



Europäische Forschungsgesellschaft Dünne Schichten e. V.
European Society of Thin Films



THE AUSTRIAN SOCIETY FOR
METALLURGY AND MATERIALS

PSE PARTNER COUNTRY 2024 AUSTRIA

AUSTRIAN COMMUNITY

AUSTRIAN MAP

WORKSHOP

ENERGY TRANSITION

THE ANSWER RESIDES IN THE COATING

NOVEMBER 13 – 14, 2023 | WELS, ÖSTERREICH



Supported by





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Imprint

Organizer

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THE AUSTRIAN PLASMA SURFACE ENGINEERING COMMUNITY

Austria was selected as PSE Partner Country 2024. We are very pleased to present an overview of the Austrian Thin Film Community in this booklet to be presented at PSE2024 – 19th International Conference on Plasma Surface Engineering. We thank our partners The Austrian Society for Metallurgy and Materials as well as the Company Rübiger GmbH & Co. KG for supporting these activities.

Many thanks to the supporters of the partner country campaigns

- (1) Christian Mitterer, Montanuniversität Leoben
- (2) Gerhard Hackl, ASMET
- (4) Thomas Müller, Rübiger GmbH & Co. KG
- (5) Wolfgang Waldhauser, JOANNEUM RESEARCH
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AUSTRIAN PROGRAM AT PSE2024

HIGHLIGHTS

Tuesday, September 3, 2024

PARTNER COUNTRY SESSION

Carl Zeiss Saal | 18:00 – 19:15

Presentation of Austria & Austrian Research Community

PL0300 **Responsible Surface Engineering for a Sustainable Future (#215)**
C. Mitterer, M. Hans, J. M. Schneider, A. Matthews
Session: PL-03 – Plenary – Partner Country Session
Date: Tuesday, 3 September, 2024, 18:00
Location: Carl Zeiss Saal left, Carl Zeiss Saal right (CZS-L, CZS-R)

OPENING OF INDUSTRIAL EVENING

Foyer Hall 1, Ground Floor, Partner Country Lounge | 19:30 – 20:00

Presentation of the Austrian Map & Austrian Exhibitors
Visit the Austrian Exhibitors and get your Austrian surprise
Supported by Plansee SE, RHP-Technology GmbH and Rübigen GmbH & Co. KG



Wednesday, September 4, 2024

Austrian Lunch Buffet

Foyer Hall 1, 13:00 – 14:30

ORAL PRESENTATIONS FROM AUSTRIA

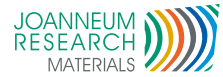
OR0408	Carbon nanostructures produced by means of pulsed DC PACVD (#163) M. Schachinger, F. A. Delfin, B. Fickl, B. C. Bayer-Skoff, C. Forsich, T. Müller, D. Heim
OR0606	Exploring the phase space and oxidation mechanisms of TM-X-C thin films (#449) S. Richter, D. Danner, R. Hahn, E. Ntemou, D. Primetzhofer, T. Wojcik, S. Kolozsvári, P. Polcik, C. Jerg, J. Ramm, H. Riedl
IW0707	Plasma nitriding and PACVD (Plasma Assisted CVD) coating as complementary technology for PVD for wind power gear boxes (#577) T. Mueller, A. Gebeshuber, C. Lugmair, C. Uebleis, D. Heim, C. Forsich
KN0800	Concepts for the direct recycling/re-use of end-of-life sputtering targets in PVD applications (#424) E. Neubauer, A. Kokic, L. Zauner
OR0902	Influence of Powder Material Selection on the Synthesis & Production of High-Entropy Alloy Targets for Thin Film Applications (#405) L. Zauner, A. Kokic, M. Friedl, E. Feuerstein, E. Neubauer
OR1003	Sputter deposited silver niobate thin films: pathway towards phase purity (#111) L. Kölbl, A. Kobald, T. Griesser, F. Munnik, C. Mitterer
OR1306	Non-reactive magnetron sputtering of Ti-Al-N coatings (#435) B. I. Hajas, S. C. Bermanschläger, D. Primetzhofer, T. Wojcik, S. Kolozsvari, P. H. Mayrhofer
OR1403	Fracture characteristics of Si-containing ternary and quaternary transition metal diborides (#466) A. Hirle, A. Bahr, O. Beck, S. Kolozsvari, P. Polcik, J. Ramm, C. Jerg, H. Riedl, R. Hahn
OR1404	Insulating and structural properties of reactively grown AlN and Al₂O₃ thin films (#448) N. Salvadores, T. Wojcik, C. Jerg, A. Gies, J. Ramm, S. Kolozsvari, P. Polcik, T. Huber, H. Riedl
TW1508	In-situ Testing of Hollow Specimen under H₂ Atmosphere (#584) B. Schrittester, W. Balasooriya, H. Gschiel
OR1901	Super-hydrophobic layers by drop-casting and atmospheric pressure plasma deposition (#98) C. Hendler, J. Vida, R. Kaindl, T. Homola, M. Beleggratis, W. Waldhauser
OR1902	Humidity-resistant low-friction dry lubricant metallic-polymeric based coatings on PEEK and PET (#274) D. Kopp, R. Kaindl, T. Prethaler, J. M. Lackner, A. M. Coclite, W. Waldhauser
OR1903	Corrosion protection of cerium containing HMDSO coatings processed by APPD (#324) M. Spuller, L. Major, T. Männer, M. Stummer, W. Waldhauser, J. Lackner, R. Kaindl
KN2200	The influence of bilayer periods and ratios on mechanical and tribological properties of TiN/MoN superlattice thin films (#429) Z. Gao, J. Buchinger, R. Hahn, Z. Chen, Z. Zhang, P. H. Mayrhofer
OR2202	Assessing hydrogen diffusion in protective coating materials (#451) P. Rückeshäuser, A. Bahr, W. Zhao, R. Hahn, S. Kolozsvari, P. Polcik, T. Stelzig, F. Rovere, H. Riedl
OR2205	Influence of Al-content on structure, mechanical properties and thermal stability of (Al, Ta, Ti, V, Zr)-nitride coatings (#433) A. Kirnbauer, S. Kolozsvari, P. H. Mayrhofer
OR2206	Influence of Al:Ti ratio and bias on the structure and mechanical properties of AlTiN coatings (#344) J. Nohava, P. Hausild, J. Kalas, S. Zierler, J. Sondor

