fully electric powertrains? Are the challenges in passenger cars and trucks really new, or are the solutions required essentially just yesterday's news?

This presentation compares coatings in hybrid-electric and fully electric powertrains with those used in powertrains with purely internal combustion engines. It also compares the steps required for successful development for series production applications.

TAC Co-Chairs:

Martin Engels, *Ionbond*, martin.engels@ionbond.com

Anas Ghailane, *Avaluxe Coating Technologies*, AGhailane@avaluxe-technologies.de

Juan Manuel Gonzalez Carmona, *Centro de Ingenieria y Desarrollo Industrial CIDESI*, juan.gonzalez@cidesi.edu.mx

Jolanta Klemberg-Sapieha, *Polytechnique Montreal*, jsapieha@polymtl.ca

Sankalp Kota, *The Timken Company*, sankalp.kota@timken.com

Christoph Schiffrers, *CemeCon*, christoph.schiffrers@cemecon.de

Christian Stein, *Fraunhofer Institute for Surface Engineering and Thin Films IST*, christian.stein@ist.fraunhofer.de



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.

TAC Co-Chairs:

Mike Miller, Angstrom Engineering, mmiller@angstromengineering.com

John Naylor, Kurt J. Lesker Company, johnn@lesker.com

Akhil Vohra, Angstrom Engineering, avohra@angstromengineering.com

Substrate Preparation & Cleaning

Effective substrate preparation and cleaning are critical enabling steps in vacuum coating applications directly impacting adhesion, performance, and reliability. As coating technologies advance, increasingly stringent cleanliness requirements demand controlled, repeatable cleaning processes to ensure consistent production quality.

In vacuum coating processes such as PVD, even small amounts of filmic or particulate contamination can prevent proper adhesion and lead to coating defects or failure. Cleaning must therefore be treated as a high-value production step, connected to the whole process chain, that prepares the surface for coating while minimizing the risk of recontamination prior to the coating process.

This session focuses on the concepts and practical implementation of cleaning concepts and processes across a range of substrates, geometries, and applications. Emphasis will be placed on process design using the interaction of chemistry, mechanics, temperature, and time, along with selecting appropriate cleaning methods based on contamination type. In many applications, optimal results are achieved through combinations of various cleaning processes.

Practical approaches will also be addressed, focusing on how combining different processes can improve cleaning performance, consistency, and coating results in production environments. In addition, this session will highlight the growing importance of process validation and monitoring to ensure a stable and reliable process. The session will also explore how cleanliness requirements are defined and verified for coating applications, emphasizing analytical methods, and application-specific standards. Special attention will be given to balancing cleaning effectiveness with potential risks such as surface damage, corrosion, or material degradation, particularly for sensitive or high-value components.

The Substrate Preparation & Cleaning session aims to bring together coaters, equipment manufacturers, cleanliness analysis providers, and researchers to share best practices, emerging technologies, and real-world case studies demonstrating how effective cleaning strategies enable high-performance coating solutions.

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



- Impact of surface cleanliness on coating adhesion, performance of functional layer systems, yield, and reliability in vacuum coating processes,
- Removal of contamination affecting PVD, CVD, and ALD coating (oils, particles, oxides, residues, outgassing sources),
- Cleaning and pretreatment strategies for high-performance and high-stress coatings (e.g., DLC, optical, functional coatings),
- Selection of cleaning technologies based on coating application requirements,
- Aqueous, solvent, and hybrid cleaning approaches for vacuum coating preparation,
- Integration of cleaning processes into vacuum coating production lines,
- Advanced cleaning technologies supporting vacuum coating (e.g. ultrasonic, plasma, CO₂, laser cleaning),
- Cleaning challenges for complex geometries, precision components, and high-purity applications,
- Cleaning requirements for critical industries (optics, semiconductors, aerospace, automotive coatings),
- Cleanliness specifications and validation methods for coating-ready surfaces,
- Drying, handling, and storage strategies to maintain coating-ready surfaces,
- Process optimization for coating yield, defect reduction, and production scalability, and
- Case studies linking cleaning process improvements to coating performance outcomes.

INVITED SPEAKER:

The Great Importance of Properly Cleaned Components for the Quality and Functionality of Coating Systems – Process Understanding Leads to Quality Gains!



