



TechCon Final Program

May 9–14, 2009 | Santa Clara Convention Center, Santa Clara, CA

Technical Program | May 11–14, 2009

Featuring a Symposium on Cleantech Energy Conversion, Storage and Related Processes

- Plus!**
- Hot Topic Session on High Power Impulse Magnetron Sputtering (HIPIMS)
 - Joint Session on Atmospheric Plasma Technologies

General Sessions on:

- Optical Coating • Vacuum Processes and Coatings for Health Care Applications
- Tribological and Decorative Coating • Vacuum Web Coating
- Plasma Processing • Emerging Technologies
- Large Area Coating • Process Modeling and Control
- Heuréka! Post-Deadline Recent Developments Session
- Poster Session • Vendor Innovators Showcase and Live Product Demonstrations

Education Program | May 9–14, 2009

Improve your skills, broaden your knowledge and increase your productivity!

You do not have to be a member to take advantage of the practical problem-solving courses offered at the TechCon.

Exhibit and Vendor Innovators Showcase | May 11–12, 2009

- Live Product Demonstrations
- Free Wireless Internet
- Meet our TechCon Sponsors—Look for the Balloon Bouquets

Participate in Unique SVC Networking Events:

- “Meet the Experts” Corner
- Technology Forum Breakfasts
- Exhibit Hall Reception, Lunch and Beer Blast
- SVC Foundation 5K Run
- The Tech Museum of Innovation in San Jose

TechCon
2009

Welcome to the 2009 SVC TechCon

Message from the President

Dear Colleagues,

“Mankind have a great aversion to intellectual labor; but even supposing knowledge to be easily attainable, more people would be content to be ignorant than would take even a little trouble to acquire it.” So, according to Boswell, said Samuel Johnson (1709 - 1784). What was true in the 18th Century is still, regrettably, true today. But, take comfort, Dear Reader, in the knowledge that this does not apply to you, because you are attending the primary knowledge disseminating event in the vacuum coating calendar. Each year we get together to share our experiences, knowledge, opinions, news and, even, gossip. No matter what your level of experience, there is plenty here for you. Somerset Maugham once observed that “it is a great nuisance that knowledge can only be acquired by hard work.” Not entirely true, at least as regards our meeting. The hard part is getting up early enough in the morning to attend the Technology Forum Breakfasts, but, from then on, it is enjoyable and rewarding. Do take advantage of everything on offer. Eat the breakfasts, go around the exhibition, attend the sessions, take in the tutorials, go to the social events. Leave the conference invigorated and refreshed, and ready to face the year before we meet again in Orlando. Welcome to Santa Clara.

Angus Madeod, Thin Film Center, Inc. (520/322-6171; angus@thinfilmcenter.com) is the SVC President

Welcome from the Program Chairs

Welcome to the Silicon Valley, a leading high technology area and home to dozens of hi-tech industries, universities and research centers. This is an area focused very much on new technologies and applications in clean renewable energy. Our SVC TechCon 2009 in Santa Clara contributes tremendously to these applications by introducing important innovations, inspirations and knowledge in vacuum coating and related technologies. We are proud that our **Industrial Exhibit** this year, more than ever, can be considered among the largest of world shows related to vacuum coating and related technologies. Our vendors will present their new achievements in the **Vendor Innovators Showcase**, during the Exhibit. Our **Plenary Speaker** on Sunday evening and the **Keynote Presentation** in the first morning of the program are both related to renewable energies – a focus of the Symposium on Cleantech Energy Conversion, Storage and Related Processes.

In keeping with TechCon tradition, the TechCon program addresses all primary aspects of coating and coating applications, including **Emerging Technologies** and featuring a specific focus on **Vacuum Processes and Coatings for Health Care Applications, Large Area Coating, Optical Coatings, Plasma Processing, Process Modeling and Control, Tribological and Decorative Coating**, and **Vacuum Web Coating** in both oral and Poster presentations.

Organizers have successfully developed the **Symposium on Cleantech Energy Conversion and Storage**, with one specific topic devoted to the *Thin film Photovoltaics*. We also offer the Hot Topic Session on **High Power Impulse Magnetron Sputtering (HIPIMS)**, and the popular evening **Heuréka! Post-Deadline Recent Developments session**. We are also excited about the papers that have been submitted for the Joint Session on **Atmospheric Plasma Technologies**.

The SVC TechCon is always a great opportunity for networking, marketing, social events, education and inspirations in vacuum coating technology. Let's start with networking and meeting friends at our **Welcome Reception**. Another opportunity is an informal Tuesday evening in the Tech Museum of Innovation in San Jose. The program also includes traditional **Technology Forum Breakfasts, Meet the Experts Corner, Donald M. Mattox Lunchtime Tutorials**, and tutorials in the **Education Program**.

TechCon organizers appreciate the efforts and contributions of every TechCon participant – whether presenter, visitor or exhibitor – during difficult economic times caused by the world financial crisis. We consider your participation a positive reflection on the value the Society of Vacuum Coaters offers to the vacuum coating industry. We hope you enjoy the program and we wish you a pleasant and rewarding stay at the SVC TechCon in Santa Clara.

Ladislav Bárδος, Uppsala University, Sweden (Ladislav.Bardos@angstrom.uu.se) is the Program Chair.

Charles Bishop, C.A. Bishop Consulting Ltd, UK (cabuk8@btinternet.com) is the Assistant Program Chair.

Ludvik Martinu, École Polytechnique, Canada (lmartinu@polymtl.ca) is the Past Program Chair.

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2009 Award Recipients

The Nathaniel H. Sugerman Memorial Award

The Nathaniel H. Sugerman Memorial Award was established in 1992 to commemorate the enduring efforts of Nat Sugerman (1922-1991) in founding, nurturing, and supporting the Society of Vacuum Coaters.

2009 Nathaniel Sugerman Award Recipient



David A. Glocker

Isoflux Incorporated

For his many years of service as an SVC officer, board member, and teacher, and for his development of inverted cylindrical magnetron sputter source technology.

David Glocker's first involvement with vacuum technology was while doing his graduate work at Clemson University. There he learned to evaporate metals and evacuate and seal off glass vessels in order to grow the crystals needed for his electron transport measurements. By compensating for the extremely low yield of this process with a very large number of attempts, he was eventually able to receive his PhD in physics in 1975.

After leaving Clemson he became a member of the physics faculty at the Rochester Institute of Technology and taught a variety of undergraduate and graduate courses. In 1980 Dave took what was intended to be a one-year leave of absence to work in the target fabrication group at the University of Rochester's Laboratory for Laser Energetics. The group was supported by British Petroleum and Dave's focus quickly evolved into sputtering amorphous silicon for solar cells. That was an area of significant interest for BP at the time and the one-year leave turned into a permanent job.

In 1983 BP moved their personnel to Cleveland and Dave and his wife Janet decided to stay in Rochester (requiring their three year old son Roan to do so as well). He took a job at Eastman Kodak, where he led a group that was responsible for understanding and scaling up the vacuum coating processes needed to produce magnetic and optical storage media. This was his first exposure to meeting the demands of a manufacturing environment, which he found invigorating. His research focused on methods for high rate reactive sputtering, the optimization and control of sputtering processes and the plasma treatment of polymers. That work led to Kodak's early use of dual cathode ac reactive sputtering, which was transferred into manufacturing there in 1987.

In 1993, while still at Kodak, Dave founded Isoflux Incorporated to make and sell cylindrical magnetrons using the Penfold and Thornton designs. A manufacturing and sales relationship quickly developed with Ion Tech (now Veeco-Ion Tech), which grew to the point that Dave was able to leave Kodak in 1998. Today Isoflux manufactures a variety of cathodes, sold primarily to medical device manufacturers, and is licensing proprietary coatings that it has developed for that market.

Dave has served in a number of positions with the SVC. He has chaired the Education Committee and the Emerging Technologies TAC and has been a member of the Board of Directors and most recently Secretary. He is presently a member of the Strategic Planning Committee, the Nominations Committee and Chair of the Vacuum Processes and Coatings for Health Care Applications Technical Advisory Committee.

Dave's interests include fly-fishing, reading American history and working on a host of small projects around his farm. He also spends as much time as possible with Janet, Roan and Roan's wife Miranda, all of whom bring him great joy.

Tickets are still available for the Networking Event at The Tech Museum of Innovation!

Inquire at the On-Site Registration Counter.

The SVC Mentor Award

The SVC Mentor Award program was established to recognize people who have made or are making significant contributions to the SVC and/or the industry by their example or guidance, including one-on-one and one-on-many interactions. Award may be posthumous.

2009 SVC Mentor Award Recipient



Clark Bright

3M Company

For his worldwide mentorship in transparent conductive coatings and for his leadership in the SVC at all levels.

Clark I. Bright is Senior Staff-Scientist with 3M Company. He was previously VP at Presstek/Delta-V and Director at Southwall. He has published or presented numerous TCO papers, was

Guest-Editor for MRS and TFS and holds more than 20 patents. Clark has Chaired or served on various SVC TACs since 1992, has taught courses in the SVC Education program since 1995, served on the SVC Board of Directors for 12 years and was the SVC President for the years 2004-2006

2009 SVC Mentor Award Recipient



Jolanta Klemberg-Sapieha

École Polytechnique de Montréal

For her contributions to tribological coating technology and strong leadership with the Tribological Coatings TAC.

Jolanta E. Klemberg-Sapieha is Research Professor in the Engineering Physics Department at École Polytechnique, Montréal, Canada.

Her research activity in the field of physics and technology of thin films, particularly their mechanical and tribological properties for aerospace, biomedical and optical applications, resulted in more than 250 publications and four patents.

2009 SVC Mentor Award Recipient



Doug Pellemounter

Advanced Energy Industries, Inc.

For his outstanding mentorship to sputtering professionals through process design, applications engineering, and problem solving in real world applications.

Doug Pellemounter is a senior application engineer at Advanced Energy and has more than 33 years of hands-on experience working with all kinds of challenging thin film applications. He is a major contributor to AE's PV Sun Times and Sputter Spotlight® e-newsletters, including the popular "Ask Doug!" column.

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SVC Sponsors Six Outstanding Students at the 2009 TechCon



Carlos Batista
University of Minho, Braga, Portugal

Carlos Batista will present the paper entitled, "Mo- and In-Doped VO₂ Thermochromic Coatings

Grown by Reactive DC Magnetron Sputtering" (O-14) on Wednesday, May 13 at 10:50 a.m.



Matej Hala
École Polytechnique de Montréal, Montréal, Canada

Matej Hala will present the paper entitled, "Analysis of Reactive HIPIMS

Discharge Based on Time- and Space-Resolved Optical Emission Spectroscopy" (HP-8) on Wednesday, May 13 at 1:30 p.m.



Ante Hecimovic
Sheffield Hallam University, Sheffield, United Kingdom

Ante Hecimovic will present the paper entitled, "Spatial and Temporal Evolution of Ion Energies

in HIPIMS Plasma Discharge" (HP-10) on Wednesday, May 13 at 2:10 p.m.



Charles Nwankire
University College Dublin, Dublin, Ireland

Charles Nwankire will present the paper entitled, "A Systematic Study of the Adhesive Properties

of a Plasma Polymerised Primer Bonding Siloxane Elastomer to Stainless Steel" (JAPT-8) on Tuesday, May 12 at 8:50 a.m.



Meghan Schulz
University of Delaware, Newark, DE

Meghan Schulz will present the paper entitled, "Visible Light-Active C-Doped TiO₂ Thin Films for

Solar Hydrogen Generation" (CT-14) on Wednesday, May 13 at 4:10 p.m.



Shao Dong You
University of Liverpool, Liverpool, United Kingdom

Shao Dong You will present the paper entitled, "Negative Ion Density Measurement by Photo-

Detachment in RF and Pulsed DC Magnetron Discharges" (P-2) on Monday, May 11 at 2:10 p.m.

SVC Foundation

5K Fun Run and Walk—Tuesday Morning

Get up a little earlier and join friends and colleagues for the SVC Fourth Annual Fun Run and Walk in Santa Clara. No matter what your ability, this event is always a great experience for all runners and walkers who participate.

Want to try it this year? The Fourth Annual 5K Fun Run and Walk will be on Tuesday, May 12, 2009 at 6:00 a.m. (meet in the Hyatt Regency Santa Clara hotel lobby at 5:45 a.m.).

Participating in this event will not only benefit your own health, but also the SVC Foundation, which awards scholarships to students working in the field of vacuum coating technology.

The \$25 registration fee includes bragging rights and a T-shirt! Register at the SVC Information Counter before 8 p.m. on Monday, May 11.

The SVC Foundation Thanks the 2009 5K Fun Run Sponsors

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Veeco Instruments Inc.

The SVC Foundation will host 2008 Scholarship recipients Bakhtyar Ali and Michael Orthner



Bakhtyar is a graduate student from the University of Delaware and will be presenting in the Emerging Technologies Session (E-3) on Monday morning at 10:30 a.m. The title of his paper is "Effect of Growth Conditions on the Structure Stabilization, Transport and Magnetic Properties of Co Doped TiO₂ Films."



Michael comes from the University of Utah where he is completing his PhD degree in Electrical and Computer Engineering. He will be presenting a Poster entitled "The Design and Development of an LPCVD Reactor for the Growth of 3C-SiC on Si" on Monday, May 11 from 4:30 to 8:00 p.m. in the Exhibit Hall.

The SVC Foundation provides funding to previous year scholarship recipients to attend the Technical Conference as a way to introduce them to our industry. They wear special badges identifying them as SVC Foundation Scholarship Winners.

Please talk to them and make them feel welcome.

In the words of Michael Orthner: "This award not only provides financial assistance but enables recipients to attend the TechCon conference to present their work (expenses paid). This networking opportunity should not be undervalued since it is one of the rare times as a student you personally interact with world experts in your field."

Career Opportunities Service at the TechCon

Monday, May 11 and Tuesday, May 12

As a service to Conference attendees and industry employers, the SVC Career Opportunities Service connects hiring companies with job seekers.

Employers interested in posting career opportunities at the Conference should check with the SVC Information Center. There is no charge for posting announcements; however, employers/recruiters who wish to review the "Resume Book" must register the position with SVC.

Job Seekers who did not register prior to the TechCon for this service by sending SVC a copy of their resume, must bring five copies of their resume to the SVC Information Center. These copies will be placed in the "Resume Book" and will be supplied to registered employers and recruiters who request them.