AUSTRIAN MAP



- 1 AIT Austrian Institute of Technology
- 2 The Austrian Society for Metallurgy and Materials (ASMET)
- 3 Burkert Austria GmbH
- 4 Busch Austria GmbH
- 5 Härtereier Michael Welser GmbH
- 6 High Tech Coatings GmbH – a Miba Group company
- 7 JOANNEUM RESEARCH Forschungsgesellschaft mbH | MATERIALS – Institute for Sensorics, Photonics and Production Technologies
- 8 Kompetenzzentrum Holz GmbH – Wood Kplus
- 9 Linde AG
- 10 Montanuniversität Leoben / Department of Materials Science
- 11 Österreichische Gesellschaft für Vakuumtechnik (ÖGV)
- 12 Pfeiffer Vacuum Austria GmbH
- 13 Plansee SE
- 14 Plasmateria
- 15 RECENDT – Research Center for Non-Destructive Testing GmbH
- 16 RHP-Technology GmbH
- 17 Rübiger GmbH & Co. KG
- 18 SCIOFLEX Hydrogen GmbH
- 19 TU Wien – Institute of Materials Science and Technology/E308
- 20 University of Applied Sciences Upper Austria
- 21 voestalpine Stahl GmbH





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The AIT Austrian Institute of Technology takes a leading position in the Austrian innovation system and a key role in Europe as the RTO focusing on the key infrastructure topics of the future. AIT provides research and technological development to realize basic innovations for the next generation of infrastructure related technologies in the fields of Energy, Transport Technologies, Health & Bioresources, Digital Safety & Security, Vision, Automation & Control and Technology Experience. These technological research areas are supplemented by the competence in the area of Innovation Systems & Policy. As a national and international network node at the interface of science and industry AIT enables innovation through its scientific-technological expertise, market experience, tight customer relationships and high quality research infrastructure.

The Austrian Society for Metallurgy and Materials (ASMET)



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ASMET is a non-profit association dedicated to metallurgy, materials science, and related processes, adhering to antitrust regulations. It collaborates on the development, production, and processing of steel, non-ferrous metals, ceramics, and refractory materials, working with national and international organizations to create synergies. ASMET conducts collaborative work in specialized committees, promotes student studies, and organizes technical conferences and meetings to exchange experiences and discuss developments. The association also publishes technical and scientific findings from its collaborative efforts.

The Cornet collective research network provides the opportunity to apply funding of international projects. The project consortia should address the interests of small and medium sized companies in at least two different countries. Cornet projects are coordinated and initialized by research associations.

Cornet projects in Austria

Austrian research institutions can get advice from the FFG – Austrian Research Promotion Agency. One possible coordination research association that can apply for Cornet projects is ASMET – The Austrian Society for Metallurgy and Materials.

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Busch Vacuum Solutions is part of the Busch Group, one of the world's largest manufacturers of vacuum pumps, vacuum systems, blowers, compressors and gas abatement systems. The extensive product and service portfolio includes solutions for vacuum, overpressure and abatement applications in all industries, the design and construction of tailor-made vacuum systems and a worldwide service network.

The Busch Group is managed by the Busch family. It is headquartered in Maulburg, Baden-Württemberg, has more than 8,000 employees in 44 countries and manufacturers in 19 own production plants worldwide. Busch Austria GmbH is a local service, systems and sales company of the Busch Group focusing on the development of tailor-made solutions.



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High Tech Coatings

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High Tech Coatings (HTC) is Miba's competence centre for coatings. With our PVD coatings, we respond individually to your requirements. Thanks to our in-house development team and many years of experience, we can offer you a wide range of possibilities. Applications for our PVD coatings include improving the tribological properties of components. We can also apply coatings for bipolar plates that protect against chemical environments and increase the electrical conductivity. We are able to coat complicated geometries and inner diameters. Flexibility for the development of new applications and coatings, but also the ability to scale up are what characterize us.

JOANNEUM RESEARCH Forschungsgesellschaft mbH MATERIALS



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INSTITUTE FOR SENSORICS, PHOTONICS AND PRODUCTION TECHNOLOGIES
JOANNEUM RESEARCH provides innovation and technology services in the field of applied research. The institute MATERIALS develops solutions for the entire value chain from the idea to the prototype, through miniaturisation, integration and material optimisation: large-area micro and nanostructures, bio and chemosensors, light technologies, functionalised surfaces and laser processes. Our Laser and Plasma Technologies research group specialises in the deposition of functional coatings (e.g. tribological, biocompatible, antibacterial, anti-corrosive, sensory, flame-retardant, optical, decorative, etc.) using plasma processes. The development and characterisation of functional surfaces and thin films is our mission.

Kompetenzzentrum Holz GmbH – Wood Kplus








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We are a leading research organisation in the area wood and wood-related renewable resources in Europe. Our core competences are materials research and process technology along the complete value chain – from raw material to finished products. We develop methods and basics and perform applied research on the economy-science interface, in order to enable resource-efficient management in the circular bioeconomy. This includes surface modification and functionalization using plasma activation and coating under atmospheric pressure conditions especially for materials based on renewable materials (integration of printed electronics, self-healing, ...).

