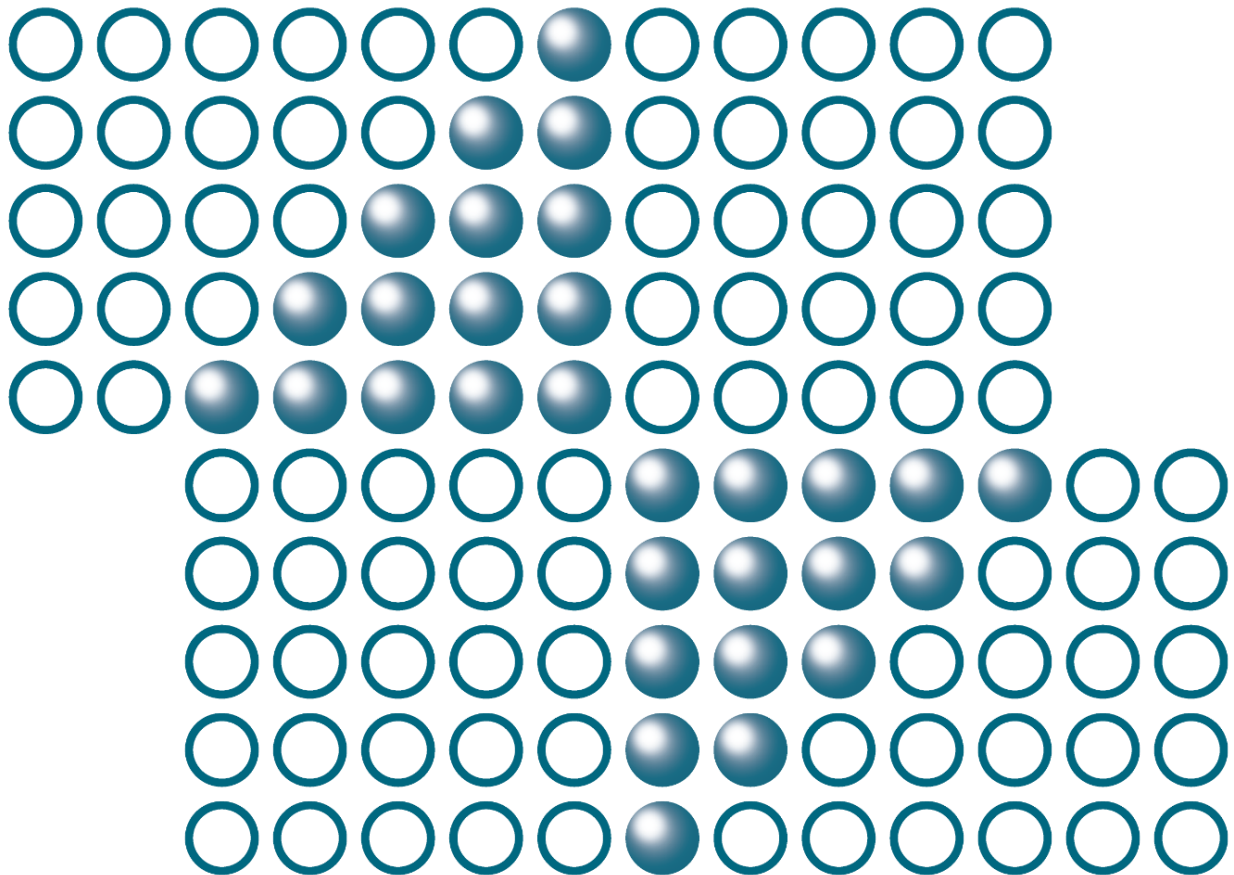


FINAL ANNOUNCEMENT & PROGRAMME
19th INTERNATIONAL SYMPOSIUM ON METALLOGRAPHY,
FRACTOGRAPHY AND MATERIALS SCIENCE

METALLOGRAPHY & FRACTOGRAPHY 2025



APRIL 23 - 25, 2025

ATRIUM HOTEL***
NOVÝ SMOKOVEC
HIGH TATRA MOUNTAINS
SLOVAKIA

SPONZORS OF METALLOGRAPHY & FRACTOGRAPHY 2025

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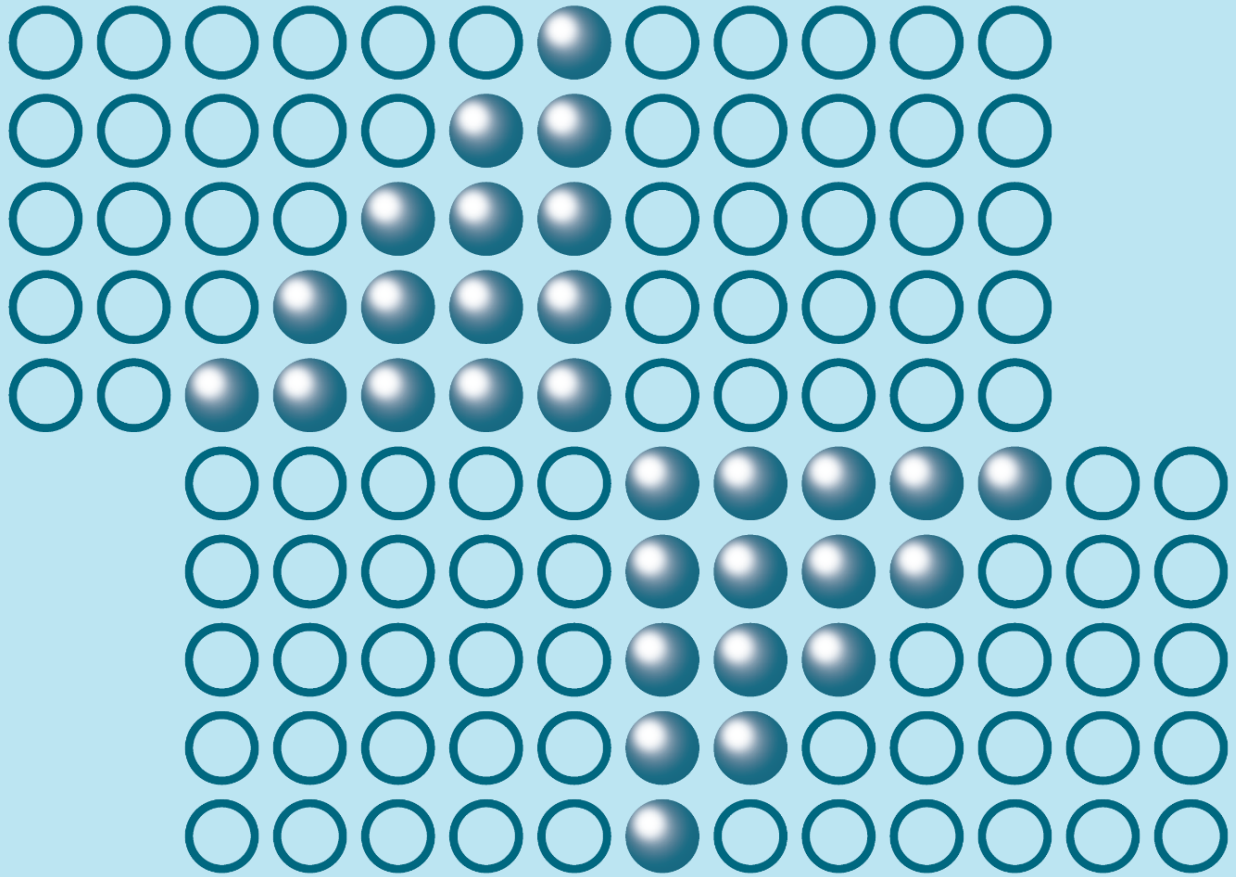


Nadácia SPP



ZwickRoell s.r.o

WELCOME TO METALLOGRAPHY & FRACTOGRAPHY 2025



PREFACE

It is our pleasure to welcome you to our regular traditional Conference on Metallography, Fractography, and Materials Science “Metallography & Fractography 2025” which will take place between 23rd – 25th April 2025 in the High Tatra Mountains in the Slovak Republic.

We have the pleasure of inviting you to participate in this traditional event where materials specialists from various parts of the world have been meeting and exchanging their latest insights at three-year intervals. The conference has featured as an important event for the presentation of results achieved in materials science and engineering. The conference focus widened long ago to cover not only the field of metallic materials but also numerous modern materials and technologies as well. The participants come from universities, academic research institutions, and different branches of industry, not only from all corners of Europe but from overseas as well with an interest in materials science and engineering. Exhibitions of instruments and equipment make it possible for the participants to acquaint themselves with recent achievements in research and investigation technology. Now at this conference, we would like to expand the program to cover new advanced materials and technologies as well as to intensify international contacts.