Conference Schedule At-a-Glance
is on pages 12 and 13

Education Program at the TechCon

**Improve your skills, broaden your knowledge
and increase your productivity!**

May 9–14, 2009

*You do not have to be a member to take advantage of the practical
problem-solving Tutorials offered at the TechCon*

Ask for details at the On-Site Registration Counter on the following Tutorials:

Saturday, May 9

- V-201** High Vacuum System Operation (O'Hanlon)
C-103 An Introduction to Physical Vapor Deposition (PVD) Processes (Shah)
C-311 Thin Film Growth and Microstructure Evolution (Greene)
C-104 An Introduction to Optical Coatings (Macleod)

Sunday, May 10

- C-203** Sputter Deposition (Greene) - Day 1 of 2-Day Tutorial
V-202 Vacuum System Gas Analysis (O'Hanlon)
C-314 Plasma Web Treatment (Grace)
C-323 High Power Impulse Magnetron Sputtering (Anders/Ehiasarian)
C-322 Characterization of Thin Films (Christensen)

Monday, May 11

- V-203** Vacuum Materials and Large System Performance (O'Hanlon)
C-303 Numerical Methods for Optical Coatings (Dobrowolski)
C-210 Introduction to Plasma Processing Technology (Báránková & Bárdos) Half-day p.m.

Tuesday, May 12

- C-208** Sputter Deposition in Manufacturing (Glocker)
C-315 Reactive Sputter Deposition (Greene)
C-211 Sputter Deposition onto Flexible Substrates (McClure)

Wednesday, May 13

- C-212** Troubleshooting for Thin Film Deposition Processes (Ash)
C-317 The Practice of Reactive Sputtering (Sproul)
C-304 ITO and Other Transparent Conductive Coatings: Fundamentals, Deposition, Properties, and Applications (Bright)
V-207 Practical Aspects of Vacuum Technology: Operation & Maintenance of Production Vacuum Systems (Langley)

Thursday, May 14

- C-324** Atmospheric Plasma Technologies (Báránková & Bárdos) Half-day a.m. **NEW!**
C-321 Alternative Transparent Conductive Coatings (TCOs) to ITO (Bright) Half-day a.m.
C-320 Diamond Like Carbon Coatings – from Basics to Industrial Realization (Schuelke, Bewilogua & van der Kolk) Half-day a.m.

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NEW! Young Members Group Meeting

Tuesday May 12 12:15 p.m. – 1:15 p.m. **Grand Ballroom C in the Convention Center**

The Society of Vacuum Coaters is establishing a Young Members Group, which will be open to young people (up to the age of 30) with an interest in vacuum coating and related technologies. Members of the group may be students or young staff in industry; the common feature is that they should meet the age requirement and have a keen interest in any topics which sit under the umbrella of the SVC. We intend to offer members of this new group special conference rates and other benefits in 2010, in exchange for their input and ideas regarding the growth and development of the Society as it relates to the younger generation. We envision that the Young Members Group will establish, from its membership, a Committee and a Chair. The Chair will be invited to attend the SVC Board meetings and participate in developing future strategies for the Society, thereby giving the Young Members a voice at the highest levels within the Society.

The inaugural meeting of the Young Members Group will be held on Tuesday, May 12, 2009, from 12:15 p.m. – 1:15 p.m. in Grand Ballroom C. Please grab a lunch and join us for this important meeting!

If you have questions regarding the Young Members Group, please contact the Chair or a Board Mentor.

Young Members Committee

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Technical Program Schedule *Sunday/Monday*

Sunday Afternoon, May 10

Learn and Remember ...

A Vacuum Wizard's Guide to Understanding Vacuum and Vacuum Coating

Sunday Afternoon, May 10

1:00 p.m. – 4:00 p.m.

Sold Out!

Theater

Sunday Evening, May 10

Plenary Session

Sunday Evening, May 10

7:00 p.m.

Theater

President's Welcome, Awards Ceremony and Business Meeting

Angus Macleod, SVC President, Thin Film Center, Inc.

SVCon TechCon Plenary Address

Renewable Energy – Innovative Solutions and Trends



Presented by Billy G. Johansson, *Seabased AB, Sweden*
Sunday Evening, May 10, after the Opening Ceremonies,
Awards Presentations and Annual Business Meeting at
7:00 p.m.

In a high-level seminar arranged in September 2008 by the Swedish-American Chamber of Commerce, discussions took place about the rapid increase of carbon dioxide content in the air. Some delegates compared the situation with writing a book and suggested that chapter one was ready. Chapter one dealt with the problem of getting the world to understand that carbon dioxide increase is a problem. The delegates were in agreement that the problem was understood. It is now necessary to find the best solutions and act. The future will show if this book turned out to be a drama, a thriller or, if we are lucky, a comedy. To succeed in this we cannot just act as we have always done by improving the existing solutions. We need to have a new type of wild, daring and humanitarian solution, but still cost-efficient. Innovative solutions must be found. Any idea/solution initially has to be "tested" intellectually against the Physical Laws. Few politicians know the facts about different renewable energies. The facts for average power: sun – 100W/ m², wind (11m/s) – 1kW/m², wave (Sweden) = 5-10Kw/m wave, wave (USA) = 15-60kW/m wave, and underwater current (2m/s) – 4kW/m². Another interesting fact is that the number of full load hours differs a lot as follows: sun – 1,000 h/year, wind (Sweden) – 2,200 h/year, wave (Sweden) – 3,000 to 4,000 h/year, wave (USA) – 3,000 to 6,000 h/year, and underwater currents – 7,000 h/year. Having these facts as background, three new ways of extracting renewable energy have been invented in Sweden. For wind energy there is a solution that uses a vertical arrangement, which of course, will lead to better cost performance and lower risk for failures or breakdown. For wave energy, the solution is based on a Wave Energy Converter (WEC) placed on the seabed (well protected) having a point absorber driving a linear generator. Arrays of WECs are then connected via underwater switchgears to the grid. For underwater current, the solution is based on a vertical arranged turbine with a slow speed generator. This will also result in a minimum or no negative influence on the environment. The trend we see nowadays is an increased focus on environment friendly solutions that will get even stronger in the future. However, it is important to question solutions that are not cost-effective and do not focus on the environment for the whole supply chain, including recycling.

Welcome Reception

Sunday Evening, May 10

8:45 p.m. – 10:30 p.m.

Theater Foyer and Terrace
Convention Center

The Welcome Reception is a great opportunity to meet the Plenary speaker and Award Recipients, network with old friends and colleagues, and make newcomers feel welcome at our Technical Conference.

Monday Morning, May 11

Technology Forum Breakfast

Monday Morning, May 11

Great America 1&2, Upper Level

7:00 a.m. – 8:15 a.m.

In these facilitator led forums, experts are available to answer your questions and discuss your concerns in an informal environment. This morning's topics include:

Applications of ALD — Erwin Kessels, *Eindhoven University of Technology, The Netherlands*

The Atomic Layer Deposition (ALD) Process is inherently conformal and poses the potential for producing superior coating performance in many current applications including displays, catalyst and barriers. We will discuss some of the many advantages of this process and the current limitations — and then speculate on future trends.

Coatings for Thin Film Photovoltaics – Wolfgang Diehl, *Fraunhofer Institute for Surface Engineering and Thin Films, Germany*
After 25 years of development, thin films have gained enough technological maturity and proven quality with calculable risk. Studies report that by 2015, 50% of all photovoltaic products will be made using thin film technology. Thin film technology has a high cost reduction potential. Thin films will take a leading role by lowering volume manufacturing costs. Cheap and reliable coatings like TCO's, AR-coatings, Back-Contact Technology, etc. for thin film photovoltaics are the key issue for the breakthrough of this technology. Bring your questions and interest to the Technology Forum Breakfast table on this fast-growing and exciting PV technology.

High-Power Impulse Magnetron Sputtering (HIPIMS) — Arutun Ehasarian, *Sheffield Hallam University, United Kingdom*
HIPIMS is an exciting new PVD process offering the possibility of engineering the interface and film microstructure to provide high adhesion strength, high film density, high resistance to harsh environments, improved optical properties. Come learn about this new technology and discuss the status and promise of this process.

N- and P-type Transparent Conductive Coatings — Clark Bright, *3M Company*

Transparent conductive coatings have numerous applications in flat panel displays and electronic devices. New applications on plastics are particularly exciting. All aspects of producing, characterizing, and using these coatings will be discussed.

Optical Coating Design — H. Angus Macleod, *Thin Film Center Inc.*
Beam Splitter Coatings, wavelength division multiplexing, ultrafast applications, decorative coatings, glare reduction, energy saving are just some of the currently important areas of applications for optical coatings. Coating designs range from more than one hundred layers to just one or two. In spite of advanced computer programs, optical coating design still involves skill, experience, and understanding. The emphasis in the forum will be on understanding design approaches and design methods.

Tribological Coatings — Allan Matthews, *University of Sheffield, United Kingdom* and Bill Sproul, *Reactive Sputtering, Inc.*

Tribological coatings are applied to surfaces by PVD processes to improve wear resistance and increase lubrication. Recent developments in multilayered and nanostructured coatings are advancing this technology. Using these structures, it is possible to combine high hardness and relatively low elastic modulus. These developments will be discussed along with individual applications of tribological coatings.

View Abstracts for all TechCon presentations in the Abstract books located near the column wrap in the Convention Center Lobby.

Technical Program Schedule Monday

Keynote Presentation

Monday Morning, May 11

8:30 a.m.

Theater

Thin Film Technology for Energy Applications



Presented by Mark R. Pinto, *Applied Materials*, Santa Clara, CA

Monday Morning, May 11, at 8:30 a.m.

Over 40 years of thin film process innovations have helped enable the IC industry today to produce well over 1018 transistors per year at costs of nanodollars per transistor, thereby empowering the information age. Likewise, large area thin film manufacturing has dramatically improved the performance and cost of low-cost displays over the past 15 years, enabling high definition video from the handheld to the wall-mounted HDTV. The overwhelming societal and market pull today for new solutions in the field of clean energy offers an exciting opportunity to build on a similar base of technology. Through a combination of materials innovation and highly productive processing platforms we have the potential to enable new solutions for conservation, conversion and storage and thus profoundly change the economics of clean energy.

9:15 a.m. – 9:30 a.m. Break

Joint Session on Atmospheric Plasma Technologies

Monday Morning, May 11

Ballroom C

Moderator: Hana Baránková, *Uppsala University*, Sweden

9:30 a.m. JAPT-1 Development of Adhesive-Free Lamination Technique Using a Plasma Surface Treatment at Atmospheric Pressure

Invited 40 min. Talk

M. Kogoma, Sophia University, Tokyo, Japan; A. Manabe, Fujimori Kogyo Co. Ltd., Yokohama, Japan; and K. Tanaka, Sophia University, Tokyo, Japan

10:10 a.m. JAPT-2 A Novel Atmospheric Microplasma Source with Integrated GaN HEMT Microwave Power Oscillator

R. Gesche, S. Kuehn, and H.E. Porteau, Ferdinand-Braun-Institut, Berlin, Germany; and R. Kovacs and J. Scherer, Aurion Anlagentechnik GmbH, Hessen, Germany

10:30 a.m. JAPT-3 Influence of Substrate to Source Distance on the Properties of Siloxane Coatings Deposited Using an Atmospheric Plasma Jet System

D.P. Dowling and M. Ardhaoui, University College Dublin, Dublin, Ireland

10:50 a.m. JAPT-4 Biomedical Applications of Atmospheric Pressure Plasma

K.-D. Weltmann, Th. von Woedtke, R. Brandenburg, and J. Ehlbeck, INP Greifswald e.V., Greifswald, Germany

11:10 a.m. JAPT-5 Chemical and Morphological Study of Atmospheric Pressure Plasma Treated Fibers and Polymer Films

Invited 40 min. Talk

D.D. Pappas and A.A. Bujanda, United States Army Research Laboratory, Aberdeen Proving Ground, MD; J.H. Yim, Department of Chemical and Biological Engineering, Drexel University, Philadelphia, PA; and K.E. Stawhecker, J.A. Orlicki, J.D. Demaree, R.E. Jensen, United States Army Research Laboratory, Aberdeen Proving Ground, MD

11:50 a.m. JAPT-6 Large Area SiO₂ Films Deposition by Atmospheric Pressure Plasma Enhanced Chemical Vapour Deposition (AP-PECVD): Growth Mechanisms by Surface Characterization

P.A. Premkumar and S. Starostin, Eindhoven University of Technology, Eindhoven, The Netherlands; H. de Vries and R. Paffen, FUJIFILM Manufacturing Europe B.V., Tilberg, The Netherlands; and M.C.M. van de Sanden and M. Creatore, Eindhoven University of Technology, Eindhoven, The Netherlands

Underline indicates the presenting author.

Emerging Technologies

Monday Morning, May 11

Ballroom D

Moderators: Chris Stossel, *Southwall Technologies* and Clark Bright, *3M Corporation*

9:30 a.m. E-1 Photocatalytic Thin Films for Biomedical Applications
Invited 40 min. Talk

P.M. Martin, Columbia Basin Thin Film Solutions LLC, Kennewick, WA; W.D. Bennett, Pacific Northwest National Laboratory, Richland, WA; B.F. Monzyk, Battelle Memorial Institute, Columbus, OH; K.A. Dasse, Levitronix, Waltham, MA; and R.J. Gilbert, MIT, Boston, MA

10:10 a.m. E-2 Comparison of Ion Trap and Quadrupole Sensors for Mass Spectrometry

G.A. Brucker, Brooks Automation, Inc., Longmont, CO

10:30 a.m. E-3 Effect of Growth Conditions on the Structure Stability, Transport and Magnetic Properties of Co Doped TiO₂ Films

Student Scholarship Presentation

B. Ali, University of Delaware, Newark, DE; A.K. Rumaiz, Brookhaven National Laboratory, Upton, NY; and A. Ozbay, E.R. Nowak, and S.I. Shah, University of Delaware, Newark, DE

10:50 a.m. E-6 Microwave Plasma-Assisted Chemical Vapor Deposition Homoepitaxial Synthesis of Single Crystalline Diamond

T. Schuelke, M. Yaran, D. King, and M. Becker, Fraunhofer USA, East Lansing, MI; and J. Asmussen, T. Grotjohn, and D. Reinhard, Michigan State University, East Lansing, MI

11:10 a.m. E-5 Highly Insulating Al₂O₃, SiO₂ and Si₃N₄ Films for Sensor Applications Deposited by Reactive Pulse Magnetron Sputtering

P. Frach, H. Bartzsch, and D. Gloess, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany; M. Gittner, Technische Universität IFE, Dresden, Germany; E. Schultheiss, Technische Universität IFE, Dresden, Germany and Fraunhofer FEP, Dresden, Germany; W. Brode, Siegert TFT GmbH, Hermsdorf, Germany; and J. Hartung, VON ARDENNE Anlagentechnik GmbH, Dresden, Germany

Vacuum Web Coating

Monday Morning, May 11

Ballroom EFG

Moderators: Greg Tullo, *SE Associates, Inc.* and James McShane, *Avery Dennison*

9:30 a.m. W-1 Polyester Substrates and Vacuum Deposition: Process Optimisation for Improved Product Performance

Invited 40 min. Talk

M. Hodgson, Dupont Teijin Films UK Ltd., Wilton Centre, United Kingdom

10:10 a.m. W-2 Transparent Conducting Oxides on Polymer Substrates

S. Louch, Centre for Process Innovation, Redcar, United Kingdom; and M. Hodgson, Dupont Teijin Films, Middlesbrough, United Kingdom

10:30 a.m. W-3 Optical, Electrical, and Structural Properties of ZAO and ZGO Coatings Deposited by Magnetron Sputtering onto Plastic Substrate

R. Kleinhempel, R. Thielsch, and A. Wahl, Southwall Europe GmbH, Grossroehrsdorf, Germany

10:50 a.m. W-6 Low Temperature Deposition of AZO Coatings on Polymeric Web

P. Barker, G.T. West, and P.J. Kelly, Manchester Metropolitan University, Manchester, United Kingdom; and J.W. Bradley, University of Liverpool, Liverpool, United Kingdom

Flashing SVC Pins

Have a question or comment? Look for anyone with a Flashing SVC Pin on their badge. These are given to Board members and TAC Chairs and they are always willing to answer general conference questions, technical questions, or point you in the right direction.