Linde Gas GmbH



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 Alexander Desch  alexander.desch@linde.com
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We are looking forward to your contact.

Montanuniversität Leoben



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The Department of Materials Science focuses on plasma-assisted synthesis of coatings, thin films and nanoparticles, using magnetron sputtering, cathodic arc deposition, magnetron sputter inert gas condensation, and various plasma treatments. The synthesized materials include metals and alloys, nitrides, oxides, carbides, and borides, with applications in tribology, microelectronics, displays, energy conversion and storage, as well as medical engineering. Process and materials development is supported by theoretical methods and a unique portfolio of characterization techniques, bridging length scales from atomistic to macroscopic, including in-situ methods to study material behavior in harsh environments and under near in-service conditions.

Österreichische Gesellschaft für Vakuumtechnik (ÖGV)



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The purpose of the Austrian Society for Vacuum Technology (ÖGV) is to network individuals, institutes and companies interested in the fields of vacuum generation, measurement and application as well as the physics, chemistry and technology of thin films, including interfaces and surfaces, in order to promote research and development in these fields, in particular by issuing information, publications, awarding research contracts, organizing lectures and workshops, exchanging experiences and holding training courses. The association is non-political, charitable and non-profit.

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Since 1890, Pfeiffer Vacuum has shaped the vacuum industry. About 4,000 employees at 10 production sites and more than 20 sales and service companies worldwide give everything for you. With our product portfolio, we offer solutions for all vacuum applications. We are not only driven by highest quality standards. It is our vision to be the most sustainable and fastest growing market player to drive technology for a sustainable future.

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Plansee SE



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Plasmateria GmbH

PLASMATERIA

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Plasmateria is an Austrian Start-up specializing in PVD Coatings for internal surfaces of components. With its innovative Inner-Diameter-Coating Technology Plasmateria is able to deposit metallic and ceramic PVD coatings inside cavities down to a diameter of 5mm with an even coating distribution to a depth of up to 1m. The new surface solution directly replaces hard-chrome coatings with eco-friendly PVD chrome coatings and further improves the performance of inner surfaces with ceramic coatings. Founded in 2021, Plasmateria is developing its own coating systems taking Inner-Diameter-Coatings from the laboratory to an industrial production environment.

RECENDT – Research Center for Non-Destructive Testing GmbH

 **RECENDT**
RESEARCH CENTER NON DESTRUCTIVE TESTING

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RECENDT, the »Research Center for Non-Destructive Testing«, specializes in customized, non-contact sensing, measurement, and characterization solutions. Our expertise in acoustic and optical technologies enables us to deliver industrial in-line quality control and process analytics across various industries. We especially support SURFACE ENGINEERING with advanced material characterization and non-destructive testing technologies. Our standout technology, laser-ultrasonics, offers high-resolution, contactless ultrasonic sensing. We support your projects with physical (elastic properties) and chemical characterization (contaminations), coating/layer thickness measurement, and defect detection (cracks, delaminations, etc.).

RHP-Technology GmbH



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RHP-Technology has more than 30 years of experience in powder technology and is specialized in the production of customized PVD target materials. Every day, tailored target compositions are produced, processed, and successfully used worldwide in both sputtering and arc evaporation processes, with applications across various industries such as semiconductor, optics, tribology, machining and others. State-of-the-art production technologies such as spark plasma sintering enable RHP to fulfill highest customer requirements and expectations in terms of material selection, purity, microstructure and target geometry – whether for individual targets or series production.

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Reliable testing and certification of materials for hydrogen applications are essential for the safety and integrity of this emerging industry. Suppliers, distributors and end processors need reliable testing procedures and uniform certification standards. SCIOFLEX Hydrogen GmbH is a competence center for materials in the field of hydrogen applications. We ensure the highest quality, safety and sustainability standards and contribute to hydrogen being recognized as a reliable and safe energy carrier. We characterize your material under realistic operating conditions and support you with know-how along the value chain. We will answer your questions on the subject of materials and hydrogen.



TU Wien – Institute of Materials Science and Technology/E308

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Our research focuses on advancing the science that underpins the relationships between synthesis, chemistry, structure, properties, and performance in nanoscale and functional thin film materials grown by PVD. Additionally, we continue our traditional investigations in crystal growth, the physical properties of metastable ceramic and metallic alloys and multilayers, and their thermal stability. These research endeavors are spearheaded by our dedicated teams in Thin Film Materials Science (Prof. Paul Mayrhofer), Applied Surface and Coating Technology (Prof. Riedl), Nanodiffraction and In-situ Micromechanics (Dr. Hahn), Data-driven Atomistic Simulations of Materials (Dr. Koutna), and Materials Development and Characterization (Dr. Kirnbauer).

University of Applied Sciences Upper Austria



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The University of Applied Sciences Upper Austria with more than 70 study programs at Bachelor's and Master's level at 4 different schools is the clear leader among Austria's universities of applied science and is also among the strongest in research and development in German-speaking countries.

In 2023, more than 450 researchers generated €30.3 million in R&D turnover. The University of Applied Sciences Upper Austria's R&D portfolio is aimed at businesses and institutions from industry and society. Geared towards the needs of the client, innovative solutions are developed and can be put directly into practice.

voestalpine Stahl GmbH



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voestalpine Stahl GmbH is one of the leading steel producers in Europe. The products supplied by voestalpine Stahl GmbH are used in the automotive, electrical, domestic and processing industries. It also acts as a supplier of input material for voestalpine Grobblech GmbH, Steel & Service Center GmbH and voestalpine Giesserei GmbH. High-quality hot-rolled and cold-rolled as well as electrolytically galvanized, hot-dip galvanized and organically coated steel strip and electrical steel strip form the basis for our diverse further processing steps.