Frank-Holm Roegner

Fraunhofer Institute for Electron Beam and Plasma technology FEP, Dresden, Germany

The performance and service life of coated components depend not only on the coating material and the deposition process but also on the condition of the substrate immediately

prior to coating. Residues from manufacturing and handling, cleaning agent traces, particles, oxides, and adsorbed layers can impair wetting, nucleation, adhesion, morphology, and long-term stability. Yet, cleaning is often treated as a mere auxiliary process and assessed primarily based on process parameters or visual inspection. This is surprising, given that the quality control of a coating usually involves sophisticated analytical methods. This article demonstrates why substrate cleanliness should instead be viewed as a functional property and an integral part of the coating process chain. A systematic approach is presented that prioritizes a traceable and verifiable cleanliness specification as the foundation for achieving cleanliness that meets specific requirements. This approach combines process chain analysis with application-oriented cleanliness testing, incorporating the assess-

ment of particulate and film-like contaminants, surface chemistry, and wettability, alongside selected microscopic and spectroscopic techniques. Particular attention is paid to distinguishing between nominally identical cleaning results that—due to factors such as substrate material, surface topography, preceding processing steps, storage, transport, or recontamination—lead to differing coating behaviors. Conversely, the knowledge-based definition of cleanliness targets, measurement strategies, and process windows enables the early detection of critical deviations and prevents both inadequate and unnecessarily excessive cleaning. Furthermore, the article discusses how interfaces between component suppliers, cleaning service providers, and coating companies can be structured using technically sound acceptance criteria rather than blanket cleanliness requirements. In addition to achieving cleaning results that meet requirements, maintaining cleanliness up to the point of the coating process is also a crucial factor that must not be overlooked. Conflicts in customer-supplier relationships often arise from unclear responsibilities regarding the maintenance of cleanliness during storage and transport processes. Consequently, clearly defining the point at which responsibility for component cleanliness is transferred is considered crucial. The resulting approach supports a robust transition from laboratory development to industrial production, reduces scrap rates and the effort required for failure analysis, and enhances resource efficiency. The key conclusion is that coating quality cannot be optimized in isolation: an understanding of the process across the entire value chain—from component manufacturing and cleaning through activation and handling to the deposition process itself—is essential for achieving reproducible, high-performance coating systems.

TAC Chair:

Tyler Wheeler, *Ecoclean*, Tyler.Wheeler@ecoclean-group.net

Assistant AC Chairs:

Stefan Lukowski, *SAFECHM*, s.lukowski@safechem.com

Frank-Holm Roegner, *Fraunhofer FEP*, frank-holm.roegner@fep.fraunhofer.de

Karl Trautz, *HEMO*, k.trautz@hemo-gmbh.de



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.

INVITED SPEAKER:

HiPIMS for Hydrogen Technologies: Bridging Advanced Coatings from Lab to Industrial Scale



Iván Fernández-Martínez

Nano4Energy SL, Madrid, Spain

The transition toward a low-carbon energy system has positioned hydrogen as a key energy carrier. Technologies such as Proton Exchange Membrane (PEM) electrolyzers and Solid Oxide Electrolysis/Fuel Cells (SOEC/

SOFC) enable clean hydrogen production and use. However, their large-scale deployment is still limited by materials challenges, particularly the durability of metallic components under harsh electrochemical and thermal conditions.

Surface degradation, corrosion, and increased interfacial contact resistance are critical issues, especially at high temperatures and in strongly acidic environments. In this context, High-Power Impulse Magnetron Sputtering (HiPIMS) is an advanced thin film deposition technique with clear advantages over conventional Physical Vapor Deposition (PVD). By generating highly ionized plasmas and enabling precise control of ion energy, HiPIMS produces dense, defect-free, and highly adherent coatings with tunable properties.

HiPIMS can be applied across hydrogen technologies. In PEM systems, corrosion-resistant coatings improve bipolar plate lifetime. In SOEC and SOFC applications, thermally stable and oxidation-resistant films protect interconnects. Materials such as amorphous carbon, platinum group metals, and Ni- or Co-based coatings can be engineered to meet these requirements.

Recent advances have improved the scalability of HiPIMS, enabling its transition from laboratory research to industrial production, including large-area coating and high-throughput processes. This makes HiPIMS a promising and scalable solution for improving component reliability and supporting the deployment of hydrogen technologies.