The Conference Committee wishes to acknowledge the assistance and support that we have received from several individuals and organizations in the preparation of this event.

The Scientific and Organizing Committee wishes to create a successful conference to spread professional experience in the wider international community of materials scientists and exhibitors.

We strongly believe that through this conference you will acquire many new insights and inspirations for your research. May the latter continue to flourish, furthering the development of new materials, and may the former continue to be a place for meetings and making new contacts for cooperation, in the sincere spirit which has always been traditional for this event.

We would like warmly to welcome you and wish all of you fruitful discussions and a useful stay in the High Tatra Mountains during the 19th International Conference on Metallography, Fractography and Materials Science.

Peter Horňák

Chair of the Symposium

THE CONFERENCE IS ORGANIZED BY

ORGANIZERS

Institute of Materials
Faculty of Materials, Metallurgy and Recycling
Technical University of Košice
Letná 1/9
042 00 Košice-Sever
Slovakia
+421 55 602 2543
+421 903 249 123
metalo@konferencie.net
www.konferencie.net/metalo

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Lumakon, s.r.o., Košice, Slovakia

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Slovak Metal Science Society of Slovak Academy of Sciences, Slovakia

Institute of Experimental Physics of the Slovak Academy of Sciences, Košice, Slovakia

Research & Development, U. S. Steel Košice, s.r.o, Košice, Slovakia

ŽP VVC s.r.o., Podbrezová, Slovakia

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Slovak Academy of Sciences,
Košice, Slovakia

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Institute of Materials Research, Slovak Academy of Sciences,
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Ján Viňaš

Institute of Technology and Materials Engineering, Faculty of Mechanical Engineering, Technical University of Košice, Košice, Slovakia

Vlastimil Vodárek

Department of Materials Engineering and Recycling, Faculty of Materials Science and Technology, VSB - Technical University of Ostrava, Ostrava, Czech Republic

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Institute of Materials, Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Košice, Slovakia

Beáta Ballóková

Institute of Materials Research, Slovak Academy of Sciences, Košice, Slovakia

Radovan Bureš

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Mária Fáberová

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Dávid Medveď

Institute of Materials Research, Slovak Academy of Sciences, Košice, Slovakia

Erika Múdra

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Peter Kalmár

GM for Testing Laboratories, U. S. Steel Košice, s.r.o. Košice Slovakia

BOOK OF THE CONFERENCE PROGRAMME

ORGANIZING INFORMATION

Date of the Conference

April 23 – 25, 2025

Place of the Conference

Atrium Hotel***, Nový Smokovec, High Tatra Mountains, Slovakia

Conference Site

The conference will be held at the Atrium Hotel situated in Nový Smokovec, in the heart of the beautiful High Tatra mountains in Slovakia. Accommodation for all participants is reserved directly in the Atrium Hotel. There are also accommodation possibilities in other hotels or guesthouses in the vicinity, which are situated quite near the Atrium Hotel.

The Atrium Hotel in the town of Nový Smokovec is a notable venue not only for its specific circular architecture but also thanks to its location at the foot of the peak Slávkovský štít. From the hotel rooms as well as the restaurant with a panoramic view, a marvelous vista of the Tatra Mountains or the sun-lit valley Podtatranská kotlina may be admired. The immediate surroundings of the hotel contain a lot of attractive places for tourists. Only a couple of steps away from the hotel there is the funicular railway Starý Smokovec – Hrebienok, which is the starting point for many hiking paths. Sports possibilities and various forms of non-traditional entertainment can be taken advantage of both in the summer and the winter seasons.

April is the beginning of the spring season in the High Tatras, so there may still be snow at higher altitudes and therefore opportunities for skiing in the mountains (e.g. at Lomnické sedlo). This part of the High Tatras is a well-known winter sports center. The average temperature in April is between +2 and +9 °C.

Conference topics

The 19th International Symposium “Metallography & Fractography 2025” features some special sessions on areas of current interest, and will focus primarily on practical aspects and advances in microstructural characterization techniques, including quantitative evaluation of microstructures, TEM, SEM, EBSD, and

other microanalyses; mathematical modelling and process simulation, stereological and statistical methods in the area of evaluating of microstructure and the process of failure; solidification and solid-state transformations, including segregation and precipitation processes; prediction of microstructures and interrelationships between microstructure and material properties, with no limitation to classes of materials and technology; welding and joining of materials; fractures, the theory of material failure, defects and material degradation; the utilization of fractography in engineering practice; fatigue and creep, corrosion and oxidation; nonferrous alloys, medium and high-entropy alloys, shape memory alloys; nanostructures and nanocrystalline materials; superconductors, composites, intermetallic, amorphous materials, biomaterials, powder metallurgy and ceramics; coatings and surface engineering; metallography in archaeology (archaeometallurgy).