19TH INTERNATIONAL CONFERENCE ON PLASMA SURFACE ENGINEERING



SEPTEMBER 2 – 5, 2024

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Photos: EFDS



- International Conference
- Industrial Exhibition
- International Matchmaking
- Networking & Team Building
- Education & Tutorials
- Posters & Awards





WORKSHOP REVIEW

Energy Transition When the answer is in the layer

Rapid changes in the Earth's climate and increasingly important geopolitical considerations have led to an urgent need to introduce self-sufficient sustainable energy technologies in Europe. For this reason, the Austrian federal government has set the goal of achieving climate neutrality in Austria by 2040. Achieving this goal is only feasible through investments in research & development, the expansion of all renewable energy sources, infrastructure, storage and investments in energy efficiency.

Surface and thin-film technologies are the key to energy-efficient technologies, ranging from hydrogen and battery technology to plasma-based chemical synthesis and photovoltaics. Austrian research centers and universities in charge of new and further development as well as Austrian companies from the surface technology sector will present innovations in this sector.

The workshop will be held in the city of WELS, which is centrally located in the industrial state No.1 of Upper Austria. It is established as an industrial, scientific and trade fair center that attracts national as well as international visitors. Approximately 40,000 employees find work in the approximately 4,000 companies in Wels and the immediate vicinity.

The topic of energy and energy transition has been in focus in this region for years. This is also reflected in regional research funding, such as the Upper Austrian Hydrogen Initiative 2030. Hydrogen Offensive 2030: »Hydrogen as a success factor for a future-proof location«. Other important events that show the orientation of Upper/Austrian energy policy are the »World Sustainable Energy Days«, an annual conference on sustainability, renewable energies and energy efficiency, which have been held for 20 years, and the annual Energy Saving Fair. Here, developments and technological possibilities are presented to the public.

Please use the opportunity to discuss the energy transition and inform yourself about the funding of European research and development projects in the framework of »Collective Research NETWORKING«. Competent contact persons from Austria (FFG) and Germany (EFDS e.V.) will be present and support you.

This workshop is jointly organized by The Austrian Society for Metallurgy and Materials ASMET and the European Research Society Thin Films e.V. EFDS. The event is related to the PSE2024 – 19th International Conference Plasma Surface Engineering in the context of the PSE Partner Country Program 2024 – Austria.

Data Privacy Statement

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PROGRAM

Monday, November 13, 2023

10:00 **Registration**

Session 1 | Innovation for the energy transition

Moderation: Thomas Müller, Rübiger GmbH & Co. KG

11:00 **Welcome**

11:15 **Hurdles, challenges and opportunities of the European energy transition**

Gerhard Dell, Landesenergiebeauftragter im österreichischen Bundesland Oberösterreich und Geschäftsführer des ÖÖ Energiesparverbandes, Österreich

11:45 **Shaping a sustainable energy future with research and innovation | Overview about the research funding of FFG**

Gertrud Aichberger, Österreichische Forschungsförderung GmbH, Wien, Österreich

12:05 **Hydrogen – The Key for a successful energy transition?**

Jürgen Wageneder, Linde Gas GmbH, Stadl-Paura, Österreich

12:25 **PVD nitrides to be used for increased life time of tools and components as well as supercapacitors**

Paul Mayrhofer, Technische Universität Wien, Österreich

12:55 **Lunch Break**

Session 2 | Tribological coatings for the energy transition

Moderation: Gerhard Hackl, ASMET

14:00 **Looking for the perfect friction match in the 2D world – How the in-operando formation of TMD's and the use of MXenes revolutionize lubricating concepts**

Carsten Gachot, Technische Universität Wien, Österreich

14:20 **Tribological Properties of Hard Coatings**

Volker Strobl, Rübiger GmbH & Co KG, Wels, Österreich

14:40 **Novel electrically conductive DLC coatings for electrical and electrochemical applications**

Daniel Heim, FH Oberösterreich, Wels, Österreich

15:00 **Reducing environmental friction with high performance coatings**

Florian Rovere, Oerlikon Balzers, Liechtenstein



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15:20 **In-situ wear detection of DLC coatings under near-application conditions**
Ewald Badisch, AC²T research GmbH,
Wiener Neustadt, Österreich

15:40 **Wear-resistant, low-friction atmospheric pressure Plasma spray coatings for sustainable (bio-based, recyclable) materials**
Reinhard Kaindl, Joanneum Research,
Niklasdorf, Österreich

16:00 **Coffee Break & Poster Session**

Session 3 | Surface modification & structuring
Moderation: Paul Mayrhofer, Technische Universität Wien

16:30 **Biozonik – What flexible nano- and microstructures can contribute to energy transition**
Dieter Nees, Joanneum Research Forschungs-
gesellschaft mbH, Weiz, Österreich

16:50 **Graphene on steels as the ultimate thin corrosion barriers**
Bernhard Bayer, Technische Universität Wien,
Österreich

17:10 **Foil architecture – The construction method of the future?**
Martin Kassecker, Hueck Folien GmbH,
Baumgartenberg, Österreich

17:30 **End of the day**

19:00 – 22:00 **EVENING EVENT**
Minoriten Wels

In the heart of the historic town center is the Minorite Church, built as early as the beginning of the 14th century, and the associated monastery. The church with the impressive medieval choir and the simple, baroque remodeled nave was converted into an event center. During this event you can deepen new acquaintances and have conversations about future projects and cooperations in a pleasant atmosphere.