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. A particular focus area this year is workforce development related to vacuum and atmospheric R2R coating & processing.

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 technical topic focus areas are:

- Substrates and other materials / consumables along the entire R2R product value chain (polymer, flexible glass, fabrics & non-wovens, functional textiles, sustainable materials, barrier approaches, transparent conducting materials, hard-coats, anti-smudge coatings etc.)
- Deposition sources and deposition modalities specific to R2R processing,
- Inline process diagnostics & 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,
- Performance of R2R 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.

INVITED SPEAKER:

Roll-to-Roll PVD on Flexible Glass and Laser-Based Fabrication of Ultra-Sensitive Electronic Devices for Detection of Biomarkers, Inhalation Hazards, and Rare-Earth Elements



Chris Muratore¹, Mike Simmons², Nick Glavin³

¹University of Dayton, Dayton, OH

²Intellivation LLC, Loveland, CO

³US Air Force Research Laboratory, Wright-Patterson AFB, OH

An electronic sensor architecture featuring ultra-thin (> 5 nm) semiconducting transducers and thin metal contacts on the surface of a 25 meter-long flexible glass substrate using a high-rate scanning laser to produce 1 cm x 1 cm chips, each with 9 individual channels to enable multiplex sensing was fabricated. The chips were specifically designed to interface with a wireless electronic reader system. Thousands of tests were conducted using the sensors in applications including detection of high impact biomarkers, inhalation hazards, and rare earth elements. To enable functionality for detection of these diverse targets, an inkjet printer was used to print capture agents on a sensor transducer that only elicits an electronic response when interacting with the intended species. For example, antibody fragments only binding to one type of virus were engineered to also bind to the transducer material, this enabled detection of viral proteins in complex biological matrices such as whole blood. Polymer thin films were also used to selectively detect vapor

hazards in mixtures of reactive gases. For detection of rare earth elements in solutions such as mine tailings which can contain multiple metal species, metal-specific binding proteins were identified and applied to the sensor transducers. For the biomarker, vapor, and rare earth targets, the sensor devices outperformed the current state of the art by over 1,000x in terms of sensitivity and were produced with 100-1,000X reduction in cost. These sensors can be stored for extensive periods of time (>1 year) in inert environments and used on demand for any of the applications investigated here. Materials and processing conditions were selected to optimize device performance while enabling end-of-life recyclability to reduce the waste stream impact after use. The sensors were made using vacuum roll-to-roll coating depositions, laser technology for ablation and morphology along with optimizing material crystallinity which was done orders of magnitude faster at significantly lower cost than those fabricated via traditional methods.

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

Andy Jack, *Emerson & Renwick*, a.jack@eandr.com

Liz Josephson, *Intellivation*, ljosephson@intellivation.com

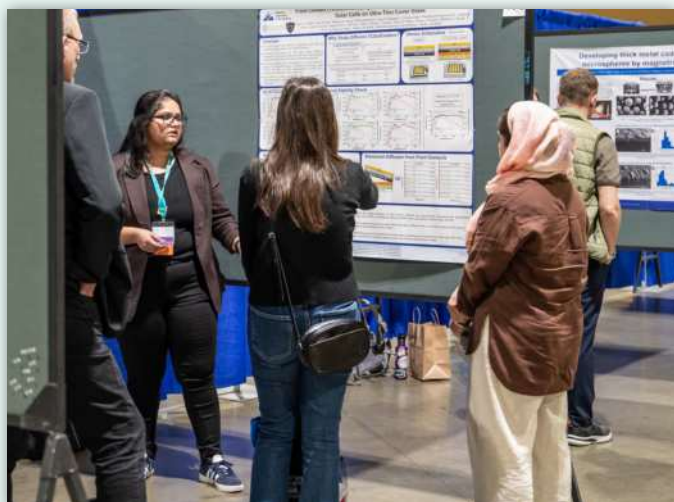
Jaime Li, *Eastman Chemical Co.*, Jaime.Li@eastman.com

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 Program by providing a format for extended discussions of the results in a casual environment.

In 2027 the SVC is dramatically increasing the visibility and reach of the Poster Session!