Technical Program Schedule **Monday**

11:10 a.m. W-7 Deposition of High Mobility ZnO and InZnO Thin Films at Ambient Temperature Using HiTUS Based Technology for TFT Applications
J.D. Dutson, Plasma Quest Ltd., Hook, United Kingdom; A.J. Flewitt and P. Beecher, University of Cambridge, Cambridge, United Kingdom; and S.J. Wakeham and M.J. Thwaites, Plasma Quest Ltd., Hook, United Kingdom

11:30 a.m. WFT-2 Paucity of Materials, a Potential Constraint to the Growth of Many Markets Including Displays and Photovoltaics
C. Bishop, C.A. Bishop Consulting Ltd., Loughborough, United Kingdom (presented by G. Tullo, General Vacuum Equipment, Raleigh, NC)

Hot Topic on High Power Impulse Magnetron Sputtering (HIPIMS)

Monday Morning, May 11

Theater

Moderator: Jolanta Klemberg-Sapieha, *École Polytechnique de Montréal*, Canada

9:30 a.m. HP-1 PVD Processes in High Aspect Ratio Features by HIPIMS

Invited 40 min. Talk

J. Weichart, M. Elghazzali, and S. Kadlec, OC Oerlikon Balzers AG, Balzers, Principality of Liechtenstein; and A.P. Ehiasarian, Materials and Engineering Research Institute, Sheffield Hallam University, Sheffield, United Kingdom

10:10 a.m. HP-2 Effect of the High Ion Irradiation on the Structure, Tribological and High Temperature Performance of CrAlN/CrN Nanoscale Multilayer Coatings Deposited by the HIPIMS Technology
P. Hovsepian, A.P. Ehiasarian, and Y. Purandare, Sheffield Hallam University, Sheffield, United Kingdom; R. Braun, DLR-German Aerospace Center, Cologne, Germany; and I.A. Ross, University of Sheffield, Sheffield, United Kingdom

10:30 a.m. HP-3 Industrial Impact of HIPIMS+ Technology for Chromium Nitride Coatings
F. Papa, C. Strondl, I. Kolev, T. Krug, and R. Tietema, Hauzer Techno Coating BV, Venlo, The Netherlands

10:50 a.m. HP-4 HIPIMS-MPP Deposited Ta and Cr Coatings for High Temperature Wear and Erosion Applications
S.L. Lee, F. Yee, M. Cipollo, and S. Smith, U.S. Army ARDEC-Benét Laboratories, Watervliet, NY; and R. Chistyakov and B. Abraham, Zond Inc./Zpulser LLC, Mansfield, MA

11:10 a.m. HP-5 Pulsed Magnetron Sputtering of Metallic Films Using a Hot Target
J. Vlcek, B. Zustin, J. Rezek, K. Burcalova, and J. Tesar, University of West Bohemia, Plzen, Czech Republic

11:30 a.m. HP-6 Magnetron Configuration to Enhance Deposition Rate in High Power Impulse Magnetron Sputtering
A.P. Ehiasarian and A. Vetushka, Sheffield Hallam University, Sheffield, United Kingdom

11:50 a.m. HP-7 Mass/Energy Analysis of a Modulated Pulse Power Plasma Compared to a DC Plasma
W.D. Sproul, Reactive Sputtering, Inc., San Marcos, CA; J. Lin, J.J. Moore, Z. Wu, and X. Zhang, Department of Metallurgical and Materials Engineering, Colorado School of Mines, Golden, CO; R. Chistyakov and B. Abraham, Zpulser LLC, Mansfield, MA; and A. Rees, Hiden Analytical, Ltd., Warrington, United Kingdom

"Friends of Bill W." Meeting

Monday, May 11, 2009 1:30 p.m. - 2:30 p.m.
Alameda Room Hyatt Regency Santa Clara

If you have questions contact John Fenn, Jr. at 818/400-2781 or John Reading at 352/442-9287

Monday Afternoon, May 11

"Grab and Go" Lunches for Sale 11:00 a.m.-1:30 p.m.
Pick up lunch in the Lobby to bring to the Tutorial.

The Donald M. Mattox Tutorial Program

Monday Afternoon, May 11

Ballroom EFG

12:30 p.m. - 1:10 p.m.

Advances and Drawbacks of Microwave Plasmas



Presenter: Michel Moisan, *Groupe de Physique des Plasmas, Université de Montréal, Canada* and *Laboratoire International de Technologies et Applications des Plasmas (LIA-LITAP)*

As compared to conventional RF capacitive or inductive discharges, microwave-sustained plasmas exhibit some specific characteristics: i) the electric field sustaining the discharge is provided by wave propagation either along dielectric materials (including the plasma itself) or within the structure of field applicators that radiate outwardly to penetrate dielectric discharge vessels (transparent to microwaves): there are no electrodes in contact with the discharge (increased lifetime and/or operating time of systems) and no self-biasing of the field applicators (less damage to substrates); ii) electron cyclotron resonance (ECR) allows to sustain efficiently discharges in the 0.1-10 mTorr (collisionless) pressure range; iii) impedance matching is easier, more efficient and reproducible than with RF systems. Nonetheless, microwave plasmas suffer from severe difficulties compared to other technologies (corona and dielectric barrier discharges at atmospheric pressure, RF discharges at reduced pressure) in the two main sectors of industrial applications, namely chemistry in gaseous phase and plasma processing of surfaces. These are essentially: i) the (radial) contraction of microwave (tubular) discharges typically at pressures above 10-20 Torr and, additionally, filamentation at frequencies above 1 GHz; ii) difficulty of scaling up microwave plasma sources for surface treatments. Design, performance and applications of new generations of microwave plasma sources are reviewed.

"Meet the Experts" Corner

Monday Afternoon, May 11

Room 207, Upper Level

1:30 p.m.-2:30 p.m.

Bring Questions to Experts and Solve Your Problems

Vacuum Web Coating

Facilitators: Don McClure, *Acuity Consulting and Training* and Bill Sproul, *Reactive Sputtering, Inc.*

Join the Experts to answer questions on web substrates and coatings, as well as sputtering in general, including reactive sputtering and choice of power supply.

Tribological and Decorative Coating

Monday Afternoon, May 11

Ballroom C

Moderators: Allan Matthews, *The University of Sheffield*, United Kingdom and Joachim Scheibe, *Fraunhofer Institute for Material and Beam Technology IWS*, Germany

1:30 p.m. T-1 Novel Design Approaches to the Development of Multifunctional Nanocomposite Coatings for Demanding Engine Applications
Invited 40 min. Talk

A. Erdemir and O.L. Eryilmaz, Argonne National Laboratory, Argonne, IL; and M. Urgen, K. Kazmanli, and V. Ezirmik, Istanbul Technical University, Istanbul, Turkey

Technical Program Schedule Monday

2:10 p.m. T-5 Effect of Si Incorporation on the Mechanical and Electrochemical Properties of DLC Films

M. Azzi, École Polytechnique de Montréal, Montréal, Canada and McGill University, Montréal, Canada; M. Paquette, École Polytechnique de Montréal, Montréal, Canada; J.A. Szpunar, McGill University, Montréal, Canada; and J.E. Klemberg-Sapieha and L. Martinu, École Polytechnique de Montréal, Montréal, Canada

2:30 p.m. T-3 Reactive Co-Evaporation of Carbon/Carbide Nanocomposites: Process, Structure and Tribological Properties

E. Bergmann, University of Applied Science of Western Switzerland, Geneva, Switzerland; G. Wahli, Roth & Rau AG, Neuchâtel, Switzerland; G. Pannatier, Platis AG, Grenchen, Switzerland; B. Pecz and L. Toth, Muszaki Fizikai és Anyagtudományi Kutatóintézet, Budapest, Hungary; and C. Mitterer, University of Leoben, Leoben, Austria

2:50 p.m. T-4 Erosion-Resistant Multilayer Coatings

A. Flores Renteria, O. Schroeter, R. Mykhaylonka, and C. Leyens, Technical University of Brandenburg at Cottbus, Cottbus, Germany

Vacuum Processes and Coatings for Healthcare Applications

Monday Afternoon, May 11

Ballroom D

Moderator: Dave Glocker, Isoflux Incorporated

1:30 p.m. HC-1 The Effect of Surface Topography on the Retention of Organic Soil and Microorganisms

A. Packer, P.J. Kelly, K.A. Whitehead, J. Verran, and G.T. West, Department of Biological Sciences, Manchester Metropolitan University, Manchester, United Kingdom

1:50 p.m. HC-2 Hydrogen-Free Tetrahedral Amorphous Carbon Coatings for Biomedical Implants

L. Haubold, M. Becker, T. Schuelke, and H.-J. Scheibe, Fraunhofer USA, East Lansing, MI; and G. Woodrough and J. Helmuth, Symmetry Medical Jet, Lansing, MI

2:10 p.m. HC-3 Sterilisation of Surgical Instruments Using Mini Electron Accelerators

Invited 40 min. Talk

G. Gotzmann and F.H. Roegner, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany

2:50 p.m. HC-4 Validation Concepts for a Biomedical Product

P.E. Gagnon and J. Gibbs, Corning Inc., Kennebunk, ME

3:10 p.m. HC-5 The Supersonic Jet Deposition of Metal-Polymer Films, in Particular for Anti-Microbial Applications

A.K. Rebrov, R.V. Maltsev, A.I. Safonov, and N.I. Timoshenko, Institute of Thermophysics, Novosibirsk, Russian Federation

Large Area Coating

Monday Afternoon, May 11

Ballroom EFG

Moderator: Michael Andreasen, AGC Flat Glass North America

1:30 p.m. L-15 Reliable Design, Installation, and Operation of Large Industrial Turbomolecular Pumping Systems as an Energy Reduction Strategy for Large Area Coaters

T.C. Forbes, Varian, Inc., Lexington, MA and E. Emelli, Varian, Inc., Leini, Italy

1:50 p.m. L-11 Stay Green - Optical Thickness and Composition Control for Large Area Coaters

W. Theiss, W. Theiss Hard- and Software, Aachen, Germany

2:10 p.m. CT-25 Surface, Morphological and Photocatalytic Properties of Doped and Undoped TiO₂ Sputtered Coatings

J.O. Carneiro, V. Teixeira, C. Tavares, and A.J. Martins, University of Minho, Guimarães, Portugal

2:30 p.m. L-13 Rotary Ceramic ITO Sputtering Targets for Large Area TCO Coating Deposition: Cost Effective and Quality Boosting

P. Lippens, UMICORE Thin Film Products, Olen, Belgium; and C. Murez, UMICORE Thin Film Products, Balzers, Principality of Liechtenstein

2:50 p.m. L-14 Switchable Electrochromic Glazing for Energy Conservation Applications

Invited 40 min. Talk

P. Nguyen, Supurban, San Jose, CA

Plasma Processing

Monday Afternoon, May 11

Theater

Moderator: Mariadriana Creatore, Eindhoven University of Technology, The Netherlands

1:30 p.m. P-1 Novel Control of Surface Energy for Functional Metalization by Integrated Diagnostics of Processing Plasma

Invited 40 min. Talk

J.G. Han, N. Britun, Y.J. Kim, and Y.S. Choi, Sungkyunkwan University, Suwon, South Korea

2:10 p.m. P-2 Negative Ion Density Measurement by Photo-Detachment in RF and Pulsed DC Magnetron Discharges

Sponsored Student Presentation

S.D. You, R. Dodd, P.M. Bryant, and J.W. Bradley, University of Liverpool, Liverpool, United Kingdom

2:30 p.m. P-3 Electrical Probes for Monitoring Electron Density, Ion Flux and Film Properties in Deposition Plasmas

Invited 40 min. Talk

N.S.J. Braithwaite, Department of Physics and Astronomy, The Open University, Milton Keynes, United Kingdom

SVC Exhibit Opens!

3:00 p.m.-8:00 p.m.

Don't miss the only exhibit dedicated to Vacuum Coating Technologies!

Poster Presentations

Monday Afternoon, May 11

Exhibit Hall

4:30 p.m.-8:00 p.m.