Foto: © Minoriten Stadt Wels



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PROGRAM

Tuesday, November 14, 2023

Session 4.1 | Hydrogen technologies

Moderation: Daniel Heim, FH Oberösterreich Wels

- | | |
|-------|--|
| 08:30 | Keynote - The storage of hydrogen - Challenge and opportunity for surface technology?
Christian Mitterer, Montanuniversität Leoben, Österreich |
| 09:00 | The properties of thin films in solid oxide fuel cells and electrolysis cells
Jürgen Fleig, Technische Universität Wien, Österreich |
| 09:20 | H₂ in mobility: challenges for thin films
Marco Carlet, IHI Ionbond Netherlands B.V., Venlo, Niederlande |
| 09:40 | PVD-coatings and coating equipment for bipolar cells for fuel cells and electrolyzers
Herbert Gabriel, PVT Plasma und Vakuum Technik GmbH, Bensheim, Deutschland |

10:00 Coffee Break

Session 4.2 | Hydrogen technologies

Moderation: Christian Mitterer, Montanuniversität Leoben

- | | |
|-------|---|
| 10:30 | Functional coatings for the production of green hydrogen
Stephan Abermann, AIT Austrian Institute of Technology GmbH, Wien, Österreich |
| 10:50 | Contributions of atmospheric plasma technology to the energy transition
Tobias Alois Männer, INOCON Technologie GmbH |
| 11:10 | Surface modifications for enhanced electrochemical performance of battery electrodes
Christina Toigo, FH Oberösterreich, Wels, Österreich |
| 11:40 | Transfer to Rübzig |
| 12:00 | Lunch & conversation at Rübzig |

13:00

COMPANY TOUR @ Rübige GmbH & Co. KG

Rübige GmbH & Co. KG Hardening Technology
Department Contract Heat Treatment/Coating

Metal with character. Join us on a tour of RÜBIG hardening technology and learn about the methods available to give metal unique properties. Components are hardened, specially tailored to customer requirements. A special highlight is the RÜBIG laboratory, which is one of the best in Europe. More information about RÜBIG: www.rubig.com



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14:10

Return to FH Oberösterreich Wels

Session 5 | Photovoltaics

Moderation: Wolfgang Waldhauser, Joanneum Research

14:30

More than a cell: Future potential of new PV technologies
Roman Trätting, Joanneum Research, Weiz, Österreich

14:50

Customized thin-film photovoltaics from the roll
Andreas Zimmermann, Sunplugged GmbH,
Wildermieming, Österreich

15:10

**Crystalsol's powder-based photovoltaics:
new tasks for thin films**
Dieter Meissner, crystalsol GmbH, Wien, Österreich

15:30

Perovskite solar cells, the new hope of photovoltaics?
Markus Clark Scharber, Johannes Kepler Universität
Linz, Österreich

Session 6 | Battery technologies

Moderation: Katrin Ferse, EFDS

14:30

**Between the laboratory and the gigafactory – the challenges
of scalability of battery production and new materials**
Marcus Jahn, AIT Austrian Institute of Technology
GmbH, Wien, Österreich

14:50

**Electrodeposition and stripping of insulating active
material layers as key for high-energy batteries**
Stefan Freunberger, Institute of Science and
Technology Austria, Klosterneuburg, Österreich

15:10

**Solid-state batteries in the automotive industry –
From vision to integration**
Lukas Ladenstein, AVL List GmbH, Graz, Österreich

16:00

PSE panel discussion

16:30

End of the workshop



Dr. Gerhard Dell

State Energy Commissioner at the Austrian Federal State
Oberösterreich and General Manager of OÖ Energiesparverband, Austria

Hurdles, challenges and opportunities of the European energy transition

Energy production and use account for 75 percent of greenhouse gas emissions in Europe. Over the last three decades, their emissions have been reduced by around 30 percent. But this is not enough to achieve the climate targets. The central fields of action for this are energy efficiency, renewable energies, grids and storage. Information, incentives, framework conditions and technology innovations are the instruments for the energy turnaround. This also offers the opportunity for economic modernization.



DI Gertrud Aichberger

Program Management
FFG Österreichische Forschungsförderungsgesellschaft mbH

Shaping a sustainable energy future with research and innovation | Overview about the research funding of FFG

Be part of it and shape the energy supply of tomorrow! In the presentation you will get an overview of the possibilities of funding research projects for the development of sustainable energy technologies and which funding programs are available to you.

Dipl.-Wirtsch.-Ing. (FH) Jürgen Wageneder

Business Development & Sales ECOVAR Linde Gas GmbH
Linde Gas GmbH



Hydrogen – The Key for a successful energy transition?

A short overview to the topic hydrogen and the company Linde Gas GmbH will be presented.

Prof. Paul Mayrhofer

Univ. Prof. Dipl. Ing. Dr. mont. Paul H. Mayrhofer | Professor of Materials Science, Dean of Studies | Technische Universität Wien, Austria

PVD nitrides to be used for increased life time of tools and components as well as supercapacitors

For mechanically dominated load profiles, nitrides are preferred, while oxides offer better protection against high-temperature corrosion. Combined mechanical and thermal loads therefore call for nitrides with excellent temperature and oxidation resistance. How to develop such nitrides with excellent strength and toughness combined with exceptional thermal stability is the focus of this talk. We will also discuss the excellent supercapacitor properties of transition metal nitrides.





Univ.-Prof. Dr.-Ing. Carsten Gachot

Head of the Tribology Research Division | Institute of Engineering Design and Product Development E307-05, TU Wien

Looking for the perfect friction match in the 2D world – How the in-operando formation of TMD's and the use of MXenes revolutionize lubricating concepts

The presentation will address new concepts of solid lubrication in aerospace applications and will focus on recent developments in 2D materials, with particular emphasis on MXenes and transition metal carbo chalcogenides (TMCC's) as bridging materials between MXenes and transition metal dichalcogenides such as MoS₂.