All oral presenters in the conference are encouraged to also provide a poster for the poster session summarizing their primary oral presentation. In addition, all oral presenters have the option to submit a second abstract for a poster presentation as part of their conference registration fee.

All posters will then be included in the judging for the overall best poster awards (\$1000/\$500/\$250 USD) which will be announced during the Exhibition "beer blast" on Wednesday afternoon, May 5, 2027 (3:00 p.m.). Many thanks to the SVC Young Members Committee for their sponsorship and judging of this new signature event of the SVC!



Conference Calendar

Start planning now for your trip to TechCon 2027

SUNDAY May 2	MONDAY May 3	TUESDAY May 4	WEDNESDAY May 5	THURSDAY May 6
Education Program 30+ Tutorial Courses				
TechCon Registration Counter Hours: Sunday, May 27:00 a.m. – 10:00 a.m. & 4:00 p.m. – 7:00 p.m. Monday, May 37:00 a.m. – 6:00 p.m. Tuesday, May 47:00 a.m. – 5:30 p.m. Wednesday, May 57:00 a.m. – 5:00 p.m. Thursday, May 67:00 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 Sheraton Dallas Hotel				

CONFERENCE REGISTRATION FEES*

Back AGAIN for 2027!

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 April 1, 2027/after April 1, 2027)

☐ Full Conference	\$1145.00/\$1295.00
☐ Media Personnel	\$0.00
☐ Student Conference	\$550.00/\$700.00
☐ Young Members Group Conference	\$550.00/\$700.00
☐ Exhibit Visitor Only	.FREE

SVC Membership is included with all paid conference registrations.

If not attending the conference, renew your membership for 2027 or join SVC on-line

Exhibitor Registration

(through April 1, 2027/after April 1, 2027)

☐ Exhibitor Booth Personnel and Manufacturer's Representative	\$0.00
☐ Exhibitor with Full Conference Registration	\$1145.00/\$1295.00

Special Events at the TechCon

☐ SVC Foundation 5K Run	\$40.00
☐ University of North Texas Research Facility Tour (Tuesday Evening; limited to 50 visitors)	No Fee
☐ Awards Ceremony and Welcome Reception (Tuesday Morning/Afternoon)	No Fee
☐ SVC Foundation Casino Night Fundraiser (Monday Evening)	1 Ticket Included with Full Conference Registration (additional tickets \$75.00)
☐ SVC 70 th Birthday Party (Thursday Evening)	No Fee

** Pricing contingent on making hotel accommodations at the Sheraton Dallas Hotel*

2027 SVC TechCon Exhibit Administrator: **Jacque Matanis**, jacque.matanis@svc.org, +1-505-897-7743

2027 SVC TechCon Exhibit Committee Co-Chairs:

Jason Hrebik, Kurt J. Lesker Company, jasonh@lesker.com
 Steve Simons, Manitou Systems Inc., ssimons@manitousys.com



TechCon 2027 Dallas

70th Annual SVC Technical Conference • May 1 – May 6, 2027

Technical
May 3 –
Education
May 1 –
Technolo
May 4 –

Ad hoc

Deposition, Plasma & Surface Engineering Processes

- Atomic Layer Processing (TAC)
- Electron Beam Processes (TAC)
- High Power Impulse Magnetron Sputtering - HIPIMS (TAC)
- Photonically-induced Transformations of Thin Films and Surfaces (TAC)
- Plasma Processing and Diagnostics (TAC)
- Substrate Preparation & Cleaning (TAC)

Functional and Protective Coatings for Energy, Environmental, and Biomedical Applications

- Advanced Multifunctional Coatings: Integrating Vacuum and Electrochemical Deposition for Sustainable Energy, Surface Protection, and Biomedical Innovations (Joint Session with The Electrochemical Society)
- Coatings and Processes for Biomedical Applications (TAC)
- Coatings For Energy Conversion and Related Processes (TAC)
- Protective, Tribological, and Decorative Coatings (TAC)
- Thin Film Contributions for the Hydrogen Economy (TAC)

Electronics, Photonics, Sensors, and Quantum Technologies

- Advances in Thin Film Sensor Technologies: Materials Design and Applications (TAC)
- Optical Coatings (TAC)
- Organic and Perovskite Electronics (TAC)
- Large Area Advanced Packaging and Integrated Photonics (TAC)
- Quantum Computing (TAC)