Poster-1 Tribological Properties of CrAlSiN Coating with Post-Deposition Heat Treatment

W.Y. Ho and C.W. Chen, MingDao University, ChangHua, Taiwan; and W.Y. Ho, National Pingtung University, Pingtung, Taiwan

Poster-3 Particle-in-Cell Monte Carlo Analysis of Inhomogeneities in Large Area Magnetron Discharges

M. Siemers, A. Pflug, and B. Szyszka, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

Poster-4 The Latest Soft Electron Technologies

G. Gotzmann, F.H. Roegner, and O. Roeder, Fraunhofer Institute of Electron Beam and Plasma Technology FEP, Dresden, Germany

Poster-5 Cr-Si-N Coating for Aerospace Applications

E. Bousser, M. Benkahoul, M. Azzi, L. Martinu, and J.E. Klemberg-Sapieha, École Polytechnique de Montréal, Montréal, Canada

Poster-6 Laser-Based Sensor for Real Time Sputter Monitoring and End Point Detection in Ion Beam Etch Systems

A. Yalin and L. Tao, Colorado State University, Fort Collins, CO; and N. Yamamoto, Kyushu University, Fukuoka, Japan

Poster-7 Study on Surface Modification of Polycarbonate Polymer Plastics by Low Energy Ion Beam

Y. Yan, J. Wu, G. Zhang, Y. Wang, and P. Wen, Beijing Institute of Aeronautical Materials, Beijing, China

Poster-8 A Comparison of Deposition Techniques for High-End Optical Coatings

P. Biedermann, S. Wuethrich, and A. Jaunzens, Evatec Ltd., Flums, Switzerland

Poster-9 Study of Structure Densification in TiO₂ Coatings Prepared by Magnetron Sputtering Under Low Pressure of Oxygen Plasma Discharge

J. Domaradzki, D. Kaczmarek, and E.L. Prociow, Wroclaw University of Technology, Wroclaw, Poland; and Z.J. Radzinski, Silicon Quest International, Reno, NV

Technical Program Schedule **Monday/Tuesday**

Poster-10 The Design and Development of an LPCVD Reactor for the Growth of 3C-SiC on Si

Student Scholarship Presentation

M. Orthner, L. Rieth, and F. Solzbacher, University of Utah, Salt Lake City, UT

Poster-13 Optical Emission Spectroscopy of Ni, Cr, and NiCr 80/20 for DC and High Power Impulse Magnetron Sputtering (HiPIMS)

H. Gerdes, J. Wellhausen, R. Bandorf, and G. Braeuer, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

Poster-14 Decorative Coating Deposition by PVD

J. Esparza, R. Rodriguez, J.A. Garcia, and M. Rico, Asociacion de la Industria Navarra, Pamplona, Spain

Poster-15 Research of Electrical, Optical and Structural Characteristics of Ga-Doped ZnO Coatings Deposited by Magnetron Sputtering on a Polymeric Substrate

M. Misels-Piesins, E. Machevski, I. Ashmanis, and V. Kozlov, Sidrabe, Inc., Riga, Latvia (presented by E. Yadin, Sidrabe Inc., Riga, Latvia)

Poster-16 The Tribological Characteristic of TiN, TiC, TiN/TiC Films Prepared by Reactive Pulse Arc Evaporation Technique

D.M. Devia Narvaez, Universidad Nacional de Columbia, Manizales, Columbia; and J. Restrepo, A. Ruden Muñoz, J.M. Gonzalez Carmona, F. Sequeda Osorio, Universidad del Valle, Cali, Columbia

Poster-17 The Effect of Deposition Temperature on Tribological Behaviour of Ti-Al-N Coatings Deposited by Magnetron Co-Sputtering Technique

M. Cano, J. Restrepo, A. Ruden, and F. Sequeda Osorio, Universidad del Valle, Cali, Columbia; and J.M. Meza, Universidad Pontifica Bolivariana, Medellin, Columbia

Poster-18 Tribological Properties of Duplex TiN Coatings Applied on Chrome Based Steels

A. Murcia, Universidad del Valle, Cali, Columbia; S.P. Bruhl, Universidad Tecnologica Nacional, Concepcion de Uruguay, Argentina; A. Neira, North Carolina State University, Raleigh, NC; and F. Sequeda Osorio and A. Ruden, Universidad del Valle, Cali, Columbia

Poster-19 Study of Synergistic Effect of Erosion-Corrosion of CrN and TiN Hard Coatings on AISI 1045 Mild Steel

H. Payan, W. Aperador, F. Sequeda Osorio, and A. Ruden, Universidad del Valle, Cali, Columbia

Poster-20 Plasma Analysis of a Novel PECVD Process for Corrosion Resistant Interior Coating of Pipelines

S. Lapp and F. Placido, University of the West of Scotland, Paisley, United Kingdom

Poster-21 The Effect of Superfinishing and Plasma-Assisted PVD and CVD Coatings on Rolling Element Bearings Under Lubricant Starvation Conditions

J. Eichler, University of Sheffield, Sheffield, United Kingdom; G. Doll, Timken Research, Canton, OH; A. Leyland and A. Matthews, University of Sheffield, Sheffield, United Kingdom

Monday Evening, May 11

HEURÉKA! Post-Deadline Recent Developments Session

Monday Evening, May 11

Ballroom EFG

Moderators: Hana Baránková and Ladislav Bárδος, *Uppsala University, Sweden*

7:30 p.m. H-1 Patents on Plasma and Surface Engineering: Actual Trends in Patents, a Patent Database Study

R. Bethke, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany; B. Rager, Fraunhofer-Gesellschaft, Muenchen, Germany; and W. Diehl, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

8:00 p.m. H-2 Voltage Control for Reactive Sputtering: Achieve Up to 10 Times the Typical Sputter Rate While Dramatically Reducing Input Power Requirements

D. Pelleymounter and K. Nauman, Advanced Energy Industries, Inc., Fort Collins, CO

8:20 p.m. H-3 Process Benefits of Wide Area, Low Energy End-Hall Ion Source for Surface Pre-Cleaning and Functional Treatment of Polymeric Substrate Materials

J.M. Lackner and W. Waldhauser, Joanneum Research Forschungsgesellschaft m.b.H., Niklasdorf, Austria; L.J. Mahoney and J. Davis, Veeco Instruments, Inc., Fort Collins, CO; and G. Riess, University of Leoben, Leoben, Austria

8:40 p.m. H-4 Technology and Industrial Applications of Film 3D Characterization

S. Han, Veeco Instruments, Inc., Tucson, AZ

9:00 p.m. H-5 Important Developments in Pulsed Cathodic Arc Deposition

R. Chistyakov and B. Abraham, Zond Inc./ZPulser, LLC, Mansfield, MA

Tuesday Morning, May 12

Technology Forum Breakfast

Tuesday Morning, May 12

Great America 1&2, Upper Level

7:00 a.m. – 8:15 a.m.

In these facilitator led forums, experts are available to answer your questions and discuss your concerns in an informal environment. This morning's topics include:

Atmospheric Plasma Technologies – Hana Baránková and Ladislav Bárδος, *Uppsala University, Sweden*

Atmospheric plasma technology is a rapidly growing area in plasma-assisted technologies. Technologies using the atmospheric pressure plasma sources bring about fast processes, but it is important to be aware of limits given by atmospheric plasma properties and plasma chemical reactions. Learn more about the most important principles and applications of non-thermal atmospheric plasma.

Cleantech Energy Conversion and Storage — Carl Lampert, *Star Science* and Ric Shimshock, *MLD Technologies, LLC*

Cleantech is a group of technologies that address global needs surrounding clean air, clean water, clean energy, and clean environment. At our breakfast we will have an open discussion on the following topics: Coatings and films and devices related to photovoltaics, photocatalysis, energy storage including batteries, fuel production, smart windows, solar energy conversion and conservation. Please bring your questions, devices and films for show and tell.

Diamond-Like Carbon (DLC) Coatings — Klaus Bewilogua, *Fraunhofer Institute, Germany*, Gerry van der Kolk, *IonBond Netherlands b.v.*, Venlo, The Netherlands, and Thomas Schuelke, *Fraunhofer, USA*

The unique microstructure of DLC films formed by appropriate proportions of sp³ and sp² hybridizations of carbon in combination with the chemical inertness, low friction, biocompatibility and other advantageous properties has made this material extremely attractive for a large number of applications. This includes low friction coatings for the engine components in automobile industry, biocompatible coatings for implantable prostheses, wear resistant protective coatings for magnetic recording media and numerous others. We encourage you to bring your questions and share your experience during this Forum on the DLC technology, while focusing on the exciting subjects ranging from basic understanding of the DLC film growth to large-scale industrial applications.

Fabrication and Performance of Optical Coatings — Ludvik Martinu, *École Polytechnique, Canada*, and Bryant Hichwa, *Sonoma State University*

In a friendly atmosphere of the Breakfast Forum, we will discuss advances in the area of optical films and optical filters with respect

Technical Program Schedule *Tuesday*

to the recent progress in optics, optoelectronics, photonics, optical microelectromechanical systems and others. Please bring your questions, solutions and discussion points related to the fabrication methods, optical coating materials, optical film metrology, mechanical properties of coated systems including plastics, as well as scale-up and other subjects related to the interests of the optical coating community.

Gas/Moisture Permeation Barrier Layers — Mariadriana Creatore, *Eindhoven University of Technology*, The Netherlands

Amongst the challenges and emerging technologies in the field of electronic displays/ lighting and flexible electronics, the research on the “ultimate gas/vapor barrier performance” which allows long term stability devices is presently withdrawing considerable attention. The state-of-the art is a μm -thick multi-layer system often consisting of an inorganic layer and an organic layer. Can this solution address both the barrier on the polymer substrate as well as the encapsulation of the device? Are other solutions more compatible with roll-to-roll production? These issues will be addressed during this Technology Breakfast Program.

Magnetron Sputtering — David Glocker, *Isoflux Incorporated*
Magnetron sputtering is widely used in industrial applications, from the rotating cylinders found in large area coaters to hollow cathode sources used in microelectronics. Magnetrons can be built in many configurations, and this session will explore some of the design opportunities and constraints. If you have an application, or if you would simply like to talk about what’s possible with magnetron sputtering, be sure to attend this session.

Plasma Processing and Biomaterials — Paul Gagnon, *Corning Inc.*
Plasma processing is an important role in many biomaterial applications. Plasma is used for enhancing adhesion properties or for changing the surface chemistry and or morphology for cellular and chemical attachment to manufacture the latest drugs or the latest biosensor. Biomaterial applications include polymeric, ceramic, metallic and composite substrates. Bioprocess is involved with the next generation of new products. Bring your questions and problems and let’s discuss these intriguing applications.

Joint Session on Atmospheric Plasma Technology

Tuesday Morning, May 12

Ballroom C

Moderator: Masuhiro Kogoma, *Sophia University*, Japan

8:30 a.m. JAPT-13 Expansion of Contracted Single Rare-Gas Tubular Discharges at Atmospheric Pressure
E. Castaños-Martinez and M. Moisan, Université de Montréal, Groupe de Physique de Plasmas, Montréal, Canada

8:50 a.m. JAPT-8 A Systematic Study of the Adhesive Properties of a Plasma Polymerised Primer Bonding Siloxane Elastomer to Stainless Steel

Sponsored Student Presentation

C.E. Nwankire and D.P. Dowling, University College Dublin, Dublin, Ireland

9:10 a.m. JAPT-9 Equipment for Large Area Plasma Processing at Atmospheric Pressure

I. Dani, G. Maeder, J. Roch, P. Grabau, B. Dresler, D. Linaschke, S. Tschoecke, S. Kaskel, and V. Hopfe, Fraunhofer Institute for Material and Beam Technology IWS, Dresden, Germany

9:30 a.m. JAPT-10 Current and Future Prospects of Non-Thermal Plasmas Exhaust-Air Pollution Control
R. Brandenburg, R. Basner, and K.-D. Weltmann, INP Greifswald e.V., Greifswald, Germany

9:50 a.m. JAPT-11 Environmental Applications of the Atmospheric Pressure Plasma Sources

H. Baránková and L. Bárdos, Uppsala University, Uppsala, Sweden

10:10-10:30 a.m. Break in the Exhibit Hall

10:30 a.m. JAPT-12 Atmospheric Pressure Plasma Deposition of Transparent Conductors - Tailoring Precursor Chemistries
K. Johnson, S. Jha, R. Sailer, and D. Schulz, North Dakota State University, Fargo, ND

Optical Coating

Tuesday Morning, May 12

Ballroom D

Moderators: Stéphane Larouche, *Duke University* and Ulrike Schulz, *Fraunhofer Institute for Applied Optics and Precision Engineering IOF*, Germany

8:30 a.m. O-1 Monte Carlo Analysis of Random Thickness Errors in Infrared Optical Coatings

D. Fuller and W. Hasan, FLIR Systems, Inc., Wilsonville, OR

8:50 a.m. O-2 Modern State of Art in Design and Monitoring of Optical Coatings

Invited 40 min. Talk

A. Tikhonravov and M. Trubetskov, Research Computing Center, Moscow State University, Moscow, Russia

9:30 a.m. O-3 Designing Optical Coatings by Using Low-Index Equivalent Layers and Low-Index Effective Media

40 Minute Talk

U. Schulz and N. Kaiser, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

10:10-10:30 a.m. Break in the Exhibit Hall

10:30 a.m. O-5 Using Different Thin-Film Design Software for Different Requirements

Invited 40 min. Talk

U. Schallenberg, mso jena Mikroschichtoptik GmbH, Jena, Germany

11:10 a.m. O-4 Broad Band Metal Dielectric Filters

D. Cushing, University of Arizona, Tucson, AZ

11:30 a.m. O-7 Computer Simulation of Monitoring of Narrow Band-pass Filters at Non-Turning Points

R. Willey, Willey Optical Consultants, Charleviox, MI; and A. Zoeller, Leybold Optics GmbH, Alzenau, Germany

11:50 a.m. O-8 *In Situ* Stress Measurement in Optical Coating Deposition System

M. Fang, J. Huang, K. Yi, Z. Fan, and J. Shao, Shanghai Institute of Optics and Fine Mechanics, Shanghai, China

Large Area Coating

Tuesday Morning, May 12

Ballroom EFG

Moderator: Michael Andreasen, *AGC Flat Glass North America*

8:30 a.m. L-1 Energy Saving Glass Solutions

Invited 40 min. Talk

R. Blacker, Guardian Industries Corporation, Carleton, MI

9:10 a.m. L-2 Enhanced Growth of Thin Silver Films via HiPIMS Deposition

G.T. West and P.J. Kelly, Manchester Metropolitan University, Manchester, United Kingdom

9:30 a.m. L-3 Sensors for Uniform Reactive Magnetron Sputtering Deposition on Large Areas

Y. Bellido-Gonzales, B. Daniel, D. Monaghan, Gencoa Ltd., Liverpool, United Kingdom; and J. Counsell, J. Counsell Ltd., West Kirby, United Kingdom

9:50 a.m. L-4 Properties of Plasma Polymerized Thin Films Deposited from Hexamethyldisiloxan (HMDSO) by Magnetron-PECVD Process
R. Nyderle, R. Bluethner, and T. Preussner, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany; and D. Pavic, Bluetec GmbH & Co. KG, Trendelburg, Germany

10:10-10:30 a.m. Break in the Exhibit Hall

Conference Schedule At-a-Glance

Technology Forum Breakfast 7:00–8:15 a.m. Great America 1 & 2		8:30 a.m.	8:50 a.m.	9:10 a.m.	9:30 a.m.	9:50 a.m.	10:10 a.m.	10:30 a.m.	10:50 a.m.	11:10 a.m.	11:30 a.m.	11:50 a.m.	12:10 p.m.	
Monday Morning	Theater	Keynote Presentation Mark Pinto 8:30–9:15 a.m.			HIPIMS HP-1 Weichart <i>Invited</i>		HP-2 Hovsepian	HP-3 Tietema	HP-4 S. Lee	HP-5 Vlcek	HP-6 Ehasarian	HP-7 Sproul	Theater	
	Ballroom C	Break 9:15–9:30 a.m. Lobby			Joint Session on Atmospheric Plasma Technologies				JAPT-5 Pappas <i>Invited</i>		JAPT-6 Premkumar		Ballroom C	
	Ballroom D				Emerging Technologies		E-1 Martin <i>Invited</i>		E-2 Brucker	E-3 B. Ali	E-6 Schuelke	E-5 Frach		Ballroom D
	Ballroom EFG				Vacuum Web Coating		W-1 Hodgson <i>Invited</i>	W-2 Louch	W-3 Kleinhempel	W-6 Barker	W-7 Dutson	WFT-2 Tullo		Ballroom EFG
	Exhibit Hall													