DI Volker Strobl MSc

division manager
Rübig GmbH & Co. KG

Tribological properties of hard coatings

In the wind power industry, rolling bearings are currently used in gearboxes. For reasons of weight and maintenance reduction, however, the trend is toward plain bearings. Here, Cu-Sn or Al-Sn, for example, are used as coating materials.

In this presentation an alternative approach will be presented, a hard material coating by means of PACVD. The tribological properties of this coating – Rübig DLCxtended® – will be presented.

FH-Prof. DI Dr. Daniel Heim

Head of the Materials Science and Production Engineering
University of Applied Sciences Upper Austria

Novel electrically conductive DLC coatings for electrical and electrochemical applications

Carbon and graphite layers play a key role in electrochemical systems such as batteries or fuel cells. Diamond-like carbon (DLC) coatings reduce friction and wear and are chemically inert. The electrical conductivity of DLC coatings can be changed and adjusted by several orders of magnitude by suitable choice of deposition parameters, which suggests a high potential for development and use in electrochemical applications.



Dr.-Ing. Florian Rovere

Head of Product Line Service Components
Oerlikon Surface Solutions AG

Reducing environmental friction with high performance coatings

Specialized physical vapor deposition (PVD) coatings are widely recognized for the critical role they perform in enhancing operational performance and extending the life of parts across countless manufacturing and industrial sectors. Less understood is the value that these coatings provide in reducing the environmental impact of the industrial processes where they are used. This important value-add should not to be overlooked.





Dipl.-Ing. Dr. mont. Ewald Badisch

Scientific Director
AC²T research GmbH

In-situ wear detection of DLC coatings under near-application conditions

The focus of the presentation is on the application of in-situ wear detection of DLC coatings. The wear measurement method developed at AC²T (RIC - Radioactive Isotope Concentration) allows continuous wear detection and is applied under different tribological loading conditions. The results show a high influence of abrasive particles on the DLC wear rate, which leads to a reduction of service life up to failure.



Dr. Mag. Reinhard Kaindl

Senior Scientist, Deputy Head of Research | Joanneum Research,
MATERIALS - Institut für Sensorik, Photonik und Fertigungstechnologien

Wear-resistant, low-friction atmospheric pressure Plasma spray coatings for sustainable (bio-based, recyclable) materials

Carbon-based atmospheric pressure plasma low-friction and wear surfaces on bio-based and recyclable engineering polymers in the powertrain increase energy efficiency and extend the service life of plain bearings and transmissions. Carbon is available in sufficient quantities in the medium to long term, coatings can be produced with relatively low energy input, and coated parts are recyclable in the sense of a circular economy.

Dipl. Chem. Dr. Dieter Nees

Principal Scientist

JOANNEUM RESEARCH Forschungsgesellschaft mbH, Weiz, Austria

Biozonik – What flexible micro- and nano structures can contribute to energy transition

We can learn from nature on many occasions how micro- and nanostructures affect macroscopic surface properties. Well-known examples are sharkskin for flow friction reduction or moth eyes for anti-reflective coatings. At JOANNEUM RESEARCH – MATERIALS, we develop roll-to-roll UV embossing processes for large-scale fabrication of bionic micro- and nanostructured polymer surfaces on flexible films.



Dr. Bernhard C. Bayer

Junior Research Group Leader

Institute of Materials Chemistry, Technische Universität Wien

Graphene on steels as the ultimate thin corrosion barriers

Two-dimensional (2D) materials have a wide application profile incl. sustainable energy. We develop scalable synthesis and integration protocols for 2D materials and their hybrids down to the controlled single-atom level. With a variety of academic & industrial partners these 2D materials/hybrids are tested as, e.g., catalysts in electro- and photocatalytic sustainable hydrogen production, heat spreaders for low-power electronics and ultimately thin corrosion barriers on metallurgical materials.





Martin Kassecker

Hueck Folien GmbH, Baumgartenberg
Technical Product Manager Design

Foil architecture – The construction method of the future?

ETFE film architecture has gained a lot of popularity in recent years and is often used for stadiums, exhibition centers, greenhouses and other architectural projects. This material makes it possible to create aesthetically pleasing and functional structures.



Prof. Dr. Christian Mitterer

Professor for Functional Materials and Material Systems
Montanuniversität Leoben

Keynote – The storage of hydrogen – Challenge and opportunity for surface technology?

The storage of hydrogen represents one of the greatest challenges of the necessary transformation to a CO₂-free energy supply. Porous carbons offer the possibility of reversible adsorption and desorption of hydrogen on their surface. This presentation will address the possibilities of developing highly porous carbons via plasma-assisted surface modification and nanoparticle deposition for application as hydrogen storage media.

Prof. Jürgen Fleig

Universitätsprofessor
Technische Universität Wien, Institute for Chemical Technologies and Analytics

The properties of thin films in solid oxide fuel cells and electrolysis cells

Oxide electrodes are of central importance in solid oxide fuel cells and electrolysis cells (SOFCs/SOECs), where they often act simultaneously as current collectors, ion conductors and catalysts. In this talk, we will show how thin film systems can be used to investigate and optimize these material properties. At the same time, the possibilities of impedance spectroscopic measurements for the characterization of oxide films will be illustrated.



Marco Carlet

Process Engineering
IHI Ionbond B.V.