Large Area, Roll-to-Roll, and Scalable Manufacturing

- Large Area Coatings (TAC)
- WebTech Roll-to-Roll Technologies and Innovation (TAC)

Characterization, Reliability, Monitoring, and Digitalization

- Characterization, Testing, and Failure Analysis of Thin Films, Coatings, and Engineered Surfaces (TAC)
- Process Monitoring, Control, and Automation (TAC)
- Digital Transformation through Artificial Intelligence, Machine Learning, Simulation, and Data Science in the Thin Film Industry (TAC)

Innovation, Translation, and Community Platforms

- Emerging and Translational Technologies and Applications (TAC)
- Exhibitor Innovator Showcase Session
- Technical Poster Session

Strategic Te
and Ma
Committee
Direc

Program
May 6
Program
May 6
Exhibit
May 5

Directors



SVC Board of Directors

Technology
Markets
- Program
Director

Executive Committee

Finance Committee

Long Range Planning Committee

Nominations Committee

Education Committee

Director of Education

SVC Instructor Base

Women in the SVC Committee

Young Members Committee

Exhibit Committee

Awards Committee

Student Sponsorship Committee

Publications Committee

SVC Executive Director

Mary Ellen Quinn (Admin/Marketing)

Jacque Matanis (Finance)

Mark Matanis (Event Management)

Marcella Matanis (Event Management)

Lauren Cramer/TK Events (Digital Event Management)

Sue Taube (Taube-Violante; Publishing)

Maja Koblar (VOD/Social Media)

Doug Khurm (DAK Networks; IT)

Eric May/Alliance AV (Audio Visual)

Freeman Company (Event Decoration)

Networking

Opportunities at the 2027 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 Meetings

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** and **Sunset Forum Meetings** have emerged as one of the most significant networking events at the TechCon. These meetings, held from 7:30 a.m. to 8:30 a.m. and again late in the afternoon 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 Technology Forums 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. Please be sure to check the daily schedule (the Technology Forum Meetings 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 Snacks 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, May 3, 2027. *Casino Night tickets can be purchased on-line during TechCon registration or at the TechCon. This is a wonderful opportunity to entertain friends and customers who may not be registered for the conference.*

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 May 5, 2027.



Back by Popular Demand: FREE Technical Conference Admission for May 4th & 5th

Networking

Opportunities at the 2027 TechCon



2027 SVC 70th Birthday Party

Date: **Thursday, May 6, 2027**

Everyone is invited to attend

The **SVC 70th Birthday Party** 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 storied history along with 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.



2027 SVC Awards Ceremony and Welcome Reception

Date: **Tuesday, May 4, 2027**

Everyone is invited to attend

The **Awards Ceremony** will introduce and recognize the Nathaniel Sugarman 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 2027 the Welcome Reception will be broken into a snacks at 2:00 p.m. and a cocktail hour at 5:00 p.m; all held in the exhibit hall.

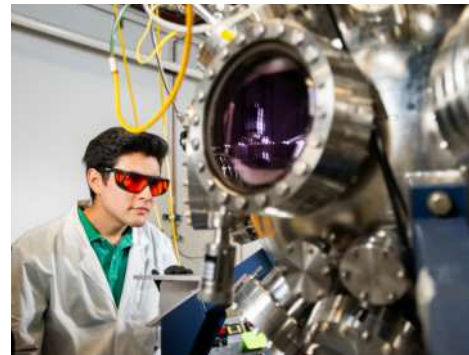


University of North Texas (Denton, Texas, USA) Research Facility Tour

Date: **Tuesday, May 4, 2027**

(6:00 p.m. bus departure from hotel entrance)

Come and join us for a walking tour of UNT's state of the art laboratories focusing on wide band gap semiconductors, tribology characterization and advanced materials characterization techniques. This event will be limited to 50 visitors and space can be reserved during conference registration.



Back by Popular Demand: FREE Technical Conference Admission for May 4th & 5th

Education Program

FROM THE EDUCATION DIRECTOR

Over the summer, we spent time reviewing the TechCon education program in Long Beach, identifying the technology gaps in our program, and developing new courses needed to fill those gaps. We are excited about what we have put together for Dallas.