The Conference Language

The official language of the conference is English. In exceptional circumstances, Slovak and Czech may also be feasible. Lectures, posters, abstracts, and papers must be in the English language.

Registration and Reservation

Participants should register themselves using the Binding Registration Form available on the website konferencie.net/metalo and reserve accommodation at the Atrium Hotel as well.

Accommodation

For the participants in the Metallography & Fractography 2025 Symposium, we have reserved accommodation in the Atrium Hotel. All reservations of the participants in the Atrium Hotel are arranged by the organizer of the conference. For detailed information about reservations of accommodation, contact us by email at metalokonferencie.net or on mobile phone at +421 903 249 123.

There is a swimming pool, wellness center, and sauna in the hotel. Entry to these is included in the room price. Because of its facilities and appealing range of services, the Atrium Hotel is considered an ideal choice not only for holidaymakers spending their family time together but also for business

clients who make use of the complete congress center and unique premises suitable for organizing conferences, education sessions, seminars, or workshops. The unique hotel premises offer guests plenty of fun and relaxation in any kind of weather. The hotel facilities include, both for accommodated and non-accommodated guests, relax zones for absolute relief of both your body and your mind, 4 Elements Wellness, 4 Elements Aqua and relax zone with a pool bar, energizing wellness facilities, a bowling bar with bowling lanes, and a Wine, Coffee & Tea Lounge.

All requested information about Atrium Hotel is available at www.atriumhotel.sk.

Accommodation Fee

Accommodation and meals beyond the scope of the conference should be arranged with the conference organizers, on the day before the beginning of the conference and on the day after the conclusion of the conference, the conference are agreed on the same prices as during the conference. The price list from April 22 – 25, 2025 in the Atrium Hotel is as follows:

Single STANDARD room:	130 €/person/night
Double STANDARD room:	75 €/person/night
Single EXCLUSIVE room:	175 €/person/night
Double EXCLUSIVE room:	92 €/person/night

Prices of accommodation include breakfast, local tax and unlimited entrance to the relax/spa center and pool.

Conference Fee

The conference fee includes participation in all conference activities, the Abstract Booklet printout available at the Conference Registration Desk, the Conference Proceedings in the indexed journal of “scientific.net” publisher available after a review process of papers, morning and afternoon refreshments, lunches, and dinners during the conference.

The Conference fee	Base / VAT 23 % / Together
Until March 31, 2025*	398.37 €/91.63 €/490.00 €
After April 1, 2025*	422.76 €/97.24 €/520.00 €
For Ph.D. Students*	300.81 €/69.19 €/370.00 €
For accomp. persons*	130.08 €/29.92 €/160.00 €

Options Item	Base / VAT 23 % / Together
Additional payment for exhibitors, exhibition table, per 3 days*	400.00 €/92.00 €/492.00 €
Advertising publication of the company name with the logo on the cover of the Conference Proceedings “Metallography & Fractography XIX” with the “advertising partner” marking*	500.00 €/115.00 €/615.00 €

One-page black & white advertising of the company in the Abstract Booklet*

500.00 €/115.00 €/615.00 €

One-page colored advertisement of the company in the Conference Proceedings*

500.00 €/115.00 €/615.00 €

Location of the company logo (banner) in the congress hall during the conference*

400.00 €/92.00 €/492.00 €

Conference tour Východná, bus transport & entrance fee included

20.00 €

*0 % VAT applies only to organizations that are registered for VAT in their own country, outside of the Slovak Republic. This means it applies to VAT-registered organizations from countries within and outside of the European Union.

All necessary information regarding Payment and VAT will be provided by Mr. Tomáš Lukáč by phone: +421 903 249 123, or by e-mail: metalo@konferencie.net

Food and beverages

For all participants the catering is as follows:

April 23, 2025	Grill and Beer Dinner
April 24, 2025	Lunch and Conference Dinner
April 25, 2025	Lunch

Accommodated participants have breakfast included in the price for accommodation.