H₂ in mobility: challenges for thin films

The application areas of thin coatings in the use of hydrogen as fuel for CO₂ emission-free drive concepts are presented. In hydrogen-powered internal combustion engines, the coatings reduce friction as well as wear in a dry hydrogen atmosphere and are intended to prevent hydrogen embrittlement. When applied to bipolar plates for fuel cells, the electrical conductivity of the surface and the corrosion resistance are adjusted.





Dr.-Ing. Herbert Gabriel

General Manager
PVT Plasma und Vakuum Technik GmbH

PVD-coatings and coating equipment for bipolar cells for fuel cells and electrolyzers

In-line coating systems are ideally suited for high volume production applications over a wide range of substrate sizes and geometries. PVT has designed and developed a series of inline coating systems that are ideally suited for Physical Vapor Deposition (PVD) coating of bipolar plates for fuel stacks and electrolyzers, razor blades, solar concentrating mirrors, etc. with most different coatings.



Dr. Stephan Abermann

Head of Competence Unit Energy Conversion and Hydrogen
AIT Austrian Institute of Technology, Center for Energy

Functional coatings for the production of green hydrogen

The presentation will give an overview of the current developments at AIT in the field of functional coatings for the production of sustainable hydrogen. Water electrolysis and direct photo-electrochemical conversion (PEC) routes are of great importance here. Significant R&D efforts are needed here to reduce the cost of commercial and especially recent electrolysis technologies (PEM/AEM/SOEC/PEC) or to develop them to commercial demonstration.

COMPANY TOUR

@ Rübige GmbH & Co. KG | 12:00 – 14:00

Afterwards, more technology developments for energy transition, batteries and photovoltaics.





Dipl. Ing. Tobias Alois Männer

INOCON Technologie GmbH,
Attnang-Puchheim, Österreich

Contributions of atmospheric plasma technology to the energy transition

Atmospheric plasmas can be used for surface cleaning, activation and coating. With the innovative technology of INOCON Technologies GmbH this step can be realized environmentally friendly and selectively at the areas wanted. No wet chemistry is necessary. Resources and money can be saved and the lifetime cycle of components can be prolonged. Examples of corrosion protection coatings for battery technology will be presented.



Christina Toigo

Christina Toigo, FH Oberösterreich, Wels, Österreich
Professorship for Hydrogen Technology and Energy Storage

Surface modifications for enhanced electrochemical performance of battery electrodes

Dendritic copper current collectors were used for the preparation of LTO anodes for Lithium-ion batteries and their performance was evaluated via mechanical analysis, FIB-SEM and electrochemical measurements. The distinct copper dendrites lead to a physically increased surface area of the current collector and also proved an increase in electrochemically active surface area.

Dr. Roman Trattnig

Deputy Head Light and Optical Technologies
Joanneum Research – MATERIALS

More than a cell: Future potential of new PV technologies

The future of solar technology is being shaped by promising developments in various areas, including III-V semiconductors, CZTS, CIGS and perovskite solar cells. These technologies hold the potential to significantly improve the energy efficiency and cost effectiveness of solar cells. With continued research and development, these technologies could revolutionize solar energy and contribute to a sustainable and renewable energy future.



Andreas Zimmermann

Sunplugged GmbH
General Manager

Customized thin-film photovoltaics from the roll

Sunplugged develops a customizable photovoltaic film. The core element is a thin-film solar cell, which is produced in a roll-to-roll process. The layers of the solar cell are deposited on a high temperature stable carrier foil. With a digitally controllable interconnection process, the foil-like solar cells can be formed into a wide variety of shapes and output voltages. The lecture will present the current state of development.





em. Univ.-Prof. Dr. Dr.hc Dieter Meissner

CSO
crystalsol GmbH

Crystalsol's powder-based photo-voltaics: new tasks for thin films

crystalsol's single crystal powder-based printed photovoltaic module technology contains five thin films that together convert the excitation energy created by light absorption in the CZTS semiconductor single crystal into electrical voltage. Not only must these be very thin and of high quality, they must also be suitable for roll-to-roll printing of the modules and they must allow high flexibility of the finished module. This will be explained in detail in the presentation.