Our 2027 TechCon education program will include 34 tutorials consisting of both old and new courses that cover a range of topics and perspectives. We will continue to offer our most popular courses covering vacuum systems, deposition basics, and troubleshooting. For example, “High Vacuum Systems and Operations,” (VT-201), taught by John O’Hanlon. “Troubleshooting for Thin Film Deposition Processes” (C-212), taught by Akhil Vora; “Introduction to Physical Vapor Deposition (PVD) Processes”, taught by Patrick Morse; and “Application of Reactive Sputtering” (C-338), taught by Ralf Bendorf & Holger Gerdes will all be offered.

We will also be offering our most popular courses from last year. Those include, “Characterization of Thick Films, Thin Films, and Surfaces” (C-322), taught by Tom Christensen; “Fundamentals of High Power Impulse Magnetron Sputtering (HIPIMS)” (C-323), taught by Arutiun Ehasarian; “Sputtering” (C-310), taught by Ralf Bendorf; and “Introduction to Ellipsometry” (M-102) taught by James Hilfiker. Two of the new courses offered last year, “Electron Beam Evaporation for Thin Film Deposition” (C-201), taught by Rob Belan and “Cleaning Fundamentals for Coating Applications” (M-150), taught by Tyler Wheeler, were well-subscribe and will be offered again this



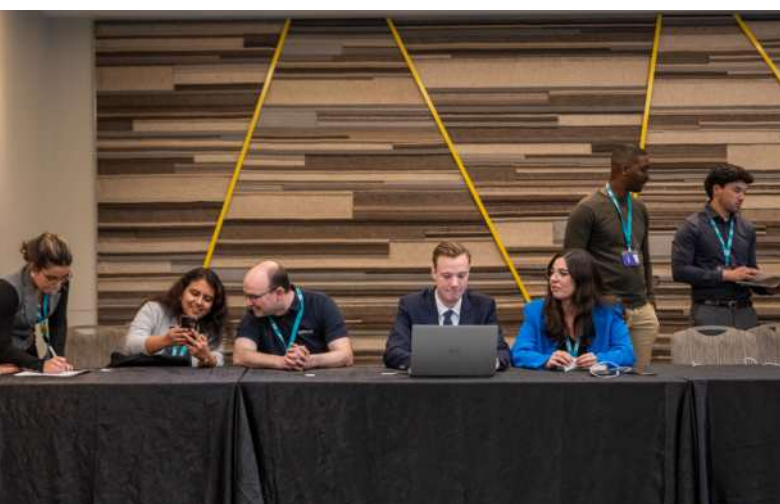
year. In addition, will offer, “Level Up: Career and Commercial Skills for Emerging Talent in the PVD Industry,” an interactive course aimed at career development, which was very popular among our young members last year.

We are also excited about the 2 new courses we will offer. Those include: “An Introduction to the Fascinating World of Decorative PVD Coatings,” taught by Martin Engels and “Practical Application of RF Power in Plasma Processing Systems,” taught by Steve Simmons.

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



About Our Venue

Sheraton Dallas Hotel,
Dallas, Texas, USA

The 2027 TechCon will be held at the Sheraton Dallas Hotel.

Located in the heart of downtown Dallas, the Sheraton Dallas Hotel boasts Texas-sized hospitality. This downtown Dallas hotel is near American Airlines Center, Fair Park, and within walking distance of many shops, restaurants and bars, including the Deep Ellum neighborhood.

Enjoy a variety of convenient on-site dining options, including breakfast, lunch, or dinner at Open Palette, sporting games at Draft Sports Bar and Lounge, cocktails at The Parlor, their hidden speakeasy, or on-the-go snacks from Open Mkt. The hotel features state of the art meeting space and contains 230,645 sq. ft. of event space.

Dallas, Texas, is a major, fast-growing metropolis in North Texas, ranked as the ninth-most populous city in the U.S. and the third-largest in Texas as of 2026.

As a core city of the 8.5 million-person Dallas–Fort Worth “Metropolitanplex”, it serves as a massive economic, cultural, and transportation hub.

Dallas is known for a strong, diversified economy featuring technology, financial services, defense, and telecommunications. The DFW area is a top market for Fortune 500 headquarters. It is a major inland port with massive air cargo and logistics operations, largely driven by Dallas/Fort Worth International Airport (DFW) and Dallas Love Field.