Beverages during lunches are not included in the conference fee, and participants should pay for these themselves. Lunches and dinners beyond the scope of the given catering schedule are paid for individually by the participants.

Payment

Please send your payment with the registration application by April 1, 2025. Exceptionally, it is possible to pay the Conference Fee at the Conference Registration Desk in the Atrium Hotel. The application form together with confirmations of Conference fees paid is to be returned online via our website, or by e-mail to metalo@konferencie.net. After April 1, 2025, participants must pay an increased conference fee of 422.76 €/person + 23 % VAT.

Bank details: Fio banka, a.s., Slovak Republic, IBAN: SK22 8330 0000 0023 0081 5059, SWIFT CODE: FIOZSKBAXXX, in favour of Lumakon, s.r.o. Košice, Na Šajbe 1A, 040 01 Košice (company ID No: 47082577, VAT Reg. No.: SK2023759925, registered for VAT). Please remember to include the name of the organization and of the participant in the transfer order.

Cancellation

It is regretted that no refund can be made, or invoices canceled for non-attending conference participants. In this case, the printout of Conference Proceedings "Metallography & Fractography XIX" in the indexed journal of "scientific.net" publisher will be mailed to non-attending participants. An exchange of conference participants is possible at any time, but information for organizers is required.

We ask authors to note that their accepted papers will be published in the indexed journal of "scientific.net" publisher only after payment of the appropriate conference fee will be received.

For cancellation of the accommodation, the same conditions which apply in the Atrium Hotel are valid.

Conference Registration Desk

The Conference Registration Desk will be open in the lobby of the Atrium Hotel at the following hours:

Wednesday, April 23, 2025	10.00 – 18.00
Thursday, April 24, 2025	10.00 – 12.00

Scientific Programme

Specialist activities will begin on Wednesday, April 23, 2025. Contributions will be presented as invited lectures, conference lectures and in the form of posters.

Lecture Sessions

The speakers of invited lectures will be allowed to talk for 25 minutes, while other conference lectures will have a max. 15 minutes. After each lecture approx. 5 minutes of discussion time are planned, and there may be a general discussion at the end of each section. With this in mind, and as there is only a short time for each presentation of each lecture, please be careful in the preparation of your lecture. For your presentation, you can use a data projector.

It is fully recommended to give the presentation of the lecture presentation to the technician the day before the presentation on a flash key, at least in the morning on the date of the presentation.

Poster Sessions

Those who have applied to present a poster will exhibit their results in Lounge S1 during sessions according to the scientific programme. Visits to poster exhibition sessions include personal discussions with authors and are followed by a more formal chaired discussion session. The panel (poster snap frame) with dimensions of 0.7 m wide and 1.0 m high will be available. The posters are divided in line with the conference programme into two sessions. Authors are urged to use pictures and texts which are clearly visible, and to avoid excessively long texts.

The Best Poster Competition is included in the programme of the symposium. Three best posters will be adjudicated for each Poster Session.

The Best Metallographic & Fractographic Photo Competition is included in the symposium programme, too. Please apply for this competition at the Conference Registration Desk. This competition will be in two sections: The Best Scientific Photograph and The Most Interesting Curiosity. It is necessary to bring high-resolution printed competition photographs. The technical and aesthetic quality of the pictures will be considered in the judging. The photographs will be displayed on the poster panel during the conference.

Exhibition

During the conference, an exhibition of instruments and devices from various companies will be organized. The list of companies taking part in the exhibition, and which also sponsor this symposium, is as follows:

General Advertising Partners:

Anton Paar Slovakia s.r.o.
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RMS Košice s.r.o.
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Exhibitors:

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KVANT spol. s r. o.
Metalco Testing s.r.o.
ZENA-R Slovakia, s.r.o.
Nadácia SPP
ZwickRoell s.r.o.
Carl Zeiss Slovakia, s.r.o.
SPECION s.r.o.

Conference Social Programme

April 23, 2025

Dinner

The dinner will be held on Wednesday, April 23, 2025, at 19.00. It will be an informal occasion with a minimum of speeches. Dress code – casual.

April 24, 2025

Conference Tour – Východná

An unexpected change: Due to the threat of foot-and-mouth disease, it was decided to temporarily

suspend farm visits until April 30, 2025. We have prepared an alternative programme in the largest natural amphitheatre in Slovakia, Východná. The amphitheatre is known mainly thanks to the legendary folklore festival Východná. The amphitheatre offers activities to strengthen team spirit: Hat dance, Hammer the Nail, Horseshoe throwing for Good Luck. You can enjoy modern or vintage style tractor ride on a straw obstacle course or fun activities such as pitchfork or axe throwing, rubber rifle, and air rifle.