Technology Forum Breakfast 7:00–8:15 a.m. Great America 1 & 2		8:30 a.m.	8:50 a.m.	9:10 a.m.	9:30 a.m.	9:50 a.m.	10:10 a.m.	10:30 a.m.	10:50 a.m.	11:10 a.m.	11:30 a.m.	11:50 a.m.	12:10 p.m.												
Tuesday Morning	Ballroom C	Joint Session on Atmospheric Plasma Technologies					Break 10:10–10:30 a.m. Exhibit Hall and DC Lobby		JAPT-12 D. Schultz					Ballroom C											
	Ballroom D	Optical Coating		O-1 Fuller		O-2 Tikhonravov <i>Invited</i>			O-3 U. Schulz		O-5 Schallenberg <i>Invited</i>	O-4 Cushing	O-7 Willey	O-8 J. Shao	Ballroom D										
	Ballroom EFG	Large Area Coating		L-1 Blacker <i>Invited</i>	L-2 West	L-3 Bellido-Gonzales			L-4 Nyderle	L-5 Ikeda	L-6 Green	L-7 Pflug <i>Invited</i>		L-8 Blondeel	Ballroom EFG										
	Exhibit Hall	The Exhibit is Open! 10:00 a.m.–5:00 p.m.											Exhibit Hall												
													Innovators Showcase—see presenter details on page 14												
													IS-1 10:30	IS-2 10:40	IS-3 10:50	IS-4 11:00	IS-5 11:10	IS-6 11:20	IS-7 11:30	IS-8 11:40	IS-9 11:50				

		8:30 a.m.	8:50 a.m.	9:10 a.m.	9:30 a.m.	9:50 a.m.	10:10 a.m.	10:30 a.m.	10:50 a.m.	11:10 a.m.	11:30 a.m.	11:50 a.m.	12:10 p.m.					
Wednesday Morning	Ballroom B	Plasma Processing		P-4 Walton	P-5 Nyets <i>Invited</i>		P-6 Creatore	P-7 Spatenka	P-8 Carter	P-9 Bergmann	P-10 T. Engemann	P-11 S. Lee	Ballroom B					
	Ballroom C	Tribological and Decorative Coating				T-6 Kolk <i>Invited</i>		T-13 Tietema	T-14 Bewilogua	T-15 Scheibe		Break 10:10–10:30 a.m. Lobby		T-16 Davies <i>Invited</i>	T-17 Coulter	T-18 Zubizarreta	T-19 T. Kaarianen	Ballroom C
	Ballroom D	Optical Coating		O-9 Larouche <i>Invited</i>		O-10 Verly	O-26 Baldwin	O-12 Frach		O-13 Thielsch	O-14 Batista*	O-15 Fuechsel	O-16 J.H. Yang	Ballroom D				
	Ballroom EFG	Symposium on Cleantech Energy, Storage & Related Processes						CT-5 Smestad <i>Invited</i>		CT-6 Schmid <i>Invited</i>	CT-7 Shah		CT-8 Sittinger <i>Invited</i>	CT-9 Creatore	CT-10 Ozimek	CT-24 Teixeira	Ballroom EFG	

		8:30 a.m.	8:50 a.m.	9:10 a.m.	9:30 a.m.	9:50 a.m.	10:10 a.m.	10:30 a.m.	10:50 a.m.	11:10 a.m.	11:30 a.m.	11:50 a.m.	12:10 p.m.		
Thursday Morning	Ballroom C	Vacuum Web Coating		W-15 Louch	W-16 Fahlteich	W-17 Yanagihara	W-18 Dickey	W-19 Guenther	W-20 Lauterbach <i>Invited</i>		W-21 Madocks	W-22 Ricci	WFT-1 McShane		
	Ballroom D	Optical Coating		O-17 M.-L. Kaarianen	O-18 Kessels <i>Invited</i>		O-19 Zhurin	O-20 Martinu	Break 10:10–10:30 a.m. Lobby		O-21 Schmauder	O-22 Sneck	O-25 Maula	O-24 Jin	
	Ballroom EF	Symposium on Cleantech Energy, Storage & Related Processes						CT-16 McGehee <i>Invited</i>		CT-17 M.Thompson	CT-18 Gevorgyan	CT-19 Hauch	CT-20 Y. Yang <i>Invited</i>	CT-21 B.Thompson	CT-22 Berry

Sunday Afternoon and Evening • Mr. Wizard, Don McClure, Theater—1:00 p.m.–4:00 p.m.
• Annual Business Meeting and Plenary Presentation, Billy Johansson, Theater—7:00 p.m.–8:30 p.m. • Welcome Reception, Theater Lobby & Terrace—8:45 p.m.–10:15 p.m.

12:10 p.m.	12:30 p.m.	12:50 p.m.	1:10 p.m.	1:30 p.m.	1:50 p.m.	2:10 p.m.	2:30 p.m.	2:50 p.m.	3:10 p.m.	3:30 p.m.	3:50 p.m.	4:10 p.m.	4:30 p.m.	4:50 p.m.				
Break "Grab & Go" Lunches for Sale in Lobby 11:30 a.m.–1:00 p.m.				Plasma Processing P-1 Han <i>Invited</i>		P-2 You*	P-3 Braithwaite <i>Invited</i>		Poster Session 4:30–8:00 p.m. Exhibit Hall See details below									
Donald M. Mattox Tutorial Michel Moisan 12:30 p.m.–1:10 p.m.				Tribological and Decorative Coating T-1 Erdemir <i>Invited</i>				T-5 Klemberg	T-3 Bergmann	T-4 Leyens	Time Available to Visit the Exhibit Hall! until 8:00 p.m.							
				Vacuum Processes and Coatings for Health Care Applications HC-1 Packer					HC-2 Haubold	HC-3 Roegner <i>Invited</i>						HC-4 Gagnon	HC-5 Rebrov	
				Large Area Coating L-15 Forbes		L-11 Theiss	CT-25 Carneiro	L-13 Lippens	L-14 Nguyen <i>Invited</i>									
										The Exhibit is Open! 3:00 p.m.–8:00 p.m.								

12:10 p.m.	12:30 p.m.	12:50 p.m.	1:10 p.m.	1:30 p.m.	1:50 p.m.	2:10 p.m.	2:30 p.m.	2:50 p.m.	3:10 p.m.	3:30 p.m.	3:50 p.m.	4:10 p.m.	4:30 p.m.	4:50 p.m.	
Visit the Exhibit until 5:00 p.m.				Tribological and Decorative Coating T-7 J.H. Yang					T-8 Beyene	T-9 Misiano	T-10 Santana	T-11 Barriga	Visit the Exhibit until 5:00 p.m.		
L-9 Duckham				Symposium on Cleantech Energy, Storage and Related Processes L-10 Wegener <i>Invited</i>					CT-1 Haendel	CT-2 George	CT-3 Kaiser	CT-4 Patrin			
				12:00 p.m. Lunch in the Exhibit Hall										3:30 p.m.–5:00 p.m. Beer Blast—Exhibit Hall	
Live Product Demonstrations LPD-1 12:10 LPD-2 12:45 LPD-2 1:20				20 minute Break	Innovators Showcase—see presenter details on page 14 IS-10 2:00 IS-11 2:10 IS-12 2:20 IS-13 2:30 IS-14 2:40 IS-15 2:50					Networking Event The Tech Museum of Innovation, San Jose 6:00 p.m.–10:00 p.m.					

12:10 p.m.	12:30 p.m.	12:50 p.m.	1:10 p.m.	1:30 p.m.	1:50 p.m.	2:10 p.m.	2:30 p.m.	2:50 p.m.	3:10 p.m.	3:30 p.m.	3:50 p.m.	4:10 p.m.	4:30 p.m.	4:50 p.m.
Break "Grab & Go" Lunches for Sale in Lobby 11:30 a.m.–1:00 p.m.				Process Modeling and Control A-1 Wolden <i>Invited</i>		A-2 Bellido-Gozales	A-9 Schwarzler	A-4 S. Smith	Break 3:10–3:30 p.m. Lobby					
Donald M. Mattox Tutorial Erich Bergmann 12:20 p.m.–1:00 p.m.				Vacuum Web Coating W-8 May		W-9 McClure <i>Invited</i>		W-10 Assender		W-11 Field <i>Invited</i>		W-12 Jack	W-13 Mount	W-14 Yializis
				HIPIMS HP-8 Hala*		HP-9 Gudmundsson	HP-10 Hecimovic*	HP-11 Bradley	HP-12 Abraham	HP-13 Helmersson	HP-14 Vergoehl	HP-15 Sittinger	HP-16 Chistyakov	HP-17 Klimszak
				Symposium on Cleantech Energy, Storage and Related Processes Clean Tech Venture Forum				CT-11 Demiryont <i>Invited</i>		CT-12 Granqvist	CT-13 Becker	CT-14 M. Schultz*	CT-15 Horakova	L-12 Szyszka

Poster Session
Exhibit Hall
 Monday May 11, 4:30 p.m.–8:00 p.m.

Poster-1 Ho	Poster-13 Gerdes
Poster-3 Siemens	Poster-14 Esparza
Poster-4 Gotzmann	Poster-15 Yadin
Poster-5 Klemberg-Sapieha	Poster-16 Sequeda Osorio
Poster-6 Yalin	Poster-17 Sequeda Osorio
Poster-7 Yan	Poster-18 Sequeda Osorio
Poster-8 Biedermann	Poster-19 Sequeda Osorio
Poster-9 Domaradzki	Poster-20 Lapp
Poster-10 Orthner	Poster-21 Eichler

Heuréka! Session
Ballroom EFG
 Monday May 11, 7:30 p.m.–9:20 p.m.

7:30 p.m. H-1 Bethke	8:40 p.m. H-4 Han
8:00 p.m. H-2 Pellymouter	9:00 p.m. H-5 Chistyakov
8:20 p.m. H-3 Mahoney	

"Meet the Experts" Corner
Upper Level—Room 207
 1:30 p.m.–2:30 p.m.

Monday
 Don McClure and Bill Sproul

Tuesday
 Artutiu Ehasarian and Mariadriana Creatore

Wednesday
 George Dobrowolski and Roel Tietema

*Sponsored Student Presentation

Technical Program Schedule **Tuesday**

10:30 a.m. L-5 Thickness Dependence of Electron Transport in Polycrystalline SnO₂:F Films

T. Ikeda, H. Odaka, and T. Oyama, Asahi Glass Co., Ltd., Kanagawa, Japan

10:50 a.m. L-6 Spatio-Temporal Measurements of Plasma Properties in an AC Magnetron Source Using an Automated Boxcar Langmuir Probe

P. Greene and P. Brillhart, Applied Materials, Fairfield, CA; and B. VornDick and S. Shannon, North Carolina State University, Raleigh, NC

11:10 a.m. L-7 Design Tools and Simulations for Plasma Processing in Large Area Coating

Invited 40 min. Talk

A. Pflug, M. Siemers, and B. Szyszka, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

11:50 a.m. L-8 Higher Performing Cylindrical Target Materials and Rotating Sputter Magnetrons Meeting the Upcoming Challenges for PV Applications

A. Blondeel, N. Carvalho, and W. De Bosscher, Bekaert Advanced Coatings, Deinze, Belgium

12:10 p.m. L-9 Stress-Free Bonding of Large Linear Sputtering Targets for LCD Displays

A. Duckham, H.B. Parker, T.J. Acchione, M.A. Curran, and J.E. Newson, Reactive NanoTechnologies, Inc., Hunt Valley, MD

SVC Exhibit Opens!

10:00 a.m.-5:00 p.m.

Don't miss the only exhibit dedicated to Vacuum Coating Technologies!

Lunch in the Exhibit Hall from 12:00 p.m.-1:00 p.m. (*bring ticket*)

Vendor Innovators Showcase

Tuesday Morning, May 12

Exhibit Hall

Moderator: Frank Zimone, *Reactive NanoTechnologies, Inc.*

10:30 a.m. IS-1 Benefits of Aluminum for the Construction of Vacuum Chambers for Use in Large Area Coating and Deposition Systems
K. Coates, J. Bothell, R. Bothell, and E. Jones, Atlas Technologies, Port Townsend, WA

10:40 a.m. IS-2 Dry Pumps - Cost Effective "Green" Vacuum Coating Process Solutions

J. Luby, Edwards Vacuum, Tewksbury, MA

10:50 a.m. IS-3 Design Considerations of Precision Planetary Rotation Systems

J. Oliver, Vacuum Innovations, LLC, Pittsford, NY

11:00 a.m. IS-4 Successful Application of Varian, Inc.'s Unique Remote Assist™ Program for Large Turbomolecular Pumps Used in Vacuum Coating Systems

T.C. Forbes, Varian, Inc., Lexington, MA

11:10 a.m. IS-5 Industrial HiPIMS-Bias Power Supplies

G. Eichenhofer, Solvix SA, Villaz-St. Pierre, Switzerland

11:20 a.m. IS-6 Recent Innovations in *In Situ* Optical Monitoring

S. Hicks, Intellevation Ltd., Glasgow, United Kingdom

11:30 a.m. IS-7 Current and Future Development of Arbitrary Voltage Waveform Pulsed Plasma Generators

R. Chisyakov and B. Abraham, Zond Inc./Zpluser, LLC, Mansfield, MA

11:40 a.m. IS-8 COPRA 300-Radio Frequency Plasma Source for Enhancement to Existing PVD Coaters

W. Schwärzler and M. Kessler, Provac AG, Balzers, Principality of Liechtenstein; and D. Gary, Ricmar Sales and Service Inc., Aptos, CA

11:50 a.m. IS-9 Optimized Magnetic Designs for Rotatable Magnetron Technology

V. Bellido-Gonzales, M. Holik, and D. Monaghan, Gencoa Ltd., Liverpool, United Kingdom (presented by S. Williams, Gencoa Ltd., San Francisco, CA)

12:00 p.m. Break for lunch in the Exhibit Hall (bring ticket).

Program resumes at 2:00 p.m. after the Live Product Demonstrations.