Dallas is the home to the largest contiguous urban arts district in the U.S., featuring the Dallas Museum of Art and the Winspear Opera House. As a major sports city it is home to the Cowboys (NFL), Mavericks (NBA), Stars (NHL), and FC Dallas (MLS)

■ \$279.00 USD/night – Sheraton Dallas Hotel,
400 North Olive Street, Dallas, Texas, 75201, USA
+1 (214) 922-8000

Important note! Discounted room rates are available **exclusively** on the dedicated hotel pages that will be accessible only on the SVC 2027 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.



Sunday, May 2 – Thursday, May 6

TECHCON EDUCATION SOLVES VACUUM COATING PROBLEMS!

34 Tutorial Sessions Offered

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**



SCHEDULE

Sunday, May 2, 2027

- | | | | |
|---------------|---|---|------------------|
| B-140 | Level Up: Career and Commercial Skills for Emerging Talent in the PVD Industry
<i>Hurkmans/Sanchez/Wäckerlin</i> | Professional: \$0 Student/Young Member: \$0 | 6:30PM – 10:00PM |
| C-103 | An Introduction to Physical Vapor Deposition (PVD) Processes
<i>Morse</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |
| C-120 | An Introduction to the Fascinating World of Decorative PVD Coatings PM New!
<i>Engels</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| C-205 | Introduction to Optical Coating Design
<i>Sargent</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |
| C-310 | Sputtering
<i>Bandorf</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |
| C-316 | Introduction to Atomic Layer Deposition (ALD) Processes, Chemistries, and Applications
<i>Biyikli</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |
| M-120 | Design of Experiments for R&D
<i>Grace</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |
| M-150 | Cleaning Fundamentals for Coating Applications PM
<i>Wheeler</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| M-250 | Deposition Process Simulation AM
<i>Gerdes</i> | Professional: \$470 Student/Young Member: \$180 | 9:30AM – 1:00PM |
| M-301 | Practical Application of RF Power in Plasma Processing Systems PM New!
<i>Simons</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| VT-201 | Vacuum Systems, Materials and Operation
<i>O'Hanlon</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |

Monday, May 3, 2027

- | | | | |
|---------------|--|---|-----------------|
| C-204 | Basics of Vacuum Web Coating AM
<i>Simmons</i> | Professional: \$470 Student/Young Member: \$180 | 9:30AM – 1:00PM |
| M-102 | Introduction to Ellipsometry PM
<i>Hilfiker</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| M-110 | Introduction to X-Ray Photoelectron Spectroscopy PM
<i>Linford</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| M-210 | Introduction to Solid-State Thin Film Batteries AM
<i>Gaines</i> | Professional: \$470 Student/Young Member: \$180 | 9:30AM – 1:00PM |
| M-240 | Basics and Applications of Electron Beam Technology for Manufacturing Processes PM
<i>Saager</i> | Professional: \$470 Student/Young Member: \$180 | 1:30PM – 5:00PM |
| VT-203 | Understanding and Using Residual Gas Analyzers
<i>O'Hanlon</i> | Professional: \$690 Student/Young Member: \$280 | 9:30AM – 5:00PM |

EDUCATION PROGRAM

SCHEDULE CONTINUED

Tuesday, May 4, 2027

- C-322** Characterization of Thick Films, Thin Films and Surfaces 9:30AM – 5:00PM
Christensen 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-201** Flexible Electronics **PM** 1:30PM – 5:00PM
Muratore Professional: \$470 or Student/Young Member: \$180
- VT-230** Design and Specification of Vacuum Deposition Systems 9:30AM – 5:00PM
Belan Professional: \$690 | Student/Young Member: \$280

Wednesday, May 5, 2027

- C-110** Materials for PVD Applications 9:30AM – 5:00PM
Pernagidis/Ghailane Professional: \$690 or 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-212** Troubleshooting for Thin Film Deposition Processes 9:30AM – 5:00PM
Miller/Vohra Professional: \$690 | Student/Young Member: \$280
- C-220** Introduction to Two-Dimensional Materials **PM** 1:30PM – 5:00PM
Muratore Professional: \$470 | Student/Young Member: \$180
- C-245** Industrial Broad Beam Ion Sources **AM** 9:30AM – 1:00PM
Rubin Professional: \$470 | Student/Young Member: \$180
- C-306** Non-Conventional Plasma Sources and Methods 1:30PM – 5:00PM
in Processing Technology **PM**
Baránková/Bárdos Professional: \$470 | Student/Young Member: \$180