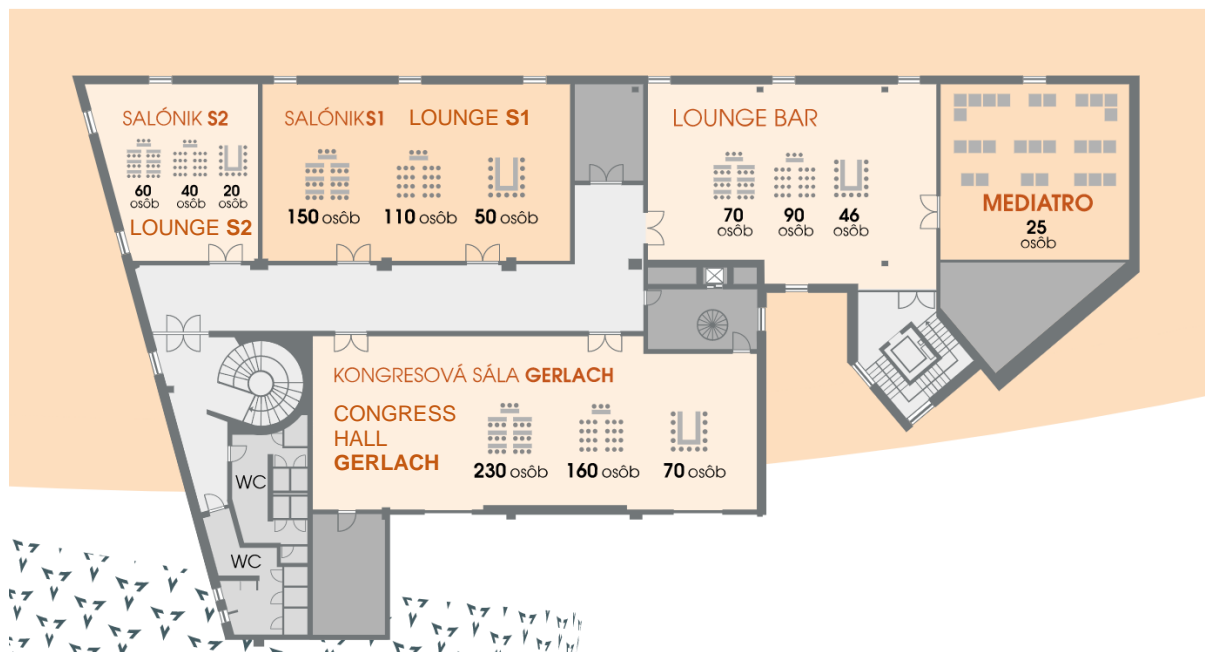
This Conference tour is for all the participants who ordered it in their Binding Registration Form. The departure of the bus is planned at 14.00 from the

parking lot in front of the Atrium Hotel. Exceptionally, you can decide to apply for the Conference tour at Conference Registration Desk, but we are limited by the capacity of the bus. The Conference tour costs 20.00 € (VAT included). The price covers transport by bus and entry ticket.

Conference Dinner

You are kindly invited to the Conference Dinner which will be held in the restaurant of the Atrium Hotel from 19.00 to 24.00. Dress code – business formal.

Hotel Atrium Floor Plan



PROGRAMME AT A GLANCE

WEDNESDAY, APRIL 23, 2025

10.00 – 18.00 Registration (Conference Registration Desk)

AFTERNOON SESSIONS

13.00 – 13.30 Opening Ceremony of the Symposium (Congress Hall Gerlach)

13.30 – 15.10 Plenary Session 1 (Congress Hall Gerlach)

15.10 – 15.40 Coffee/Tea Break (Lounge Bar)

15.40 – 17.20 Conference Session 1 (Congress Hall Gerlach)

17.30 – 18.30 Poster Session 1, Visit of the Exhibitions (Lounge S1)

19.00 – 22.00 Grill and Beer Dinner (Hotel Restaurant)

THURSDAY, APRIL 24, 2025

10.00 – 12.00 Registration (Conference Registration Desk)

MORNING SESSIONS

09.00 – 09.30 Plenary Session 2 (Congress Hall Gerlach)