Live Product Demonstrations

Tuesday Afternoon, May 12

Exhibit Hall

Moderator: Frank Zimone, *Reactive NanoTechnologies, Inc.*

12:10 p.m. LP-1 A Demonstration of Theory and Methods for Cost-Effective Nanoindentation

N. Randall and E. Skopinksi, CSM Instruments, Needham, MA

12:45 p.m. LP-2 Demonstration of Sputter Target Bonding at Room Temperature Using NanoFoil®

M. O'Neill and A. Duckham, Reactive NanoTechnologies, Inc., Hunt Valley, MD

1:20 p.m. LP-3 Better Utilization with Cylindrical Magnetron

R. Newcomb and J. Hrebik, Angstrom Sciences Inc., Duquesne, PA

Vendor Innovators Showcase

Tuesday Afternoon, May 12

Exhibit Hall

Moderator: Frank Zimone, *Reactive NanoTechnologies, Inc.*

2:00 p.m. IS-10 Advanced Sputter Magnetrons and Linear Ion Sources
J. Madocks, General Plasma, Inc., Tucson, AZ

2:10 p.m. IS-11 Controlling Utilization and Uniformity

R. Newcomb, Angstrom Sciences, Inc., Duquesne, PA

2:20 p.m. IS-12 Technology Update: NanoBonding of Sputter Targets

M. O'Neill and A. Duckham, Reactive NanoTechnologies, Inc., Hunt Valley, MD

2:30 p.m. IS-13 Deposition Tolerant Langmuir Probe

D. Gahan, National Centre for Plasma Science and Technology, Dublin, Ireland; and B. Dolinaj and M.B. Hopkins, Impedans Ltd., Dublin, Ireland

2:40 p.m. IS-14 Investigation of Creep Behaviour with a New Innovative Nanoindentation Tester

N. Conte and R. Consiglio, CSM Industries SA, Peseux, Switzerland; and N. Randall and E. Skopinksi, CSM Instruments Inc., Needham, MA

2:50 p.m. IS-15 Surface Modification by 3D Nano Coatings

M. Fliedner, Cotec GmbH, Karlstein, Germany

Tuesday Afternoon, May 12

"Meet the Experts" Corner

Monday Afternoon, May 11

Room 207, Upper Level

1:30 p.m.-2:30 p.m.

Bring Questions to Experts and Solve Your Problems!

Plasmas for Processing

Facilitators: Arutian Ehasarian, *Sheffield Hallam University* and Mariadriana Creatore, *Eindhoven University of Technology*

Plasmas can be used in so many ways at low pressure up to atmospheric pressure and with low to very high density. These experts will discuss HIPIMS and all aspects of plasma processing.

Tribological and Decorative Coating

Tuesday Afternoon, May 12

Ballroom D

Moderators: Jolanta Klemberg-Sapieha, *École Polytechnique de Montréal*, Canada and Kent Coulter, *Southwest Research Institute*

1:30 p.m. T-7 The Morphology of Sn Thin Films on Plastic Substrates Deposited with Sputtering and Thermal Evaporation

J.H. Yang, J.I. Jeong, Y.H. Park, and K.H. Lee, Research Institute of Industrial Science and Technology, Pohang, Korea

Technical Program Schedule Tuesday/Wednesday

1:50 p.m. T-8 Plasma-Based Deposition of Dielectric/Metal Nanocomposite Films Exhibiting Surface Plasmon Resonance Effects for the Production of Hard and Uniform Coloured Coatings

H.T. Beyene, Materials Innovation Institute, Delft, The Netherlands; and M. Creatore and M.C.M van de Sanden, Eindhoven University of Technology, Eindhoven, The Netherlands

2:10 p.m. T-9 New Cost-Effective Titanium Based Protective and Decorative Coatings by Ion Plating Plasma Assisted IPPA

C. Misiano, Romana Film Sottili, Rome, Italy; and P. Matarazzo and M. Pezzilli, Romana Film Sottili, Anzio, Italy

2:30 p.m. T-10 Broadening the Application Window of Ternary Zr Compounds by Using HIPIMS

A. Santana, Ionbond, Olten, Switzerland; A. Hieke, Ionbond Netherlands b.v., Venlo, The Netherlands; R. Fontana, Ionbond North East, Rockaway, NJ; and G.J. van der Kolk, Ionbond Netherlands b.v., Venlo, The Netherlands

2:50 p.m. T-11 Decorative Coatings Obtained by Combination of PVD, Galvanic and Powder Coatings

J. Barriga, Fundación Tekniker, Eibar, Spain; C. Schrauwen, TNO Science and Industry, Eindhoven, The Netherlands; D. Gawne, London South Bank University, London, United Kingdom; C. Zubizarreta, Fundación Tekniker, Eibar, Spain; and A. Hovestad, TNO Science and Industry, Eindhoven, The Netherlands

Symposium on Cleantech Energy Conversion, Storage and Related Processes

Large Area Coating

Tuesday Afternoon, May 12

Ballroom EFG

Moderator: Michael Andreasen, AGC Flat Glass North America

1:30 p.m. L-10 North America - The Next Solar Growth Market
Invited 40 min. Talk

E. Wegener and P. Thompson, AGC Flat Glass North America, Alpharetta, GA

2:10 p.m. CT-1 Silicon Oxide Barrier Layers on Flexible Metal Substrates for Thin Film Photovoltaic Produced by High Rate EB-Deposition for Large Area Coatings

F. Haendel, H. Morgner, and C. Metzner, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany

2:30 p.m. CT-2 PECVD Thin Films for Anti-Reflection and Passivation of Crystalline Silicon Solar Cells

M. George, H. Chandra, and J.E. Madocks, General Plasma, Inc., Tucson, AZ

2:50 p.m. CT-3 Stochastic Nanostructures on Polymers for Solar Applications

N. Kaiser, K. Fuechsel, U. Blumrueder, P. Munzert, and U. Schulz, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

3:10 p.m. CT-4 Web and Inline System Optimization Utilizing Thermal Sources for Thin Film Solar

J. Patrin and R. Brasnahan, Veeco Instruments, St. Paul, MN; and D.L. Miller, Consultant, Valley Center, CA

SVC Exhibit Beer Blast!

3:30 p.m.-5:00 p.m. Hosted by VON ARDENNE

Wednesday Morning, May 13

Plasma Processing

Wednesday Morning, May 13

Ballroom B

Moderator: James Bradley, University of Liverpool, United Kingdom

8:30 a.m. P-4 Plasma-Based Approach to Controlling the Oxygen Concentration in Graphene Oxide

S.G. Walton, E.H. Lock, and M. Baraket, Plasma Physics Division, U.S. Naval Research Laboratory, Washington, DC; P.E. Sheehan and Z. Wei, Chemistry Division, U.S. Naval Research Laboratory, Washington, DC; and J.T. Robinson and E.S. Snow, Electronics Division, U.S. Naval Research Laboratories, Washington, DC

8:50 a.m. P-5 Modeling the Plasma Growth of Carbon Nanostructured Materials

Invited 40 min. Talk

E. Neyts, M. Eckert, A. Maeyens, and A. Bogaerts, University of Antwerp, Antwerp, Belgium

9:30 a.m. P-6 Film Microstructure Characterization of Plasma-Deposited SiO₂-Like Films

M. Creatore, N.M. Terlinden, G. Aresta, and M.C.M van de Sanden, Eindhoven University of Technology, Eindhoven, The Netherlands

9:50 a.m. P-7 Plasma Treatment of Micropowder - From Laboratory Experiments to Production Plant

P. Špatenka, Technical University in Liberec, Liberec, Czech Republic and University of South Bohemia, Ceske Budejovice, Czech Republic; J. Hladík, Department of Material Science, Technical University of Liberec, Liberec, Czech Republic; and M. Peciar, Institute of Process and Fluid Engineering, Slovak University of Technology in Bratislava, Bratislava, Slovakia

10:10 a.m.-10:30 a.m. Break

10:30 a.m. P-8 Detecting and Preventing Instabilities in Plasma Processes

D.C. Carter and V.L. Brouk, Advanced Energy Industries, Inc., Fort Collins, CO

10:50 a.m. P-9 Pulsed Heating for Plasma Assisted Processes, Principles and Application

E. Bergmann and A. Houbbi, University of Applied Science of Western Switzerland, Geneva, Switzerland; and B. Pecz and L. Toth, Muszaki Fizikai és Anyagtudományi Kutatóintézet, Budapest, Hungary

11:10 a.m. P-10 Recent Advances in APP-Based Food and Non-Food Decontamination/Sterilization

J. Engemann, JE PlasmaConsult GmbH, Wuppertal, Germany (presented by T. Engemann, JE Plasma Consult, Wuppertal, Germany)

11:30 a.m. P-11 Plasma Enhanced PVD Coatings for 120mm and 155mm Barrel Applications

S.L. Lee, U.S. Army ARDEC-Benét Laboratories, Watervliet, NY; R. Wei, Southwest Research Institute, San Antonio, TX; M. Todaro, U.S. Army ARDEC-Benét Laboratories, Watervliet, NY; E. Langa, Southwest Research Institute, San Antonio, TX; and S. Smith, U.S. Army ARDEC-Benét Laboratories, Watervliet, NY

Tribological and Decorative Coating

Wednesday Morning, May 13

Ballroom C

Moderators: Michael Drory, Timken Technology Center and Klaus Bewilogua, Fraunhofer Institute for Surface Engineering and Thin Films IST, Germany

8:30 a.m. T-6 Present Status of Carbon Based Cutting Tool Coatings for Soft Alloy Workpiece Materials

40 Minute Talk

G.J. van der Kolk, Ionbond Netherlands, Venlo, The Netherlands; and E. Damond, Ionbond France, Chassieu, France

9:10 a.m. T-13 DLC Base Coating on Plastics as Support for Scratch Resistant Decorative Finishes

P. Peeters, I. Kolev, J. Landsbergen, R. Tietema, and T. Krug, Hauzer Techno Coating BV, Venlo, The Netherlands

9:30 a.m. T-14 Advanced Magnetron Sputter Technique for Deposition of Superhard a-C:H Coatings

K. Bewilogua, M. Keunecke, H. Thomsen, and R. Wittorf, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany; Y. Ivanov, SVS Vacuum Coating Technologies GmbH & Co. KG, Karlstadt, Germany; and T. Zufass, Systec GmbH & Co. KG, Karlstadt, Germany

Technical Program Schedule **Wednesday**

9:50 a.m. T-15 Influence of Surface Roughness on the Tribological Performance of Superhard Amorphous Carbon Films
H.-J. Scheibe, A. Leson, and V. Wehnacht, Fraunhofer Institute for Material and Beam Technology IWS, Dresden, Germany

10:10 a.m.-10:30 a.m. Break

10:30 a.m. T-16 How Substrate Constraints Affect the Performance of Thin Film Coatings Under Dynamic Impact Loading

Invited 40 min. Talk

L.V. Davies, Caterpillar, Inc., Peoria, IL

11:10 a.m. T-17 Erosion, Corrosion and Wear Resistance and Microstructure of Diamond-Like Carbon (DLC) Coatings Prepared Using a Mesh Method

R. Wei, M. Jakab, V. Poenitzsch, and K. Coulter, Southwest Research Institute, San Antonio, TX

11:30 a.m. T-18 Adhesion of ZrCN Decorative PVD Coatings on Nickel Electroplated Substrates: Effect of Stresses

C. Zubizarreta, J. Goikoetxea, J. Barriga, U. Ruiz-Gopegui, and B. Coto, Fundación Tekniker, Eibar, Spain

11:50 a.m. T-19 ALD-Deposited Nanometer Scale Metal Oxide Films as Adhesion Promoters for Sputtered Metal and Ceramic Coatings on PMMA

T. Kaariainen and D.C. Cameron, Lappeenranta University of Technology, Mikkeli, Finland

Optical Coating

Wednesday Morning, May 12

Ballroom D

Moderators: Uwe Schallenberg, *mso jena Mikroschichtopik GmbH*, Germany and Angus Macleod, *Thin Film Center, Inc.*

8:30 a.m. O-9 Recent Advances in the Design of Optical Filters with Arbitrary Intermediate Refractive Indices

Invited 40 min. Talk

S. Larouche, Pratt School of Engineering, Duke University, Durham, NC

9:10 a.m. O-10 Antireflection Coating Design by Fourier Frequency Filtering with Frequency Range Adjustments

P. Verly, National Research Council of Canada, Ottawa, Canada

9:30 a.m. O-26 Synthesis Route to Garnet and Perovskite Thin Films via Quad-Reactive Co-Sputter Deposition of Amorphous Non-Equilibrium Alloy Oxides and Subsequent Annealing

D. Baldwin, 4Wave, Inc., Sterling, VA; M. Martyniuk and R.C. Woodward, The University of Western Australia, Perth, Australia; and R.D. Jeffery, Panorama Synergy Ltd., Balcatta, Australia

9:50 a.m. O-12 Multifunctional Optical Coatings on Polymers Deposited by Pulse Magnetron Sputtering and Magnetron Enhanced PECVD

P. Frach, H. Bartzsch, K. Taeschner, J. Liebig, and E. Schultheiss, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany

10:10 a.m.-10:30 a.m. Break

Moderators: Bryant Hichwa, *Sonoma State University* and Ludvik Martinu, *École Polytechnique de Montréal*, Canada

10:30 a.m. O-13 On the Influence of Surface and Interface Roughness on the Optical Performance of Silver Based Stacks Deposited onto Plastic Film

R. Thielsch, R. Kleinhempel, T. Boehme, and A. Wahl, Southwall Europe GmbH, Grossroehrsdorf, Germany

10:50 a.m. O-14 Mo- and In-Doped VO₂ Thermo-chromic Coatings Grown by Reactive DC Magnetron Sputtering

Sponsored Student Presentation

C. Batista, V. Teixeira, and R.M. Ribeiro, Department of Physics, University of Minho, Braga, Portugal

11:10 a.m. O-15 Optical Properties of ITO Thin Films Produced by Plasma Ion-Assisted Evaporation and Pulsed DC Sputtering
K. Fuechsel, U. Schulz, N. Kaiser, and A. Tuennermann, Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena, Germany

11:30 a.m. O-16 Low Temperature Deposition of Indium-Tin Oxide Films Using Magnetron Sputtering

J.I. Jeong and J.H. Yang, Research Institute of Industrial Science and Technology, Pohang, Korea

Symposium on Cleantech Energy Conversion, Storage and Related Processes

Thin Film Photovoltaics

Wednesday Morning, May 13

Ballroom EFG

Moderators: Wolfgang Diehl and Volker Sittinger, *Fraunhofer Institute for Surface Engineering and Thin Films IST*, Germany

8:30 a.m. CT-5 Basic Economics of Photovoltaics for Vacuum Coaters
Invited 40 min. Talk

G. Smestad, Sol Ideas Technology Development, San Jose, CA

9:10 a.m. CT-6 A Turnkey Approach for CIGS Thin Film Photovoltaic Production

Invited 40 min. Talk

D. Schmid, I. Koetschau, A. Kampmann, and T. Hahn, centrotherm photovoltaics AG, Blaubeuren, Germany

9:50 a.m. CT-7 TiO₂-Ge Nanocomposites for Solar Cells Applications
S.I. Shah and B. Ali, University of Delaware, Newark, DE; and M. Abbas, COMSATS Institute of Technology, Islamabad, Pakistan

10:10 a.m.-10:30 a.m. Break

10:30 a.m. CT-26 Survey of Thin Film Solar Cell Technology in Germany

Invited 40 min. Talk

V. Sittinger, W. Diehl and B. Szyszka, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

11:10 a.m. CT-9 A Novel Approach for Thin-Film Crystalline Silicon on Glass

K. Sharma, A. Illiberi, A. Branca, M. Creatore, and M.C.M. van de Sanden, Eindhoven University of Technology, Eindhoven, The Netherlands

11:30 a.m. CT-10 Progressive DC Power for TCO Deposition
D. Ochs, HUETTINGER Elektronik GmbH + Co. KG, Freiburg, Germany; and P. Rozanski and P. Ozimek, HUETTINGER Electronic Sp. z O.O., Zielonka, Poland

11:50 a.m. CT-24 Mechanical Behaviour Study on Conductive Polymer and TCO Thin Films on PET for Smart Flexible Devices

V. Teixeira, J.O. Carneiro, P. Carvalho, and S. Lanceros, University of Minho, Guimarães, Portugal; and A. Cochet, U. Posset, and G. Schottner, Fraunhofer Institut für Silicatforschung ISC, Würzburg, Germany

Wednesday Afternoon, May 13

"Grab and Go" Lunches for Sale 11:00 a.m.-1:30 p.m.
Pick up lunch in the Lobby to bring to the Tutorial.