Wednesday, May 5, 2027 *continued*

- C-323** Fundamentals of High Power Impulse Magnetron Sputtering (HIPIMS) 9:30AM – 5:00PM
Ehiasarian Professional: \$690 | Student/Young Member: \$280
- M-260** Advanced Packaging **AM** 9:30AM – 1:00PM
Banerjee Professional: \$470 | Student/Young Member: \$180
- VT-240** Practical Elements of Leak Detection[†] 9:30AM – 5:00PM
Deluca/Ridenour
- VT-245** Hands-On Helium Mass Spectrometer Leak Detection[†]
Deluca/Ridenour Professional: \$690 | Student/Young Member: \$280

Thursday, May 6, 2027

- C-201** Electron Beam Evaporation for Thin Film Deposition **AM** 9:30AM – 1:00PM
Belan Professional: \$470 | Student/Young Member: \$180
- C-320** Diamond-Like Carbon Coatings – From Basics to Industrial Realization **AM** 9:30AM – 1:00PM
Savva/Haubold/Keunecke/Stein/Petzold Professional: \$470 | Student/Young Member: \$180
- M-103** In Situ Spectroscopic Ellipsometry **PM** 1:30PM – 5:00PM
Pribil 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

[†] VT-240 and VT-245 are offered together as a single full day tutorial for a single fee (\$690/\$280)

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 registration 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.

**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 iron silicides 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 tribological 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. Ladislav 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.

**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. Biyikli's Ph.D. research concentrated on GaN/AlGaIn-based ultraviolet and solar-blind photodetectors. Afterwards, during his postdoctoral research

at the Virginia Commonwealth University, he worked on the MOCVD growth of AlGaIn/GaN hetero-structures for various applications including high-performance transistors. Dr. Biyikli 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.



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 facul-

ty 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.



Arutiun P. Ehasarian

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 NTC PVD 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 dis-

charges, 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 NTC PVD. 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.



Martin Engels

has an M.Sc. in Physics and Dr.-Ing. In Surface Engineering with specialization on process diagnostics of PVD processes. In total, 14 years of experience in PVD and 5 years in decorative coating for various product groups (i.e. sanitary, automotive, sporting goods, luxury etc.).



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 NTT 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.



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."



Ton Hurkmans

is the Chief Technology Officer (CTO) at the IHI Ionbond Group. He holds a M.Sc. degree in mechanical engineering at the Technical University of Eindhoven, The Netherlands, a Ph.D. from the Materials Research Group of Sheffield Hallam University, UK, and EMBA at The Ohio State University, USA.

Ton works in the vacuum coatings industry since 1990 and started at Hauzer Techno Coating in Venlo, Netherlands. Within the earlier years he was heavily involved in vacuum coating processes and the related hardware developments. Multiple coating machine installs and training across the globe. In 2002 Ton moved to Ionbond job coating and has worked to introduce coating applications to pretty much all industries. For both Hauzer and Ionbond he lived a total of 17 years in the USA. For 10 years he ran 13 job coating centers in North America. Since 2017 CTO for the Ionbond Group and responsible for innovation within the business segments. Ton has published multiple papers, holding vacuum coating related patents, has been a regular invited speaker at conferences, and reviews scientific papers.



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.



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 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.

**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.

**Steve Simons**

is president of Manitou Systems Inc. a supplier of plasma processing components and consulting used in R&D and manufacturing equipment. Manitou Systems was founded in 1989 providing technical support services and has grown by developing its own products as well as distributing related products from European manufacturers. These products include RF power generators, impedance matching networks, RF filters, switching modules and RF plasma sources. Steve's background and applications knowledge in RF (Radio Frequency) power is leveraged and applied daily in the development of new products and applications support to Manitou Systems customers. He has been affiliated with SVC since 1985 and has served on the SVC Board of Directors and chaired the Exhibit Committee. His presented papers at SVC include: Care & Feeding of Process Power Supplies and Switching RF, DC & HiPIMS power supplies.

**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.

**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.