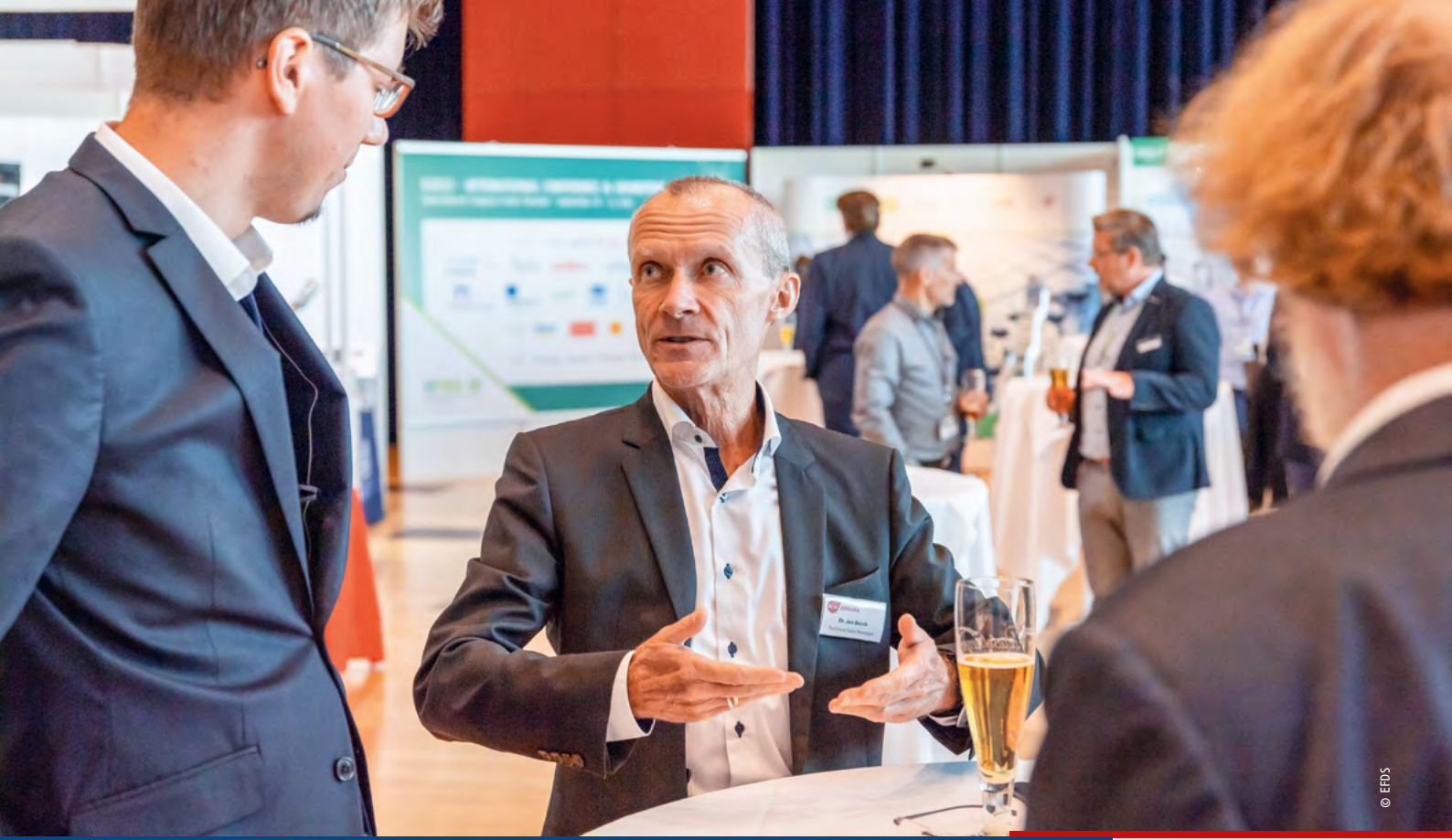


Dr. Markus Scharber

Johannes Kepler Universität

Perovskite solar cells, the new hope of photovoltaics?

In recent years, the efficiency of perovskite-based solar cells has been increased to over 25%. In addition, these devices are very easy to manufacture and can be combined with silicon solar cells to form efficient tandem solar cells. In my presentation, I will give an overview of the current state of research and discuss the advantages and disadvantages of perovskite solar cells.



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Dr. Marcus Jahn

Head of Competence Unit Battery Technologies

Between the laboratory and the gigafactory – the challenges of Scalability of Battery Production and New Materials

Research and industry must be closely linked for the energy transition. However, it often takes several years of process research, scaling optimization and the development of new methods in the manufacture of materials and products to bring the latest innovations in battery technology from the laboratory to market maturity. So, what is the state of the art? When will we see the latest materials in the vehicles of the future? What will be needed for the energy storage system of the future?





Prof. Stefan Freunberger

Institute of Science and Technology Austria,
Klosterneuburg, Österreich

Electrodeposition and stripping of insulating active Material layers as key for high-energy batteries

In order to enable electrochemical energy storage on the huge scale required, it is necessary to consistently rely on abundantly available main group elements. Among the most interesting of these are batteries based on oxygen and sulphur, but whose electrochemically active forms (metal oxides, sulphides and sulphur) are extremely insulating. Here I describe our research into how high-performance batteries are possible with these insulating materials.



Dr. techn. Lukas Ladenstein

Development Engineer Battery
AVL List GmbH

Solid-state batteries in the automotive industry – From vision to integration

All-solid-state batteries (ASSBs) are a promising technology for electric vehicles. Therefore, the automotive industry is closely following the development and progress of ASSBs. However, in order to enable integration, some aspects, such as significant breathing behavior of the metal anodes or a wider temperature window during operation, need to be subject to close scrutiny. These will be discussed in more detail in the presentation.

POSTER PRESENTATIONS

Laser-based analysis of thin film systems – elastic characterization and defect detection.

Felix Noll, RECENDT Research Center for Non Destructive Testing GmbH, Linz Österreich

Thin film based membrane electrode assemblies for green ammonia synthesis.

Jan Wallis, Leibniz-Institut für Plasmaforschung und Technology e.V. (INP), Greifswald, Deutschland

Describing hydrogen diffusion in metallic and ceramic thin film materials

Phillip Rückeshäuser, Christian Doppler Laboratory for Surface Engineering of high-performance Components, Wien, Österreich

Fatigue testing of protective ceramic coating materials

Arno Gitschthaler, Christian Doppler Laboratory for Surface Engineering of high-performance Components, Wien, Österreich

Understanding DLC failure influenced by progressed wear

Manuel Zellhofer, Martin Jech, Ewald Badisch, Paul Heinz Mayrhofer, AC²T research GmbH, TU Wien, Österreich

Electrical and mechanical properties of highly conductive nitrogen doped DLC films deposited via high-temperature DC PACVD

Manuel Schachinger* a, Francisco A. Delfin a, b, Alexander Stiglbauer a, Zürn Christian a, Christian Forsich a, Daniel Heim a, Bernd Rübzig c, Thomas Müller ctt, Christian Dipolt, a University of Applied Sciences Upper Austria., Wels, Austria; b Universidad Tecnológica Nacional, Facultad Regional Concepción del Uruguay, Concepción del Uruguay, Argentina, c Rübzig GmbH & Co KG., Wels, Austria



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