The Donald M. Mattox Tutorial Program

Wednesday Afternoon, May 13

Ballroom EFG

12:20 p.m. - 1:00 p.m.

Coatings for Automotive Applications



Presenter: Erich Bergmann, *École D'ingénieurs de Genève, University of Applied Science of Western Switzerland*, Switzerland

Wear protecting PVD coatings were first introduced on a large scale to automotive applications in the early eighties; AlSn₂₀Co nanocomposite coatings on conrod bearings were the materials which enabled the introduction of the first turbocharged diesel engines. However, the big wave started with the introduction of the WC/C coatings for the new hydraulic cam followers of the common rail system by Balzers/Bosch/INA. From then on, the application of PVD coatings spread quickly to

Technical Program Schedule Wednesday

a wide range of components. PVD coatings for automotive components have become the fastest growing sector of PVD wear protection coatings and the main enabler of innovations in cars. Today PVD coatings can be found in almost every system of a car. This tutorial will present the requirements and wear mechanisms of the most important subsystems of cars and compare them with the PVD coatings currently used. A special focus will be given to the recent and current developments for engine components.

“Meet the Experts” Corner

Wednesday Afternoon, May 13

Room 207, Upper Level

1:30 p.m.-2:30 p.m.

Bring Questions to Experts and Solve Your Problems!

Optical and Tribological Coatings

Facilitators: George Dobrowolski, *National Research Council of Canada*, (retired) and Roel Tietema, *Hauzer Techno Coating BV*

There are many similarities between optical and tribological coatings such as the need to control coating stoichiometry, density and stress levels. Join these experts to discuss these and other issues pertinent to both Optical and Tribological coatings.

Process Modeling and Control

Wednesday Afternoon, May 13

Ballroom B

Moderators: Dan Carter, *Advanced Energy and Industries* and Colin Quinn, *Veeco Instruments, Inc.*

1:30 p.m. A-1 Fundamental Understanding of Pulsed PECVD Through Diagnostics and Modeling

Invited 40 min. Talk

C.A. Wolden, Colorado School of Mines, Golden, CO

2:10 p.m. A-2 Optimizing Sputter Processes via 3D Magnetic and Plasma Simulations

D. Monaghan, M. Holik, and V. Bellido-Gonzales, Gencoa Ltd., Liverpool, United Kingdom; and J. Bradley, Liverpool University, Liverpool, United Kingdom

2:30 p.m. A-3 Simulation Analysis of Plasma Discharge Anomalies in PVD and PECVD Processes

M. Siemers, A. Pflug, and B. Szyszka, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

2:50 p.m. A-9 Advanced Radio Frequency Plasma Enhanced Evaporation and its Advantages

W. Schwärzler, Provac AG, Balzers Principality of Liechtenstein and D. Gary, Ricmar Sales and Service Inc., Aptos, CA

3:10 p.m.-3:30 p.m. Break

3:30 p.m. A-7 The Modeling of Large and Distributed Vacuum Systems

J. Luby, Edwards Vacuum, Tewksbury, MA; A. Chew, Edwards Vacuum, Crawley, United Kingdom; and M. Galtry, Edwards Vacuum, Shoreham, United Kingdom

3:50 p.m. A-6 Differential Sputter Yield Measurements of Single- and Multi-Element Targets Due to Ion Beam Bombardment

A. Yalin, B. Rubin, J. Topper, and C. Farnell, Colorado State University, Fort Collins, CO

4:10 p.m. A-8 Development of Me-DLC Films for Strain Gauge Applications

R. Bandorf, U. Heckmann, S. Schnabel, M. Luebke, and G. Braeuer, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

Vacuum Web Coating

Wednesday Afternoon, May 13

Ballroom C

Moderator: Dick Swisher, *Swisher and Associates*

1:30 p.m. W-8 Roll-to-Roll Deposition for OLED Lighting Devices

C. May, S. Mogck, and J. Amelung, Fraunhofer IPMS, Dresden, Germany

2:10 p.m. W-9 Opportunities and Challenges in Flexible Electronics
Invited 40 min. Talk

D.J. McClure, 3M Corporate Research, St. Paul, MN

2:50 p.m. W-10 Pentacene Deposition for Vacuum Web Coated Organic Transistors

G.A.W. Abbas and H.E. Assender, University of Oxford, Oxford, United Kingdom

3:10 p.m.-3:30 p.m. Break

3:30 p.m. W-11 Sputtering Synthesis of Antimicrobial Materials and Associated Process Optimization Approaches to Remain Competitive in Global Markets

Invited 40 min. Talk

D. Field, NUCRYST Pharmaceuticals, Fort Saskatchewan, Canada

4:10 p.m. W-12 In-Register In-Vacuum Pattern Printing: From Wish to Reality

N. Copeland and L. Harland, General Vacuum Equipment, Heywood, United Kingdom (presented by A. Jack, General Vacuum Equipment, Heywood, United Kingdom)

4:30 p.m. W-13 Impact of Metallizing Process Parameters on Metal Deposition, Optimum Film Properties and Converting Performance

E. Mount, EMMOUNT Technologies, LLC, Canandaigua, NY

4:50 p.m. W-14 Multi-Layer, Low Emissivity Materials

A. Yializis and S. Yializis, Sigma Technologies International, LLC, Tucson, AZ

Hot Topic Session on High Power Impulse Magnetron Sputtering (HIPIMS)

Wednesday Afternoon, May 13

Ballroom D

Moderator: Arutiun Ehasarian, *Sheffield Hallam University*, United Kingdom

1:30 p.m. HP-8 Analysis of Reactive HIPIMS Discharge Based on Time- and Space-Resolved Optical Emission Spectroscopy

Sponsored Student Presentation

M. Hala, N. Viau, O. Zabeida, J. Klemberg-Sapieha, and L. Martinu, École Polytechnique de Montréal, Montréal, Canada

1:50 p.m. HP-9 A Langmuir Probe Study of the Plasma Parameters in the HiPIMS Discharge

J.T. Gudmundsson, University of Iceland, Reykjavik, Iceland; and P. Larsson, D. Lundin, and U. Helmersson, Linköping University, Linköping, Sweden

2:10 p.m. HP-10 Spatial and Temporal Evolution of Ion Energies in HIPIMS Plasma Discharge

Sponsored Student Presentation

A. Hecimovic and A.P. Ehasarian, Sheffield Hallam University, Sheffield, United Kingdom

2:30 p.m. HP-11 The Temporal and Spatial Evolution of Ion Energies in HIPIMS Discharges

J.W. Bradley and A. Mishra, University of Liverpool, Liverpool, United Kingdom; and P. Kelly, Manchester Metropolitan University, Manchester, United Kingdom

2:50 p.m. HP-12 Arbitrary Voltage Pulse Shape Plasma Generator with RF Capabilities for Material Processing

R. Chistyakov and B. Abraham, Zond Inc./Zpulser LLC, Mansfield, MA

3:10 p.m.-3:30 p.m. Break

3:30 p.m. HP-13 Reactive Sputtering Using HiPIMS

M. Aiempnanakit and E. Wallin, Linköping University, Linköping, Sweden; W. Moller, Forschungszentrum Dresden-Rossendorf, Dresden, Germany; and U. Helmersson, Linköping University, Linköping, Sweden

3:50 p.m. HP-14 Progress in Process Control of High Rate HiPIMS Processes for Optical Thin Films

M. Vergoehl, O. Werner, and S. Bruns, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

Technical Program Schedule Wednesday/Thursday

4:10 p.m. HP-15 Heat Treatable TCO Film for Position 1 Based on HIPIMS

V. Sittinger, F. Horstmann, W. Boentoro, W. Werner, and B. Szyszka, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

4:30 p.m. HP-16 Modulated Pulse Power Deposition of ITO, Silicon and Silver Coatings

R. Chistyakov and B. Abraham, Zond Inc./Zpulser LLC, Mansfield, MA; W.D. Sproul, Reactive Sputtering, Inc., San Marcos, CA; and J.J. Moore and J. Lin, Colorado School of Mines, Golden, CO

4:50 p.m. HP-17 HIPIMS Power Supply Requirements, A Guide to Selecting a Supply

D. Ochs, Huettinger Elektronik GmbH + Co., Freiburg, Germany; R. Spencer, Alacritas Consultancy Ltd., Markfield, United Kingdom; and P. Ozimek, Huettinger Electronic Sp. Z O.o., Warsaw, Poland (presented by A. Klimczak, Huettinger Electronic Sp. Z.O.o., Warsaw, Poland)

Symposium on Cleantech Energy Conversion, Storage and Related Processes

Venture Forum

Wednesday Afternoon, May 13

Ballroom EFG

1:30 p.m.-2:30 p.m.

Moderators: Carl Lampert, *Star Science* and Michael Andreasen, *AGC Flat Glass North America*

Join the Symposium on Cleantech Energy Conversion, Storage and Related Processes Venture Forum, where some of the best people in Cleantech venture, utility and solar business areas have been invited to share their perspective of the future and emerging business areas and how it will impact the coatings industry.

The Venture Forum Members as of publication are:



Tom Blaisdell, *General Partner, Doll Capital Management*, Menlo Park, CA

With a focus on software, technology-enabled services, media and cleantech, Tom Blaisdell helps DCM portfolio companies create high-growth marketing strategies, structure successful strategic partnerships and build strong management teams.



Michele Kliem, *Senior Director, Applied Ventures LLC*, Santa Clara, CA

Applied Ventures LLC, is the venture capital fund of Applied Materials, Inc. Michele Kliem is responsible for identifying, recommending and managing venture capital investments in solar energy, energy storage, and metrology. She has led the In-line Electrical Metrology

team in Applied Materials' Process and Diagnostics Control (PDC) business group.

We are actively negotiating with some more representatives from the utility and solar industries to be added to the Forum. We look forward to a lively and informative session and we invite you to participate.

Cleantech Symposium Sponsors

Organizers of the Cleantech Symposium would like to thank AGC Flat Glass North America and ChromoGenics Sweden AB for their generous sponsorship.

AGC Flat Glass North America



Smart Materials

Wednesday Afternoon, May 13

Ballroom EF

Moderators: Claes Granqvist, *Uppsala University*, Sweden and Carl Lampert, *Star Science*

2:30 p.m. CT-11 Emissivity Modulating Electrochromic Device
Invited 40 min. Talk

H. Demiryont, Eclipse Energy Systems, Inc., St. Petersburg, FL

3:10 p.m.-3:30 p.m. Break

3:30 p.m. CT-12 New Thermochromic Coatings for Energy Efficient Windows

C.G. Granqvist, N.R. Mlyuka, and G.A. Niklasson, Ångström Laboratory, Uppsala University, Uppsala, Sweden

3:50 p.m. CT-13 Boron-Doped Polycrystalline Diamond Electrodes for Electrochemical Applications

M. Becker and T. Schuelke, Fraunhofer USA, East Lansing, MI; G. Swain, Department of Chemistry, Michigan State University, East Lansing, MI; and J. Asmussen, Department of Electrical and Computer Engineering, Michigan State University, East Lansing, MI

4:10 p.m. CT-14 Visible Light-Active C-Doped TiO₂ Thin Films for Solar Hydrogen Generation

Sponsored Student Presentation

M. Schulz, H.Y. Lin, M. Day, and S.I. Shah, University of Delaware, Newark, DE

4:30 p.m. CT-15 The Properties of Metal Doped TiOx Thin Films Deposited by PVD Method

M. Horakova, Technical University in Liberec, Liberec, Czech Republic; N. Martin and E. Aubry, Institut FEMTO-ST, Besancon, France; P. Spatenka, Technical University in Liberec, Liberec, Czech Republic and University of South Bohemia, Ceske Budejovice, Czech Republic; and P. Hájková, Technical University in Liberec, Liberec, Czech Republic

4:50 p.m. L-12 Reactive Magnetron Sputtering of ZnO:Al, A Status Report

B. Szyszka, V. Sittinger, W. Dewald, A. Pflug, S. Ulrich, A. Kaiser, and W. Werner, Fraunhofer Institute for Surface Engineering and Thin Films IST, Braunschweig, Germany

Thursday Morning, May 14

Vacuum Web Coating

Thursday Morning, May 14

Ballroom C

Moderators: Eldridge Mount, *EMMOUNT Technologies* and Akita Jones, *Avery Dennison*

8:30 a.m. W-15 Efficacy of Flexible Moisture Barrier Films Produced Using a Roll-to-Roll Coater as Measured by the Calcium Test

S. Louch, Centre for Process Innovation, Redcar, United Kingdom; M. Hodgson, Dupont Teijin Films, Middlesbrough, United Kingdom; and S. Edge and K. Luxmore, Centre for Process Innovation, Redcar, United Kingdom

8:50 a.m. W-16 All-in-Vacuum Deposited Transparent Multilayer Barriers on Polymer Substrates

J. Fahlteich, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany

9:10 a.m. W-17 Study of High Gas Barrier Performance of Film with Coated SiOxNy Layers

H. Yanagihara, Mitsubishi Plastics, Nagahama, Japan; C. Ookawara and S. Yoshida, Mitsubishi Plastics, Inc., Ibaraki, Japan; and K. Ohdaira and H. Matsumura, Japan Advanced Institute of Science and Technology, Ishikawa, Japan

9:30 a.m. W-18 High Rate Roll-to-Roll Deposition of ALD Thin Films on Flexible Substrates

E. Dickey and W. Barrow, Lotus Applied Technology LLC, Hillsboro, OR

Technical Program Schedule *Thursday*

9:50 a.m. W-19 Innovative Transparent Barrier for Packaging
S. Guenther, S. Straach, and N. Schiller, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Dresden, Germany

10:10 a.m.-10:30 a.m. Break

10:30 a.m. W-20 Polymer Nanofilms from a Topochemical Deposition/Polymerization Process

Invited 40 min. Talk

J. Lauterbach, Department of Chemical Engineering, University of Delaware, Newark, DE

11:10 a.m. W-21 Plasma Enhanced Chemical Vapor Deposition (PECVD) on Web Using Novel Linear, High Density Plasma Source
M.A. George, H. Chandra, P. Morse, L. Birch, and J. Madocks, General Plasma, Inc., Tucson, AZ

11:30 a.m. W-22 Chemistry of Powder Formation in SiO_x Deposition Plasmas

M. Ricci, J.L. Dorier, and Ch. Hollenstein, École Polytechnique Fédérale de Lausanne (EPFL); and P. Fayet, Tetra Pak (Suisse) SA, Romont, Switzerland

11:50 a.m. WFT-1 Regression Analysis for the Determination of Optical Density

J. McShane and A. Jones, Avery Dennison, Schererville, IN

Optical Coating

Thursday Morning, May 14

Ballroom D

Moderators: James Hilfiker, J.A. Woolam Co., Inc. and Georg Ockenfuss, JDSU

8:30 a.m. O-17 Titanium Dioxide Thin Films: Their Structure and its Effect on their Photoactivity and Photocatalytic Properties

M.L. Kaariainen, T.O. Kaariainen, and D.C. Cameron, ASTRAL, Lappeenranta University of Technology, Mikkeli, Finland

8:50 a.m. O-18 *In Situ* Spectroscopic Ellipsometry for Atomic Layer Deposition

Invited 40 min. Talk

W.M.M. Kessels, Eindhoven University, Eindhoven, The Netherlands

9:30 a.m. O-19 End-Hall Ion Sources: Improvements, Problems, Future

V.V. Zhurin, Colorado Advanced Technology LLC, Fort Collins, CO

9:50 a.m. O-20 Anisotropic Nonlinear Optical Absorption in Gold Nanorod Nanocomposite Coatings: Theory and Experiment

J.-M. Lamarre, École de Polytechnique de Montréal, Montréal, Canada; F. Billard, Institut Carnot de Bourgogne, Dijon Cedex, France; C. Harkati Kerboua, Université de Montréal, Montreal, Canada; M. Lequime, Institut Fresnel, Marseille Cedex, France; S. Roorda, Université de Montréal, Montréal, Canada; and L. Martinu, École de Polytechnique de Montréal, Montréal, Canada

10:10 a.m.-10:30 a.m. Break

10:30 a.m. O-21 High Reflective Silver Coatings on 3D Plastic Parts for Solar Concentrators

T. Schmauder, S. Kueper, and P. Wohlfahrt, Leybold Optics GmbH, Alzenau, Germany

10:50 a.m. O-22 Optical Coatings on Glass Tubes Made by Atomic Layer Deposition (ALD) Technology

T. Alasaarela, J. Maula, and S. Sneck, Beneq Oy, Vantaa, Finland

11:10 a.m. O-25 ALD (Atomic Layer Deposition) for Optical Coatings

J. Maula, T. Alasaarela, and S. Sneck, Beneq Oy, Vantaa, Finland

11:30 a.m. O-24 Optical Properties and Microstructure of Oxide Sculptured Thin Films by Glancing Angle Deposition

X. Xiao, Y. Jin, H. He, H. Qi, Z. Fan, and J. Shao, Shanghai Institute of Optics and Fine Mechanics, Shanghai, China

Symposium on Cleantech Energy Conversion, Storage and Related Processes

Photovoltaics

Thursday Morning, May 14

Ballroom EF

Moderators: Barry Thompson, University of Southern California and Jens Hauch, Konarka Technologies GmbH, Germany

8:30 a.m. CT-16 An Update on the Center for Advanced Molecular Photovoltaics

Invited 40 min. Talk

M. McGehee, Department of Materials Science and Engineering, Stanford University, Stanford, CA

9:10 a.m. CT-17 New Materials for Organic Photovoltaic Devices
M.E. Thompson, M.D. Perez, K. Mutolo, and C. Schlenker, Department of Chemistry, University of Southern California, Los Angeles, CA

9:30 a.m. CT-18 Advanced Processing of New Materials for Extended Operational Lifetime of Polymer Solar Cells

S. Gevorgyan and F. Krebs, Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Roskilde, Denmark

9:50 a.m. CT-19 Stability Investigations of Organic Photovoltaic Cells

J.A. Hauch, A. Seemann, F.R. Kogler, and P. Schilinsky, Konarka Technologies GmbH, Nuremberg, Germany

10:10 a.m.-10:30 a.m. Break

10:30 a.m. CT-20 Modification of Nanomorphology in Polymer: Fullerene Blends-Route Towards High Efficiency Polymer Solar Cells

Invited 40 min. Talk

Y. Yang, Department of Materials Science and Engineering, University of California Los Angeles, Los Angeles, CA; G. Li and V. Shrotriya, Solarmer Energy Inc., El Monte, CA; and Y. Yao, H.Y. Chen, and S. Sista, Department of Materials Science and Engineering, University of California Los Angeles, Los Angeles, CA

11:10 a.m. CT-21 Supramolecular Approaches for Polymer-Based Solar Cells

B.C. Thompson, University of Southern California, Los Angeles, CA

11:30 a.m. CT-22 Alternative Hole Transport Layers for Organic Photovoltaics

D.C. Olson, J.J. Berry, N.E. Widjonarko, M.S. White, M.O. Reese, and D.S. Ginley, National Renewable Energy Laboratory, Golden, CO

11:50 a.m. CT-23 Large Scale Demonstrations of Polymer Solar Cells as a Tool for Innovation, Cost Analysis and Market Development

T. Nielsen and F. Krebs, Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Roskilde, Denmark

Networking Event at The Tech Museum of Innovation in San Jose



Tuesday Evening, May 12, 2009

6:00 p.m. – 10:00 p.m. Cost per person: \$62

Purchase tickets at the On-Site Registration Counter



On-Location Education Program

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SVC On-Location Education Tutorial Roster

- | | |
|--|---|
| C-101: Nathaniel Sugerman Memorial Short Course—A Primer on Thin Films and Vacuum Technology | C-321: Alternative Transparent Conductive Coatings (TCOs) to ITO |
| C-102: Introduction to Evaporation and Sputtering | C-322: Characterization of Thin Films |
| C-103: Introduction to PVD Processes | C-323: High Power Impulse Magnetron Sputtering |
| C-203: Sputter Deposition | V-201: High Vacuum System Operation |
| C-204: Basics of Vacuum Web Coating | V-202: Vacuum System Gas Analysis |
| C-207: Evaporation as a Deposition Process | V-203: Vacuum Materials and Large System Performance |
| C-208: Sputter Deposition in Manufacturing | V-206: Practical Helium Leak Detection Workshop |
| C-210: Introduction to Plasma Processing Technology | V-207: Practical Aspects of Vacuum Technology: Operation and Maintenance of Production Vacuum Systems |
| C-211: Sputter Deposition onto Flexible Substrates | V-301: Care and Feeding of Mechanical Pumping Systems |
| C-212: Troubleshooting for Thin Film Deposition Processes | V-304: Cryogenic High Vacuum Pumps |
| C-213: Introduction to Smart Materials | M-101: Basic Principles of Color Measurement |
| C-214: Pulsed Plasma Processing | |
| C-301: Optical Coating Design & Monitoring | |
| C-302: Preparation & Properties of Optical Thin Film Materials | |
| C-303: Numerical Methods for Optical Coatings | |
| C-304: ITO and Other Transparent Conductive Coatings: Fundamentals, Deposition, Properties, and Applications | |
| C-306: Nonconventional Plasma Sources and Methods in Processing Technology | |
| C-307: Cathodic Arc Plasma Deposition | |
| C-308: Tribological Coatings | |
| C-310: Plasma Immersion Techniques for Surface Engineering | |
| C-311: Thin Film Growth and Microstructure Evolution | |
| C-312: Process Control for Applications in Large Area Sputtering | |
| C-314: Modification of Plasma Polymer Materials and Plasma Web Treatment | |
| C-315: Reactive Sputter Deposition | |
| C-317: The Practice of Reactive Sputtering | |
| C-318: Nucleation & Growth of Nanostructures | |
| C-319: Introduction to Energy Conversion Materials and Technology | |

Tutorial Classification System

The tutorial codes are intended to provide the prospective attendee with some guidance as to whether the emphasis in the tutorial is primarily on vacuum technology (V code), or vacuum deposition coating processes and technology (C code), or other miscellaneous topics (M code). The tutorial number is intended to indicate the level of tutorial specialization—the lower numbers refer to tutorials that are basic or introductory in nature, and the higher numbers refer to tutorials that offer a more specialized treatment of a specific topic.

For an up-to-date list of tutorial descriptions and instructor biographical sketches, visit www.svc.org and explore the "Education" button on the main page.

For technical questions regarding the tutorial content, contact the SVC Administrative Office at svcinfo@svc.org, or 505/856-7188.

"Fantastic job! This tutorial very much related to the real world. This class was excellent and gave many ideas to implement on the plant floor." — Toma Ljuli, Emrick Plastics (V-207)

"There was a wonderful balance between various industry uses as well as new ideas which could be used across various process types." — Kevin Moreau, Elcan Optical Technologies (C-306)

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Schedule of Events - Program highlights are in color

Sunday – Thursday

Corporate Sponsor Meeting Room – Inquire at the SVC Information Center
All meeting rooms are in the Santa Clara Convention Center (CC) unless otherwise noted.
Presenter/Manuscript Center – CC Lobby – All Presenters Must Check-in Please!

Sunday, May 10, 2009

8:15 a.m.–9:30 a.m. *Education Committee Breakfast Meeting* – Central Room, Hyatt
10:00 a.m.–3:00 p.m. *Board of Directors Meeting* – Cypress Room, Hyatt
1:00 p.m.–4:00 p.m. *Mr. Vacuum Wizard Program* – Theater
4:15 p.m.–4:50 p.m. *TAC Chair and Moderator AV Training Session* – Theater
7:00 p.m.–8:45 p.m. **SVC Business Meeting, Awards Ceremony & Plenary Session** – Theater
Everyone is Welcome.
8:45 p.m.–10:30 p.m. **Welcome Reception** – Theater Foyer and Terrace

Monday, May 11, 2009

7:00 a.m.–8:15 a.m. *Technology Forum Breakfast* – Great America 1 and 2 (upper level of CC)
7:30 a.m. *Companions Breakfast Get Together* – Tresca Private Dining room, Hyatt
8:30 a.m.– 9:15 a.m. **Keynote Presentation** – Theater (Badge or Pass required)
11:00 a.m.–1:30 p.m. *“Grab & Go” Lunches for Sale in CC Lobby Foyer*
12:30 p.m. – 1:10 p.m. **Donald M. Mattox Tutorial Program** – Ballroom EFG (Badge or Pass required)
3:00 p.m.–8:00 p.m. **Exhibit Open Hours** – Exhibit Hall A, B and C
1:30 p.m.–2:30 p.m. *“Meet the Experts” Corner* – Room 207 (upper level of CC)
1:30 p.m.–2:30 p.m. *“Friends of Bill W.” Meeting* – Alameda Room, Hyatt
4:30 p.m.–8:00 p.m. **Poster Session** – Exhibit Hall C
6:00 p.m.–8:00 p.m. *Dinner Buffet* – Exhibit Halls A, B and C
7:30 p.m. – 9:20 p.m. **Heurêka! Late-Breaking News Session** –Ballroom EFG

Tuesday, May 12, 2009

5:45 a.m. **5K Fun Run** – Meet in Hyatt Lobby
7:00 a.m.–8:15 a.m. *Technology Forum Breakfast* – Great America 1 and 2 ((upper level of CC)
7:30 a.m. *Companions Breakfast Get Together* – Tresca Private Dining room, Hyatt
8:30 a.m.–9:30 a.m. *Exhibitor Breakfast* – Exhibit Hall C (badge required)
10:00 a.m.–5:00 p.m. **Exhibit Open Hours** – Exhibit Hall A, B and C
10:30 p.m.–3:30 p.m. **Vendor Innovators Showcase & Live Product Demos** – Exhibit Hall C
12:00 p.m.–1:00p.m. *Lunch (ticket required)* Exhibit Halls
12:15 p.m. – 1:15 p.m. **Young Members Group Meeting** – Ballroom C (Welcome to 18 to 30 year-olds!)
1:30 p.m.–2:30 p.m. *“Meet the Experts” Corner* – Room 207 (upper level of CC)
3:30 p.m.–5:00 p.m. **Exhibit Beer Blast & Best Poster Award** – Exhibit Hall A, B and C
6:00 p.m.–10:00 .m. **SVC Networking Event! The Tech Museum of Innovation, San Jose** (ticket required)
Board Bus at 5:30 p.m. outside the front of the Hyatt Regency Hotel.
Bus departs every 20 minutes until 7:20 p.m.

Wednesday, May 13, 2009

7:00 a.m.–8:15 a.m. *Vacuum Web Coating TAC Breakfast Meeting* – Cypress Room, Hyatt
Optical Coating TAC Breakfast Meeting – Winchester Room, Hyatt
Plasma Processing TAC Breakfast Meeting – Lawrence, Hyatt
Large Area Coating TAC Breakfast Meeting – Lafayette, Hyatt
Emerging Technologies/Health Care/Atmospheric Plasma TAC Breakfast Meeting – Stevens Creek, Hyatt
Tribological and Decorative Coating TAC Breakfast Meeting – San Tomas, Hyatt
Cleantech Symposium Breakfast Meeting – Camino Real, Hyatt
7:30 a.m. *Companions Breakfast Get Together* – Tresca Private Dining room, Hyatt
11:00 a.m.–1:30 p.m. *“Grab & Go” Lunches for sale in CC Lobby Foyer*
12:20 p.m. – 1:00 p.m. **Donald M. Mattox Tutorial Program** – Ballroom EFG (Badge or Pass required)
1:30 p.m.–2:30 p.m. *“Meet the Experts” Corner* – Room 207 (upper level of CC)
6:30 p.m.–8:00 p.m. *Program Committee Meeting* – Cypress Room, Hyatt

Thursday, May 14, 2009

7:00 a.m.–8:15 a.m. *Board of Directors Breakfast Meeting* – Cypress, Hyatt

Mark Your Calendar! 2010 53rd Annual SVC Technical Conference

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