09.30 – 10.30 Conference Session 2 (Congress Hall Gerlach)

10.30 – 11.00 Coffee/Tea Break (Lounge Bar)

11.00 – 12.00 Conference Session 3 (Congress Hall Gerlach)

12.00 – 13.00 Poster Session 2, Visit of the Exhibitions (Lounge S1)

13.00 – 14.00 Lunch (Hotel Restaurant)

AFTERNOON ACTIONS

- 14.00 – 17.30 Conference Tour (Východná)
- 17.30 – 19.00 Meeting of H2MobilHydride Project Team (Lounge S2)
- 19.00 – 24.00 Conference Dinner (Hotel Restaurant)

FRIDAY, APRIL 25, 2025

MORNING SESSIONS

- 09.00 – 10.20 Conference Session 3 (Congress Hall Gerlach)
- 10.20 – 10.50 Coffee/Tea Break (Lounge Bar)
- 10.50 – 12.10 Conference Session 4 (Congress Hall Gerlach)
- 12.30 – 13.00 Closing Ceremony of the Symposium (Congress Hall Gerlach)
- 13.00 – 14.00 Lunch (Hotel Restaurant)

**SCIENTIFIC PROGRAMME OF THE
19th SYMPOSIUM ON METALLOGRAPHY,
FRACTOGRAPHY AND MATERIALS SCIENCE**

Wednesday, April 23, 2025

10.00 – 18.00 Registration
(Conference Registration Desk)

13.00 – 13.30 Opening Ceremony of the
Symposium
(Congress Hall Gerlach)

AFTERNOON SESSIONS

Congress Hall Gerlach

**PLENARY SESSION 1
INVITED LECTURE**

Chairs: J. Dusza, P. Horňák

13.30 Effects of Gas Composition and Gas
Pressure on Plasma Nitriding of Ferritic
Stainless Steel Using 304 Stainless
Steel Screen

A. NISHIMOTO¹, D. TANAKA¹ and
O. KISHIMOTO²

¹ Department of Chemistry and Material
Engineering, Kansai University, Japan

² Graduate School of Science and
Engineering, Kansai University, Japan

EXHIBITOR PRESENTATIONS

Chairs: J. Dusza, P. Horňák

14.00 Latest FEG SEM from JEOL
L. VASSE
JEOL (EUROPE) SAS, France

14.30 Instrumentation for Material Research
and Quality Control – XRD, SAXS,
Particle Size and Shape Analysis,
Nanoindentation, Scratch Testing
R. LANDL
Anton Paar Slovakia, Slovakia

15.00 Presentation of ZwickRoell Company
M. REINISCH
ZwickRoell, Czech Republic

15.10 Coffee/Tea Break (Lounge Bar)

Congress Hall Gerlach

CONFERENCE SESSION 1

Chairs: A. Mašlejová, A. Nishimoto

- 15.40** **Additively Manufactured and Heat Treated Dievear Tool Steel**
L. KUČEROVÁ
University of West Bohemia in Pilsen, Czech Republic
- 16.00** **Microstructure and Deformation Behavior of Ag-Cu Metastable Metal-Matrix Composite Prepared from Core-Shell Powder**
P. LEJČEK¹, A. STRAKOSOVA¹, F. PRŮŠA² and D. DVORSKÝ¹
¹ Institute of Physics of the Czech Academy of Sciences, Czech Republic
² University of Chemistry and Technology, Czech Republic
- 16.20** **Microstructural Characteristics of Ultra-High Temperature Binary Carbides with Improved Mechanical Properties**
A. KOVALČÍKOVÁ, M. HRUBOVČÁKOVÁ, L. ĐAKOVÁ, D. ALBOV, P. HVIŠČOVÁ, J. SZABÓ, R. SEDLÁK and T. CSANÁDI
Institute of Materials Research, Slovak Academy of Sciences, Slovakia
- 16.40** **Fine Tuning of Shape Memory Temperature in Metastable Ni₂FeGa Heusler Alloys**
O. MILKOVIČ^{1,2,3}, L. NULANDAYA⁴ and R. VARGA¹
¹ RVmagnetics, Slovakia
² Institute of Materials Research, Slovak Academy of Sciences, Slovakia
³ Institute of Experimental Physics, Slovak Academy of Sciences, Slovakia
⁴ Department of Functional Materials, Institute of Physics, Czech Academy of Sciences, Czechia
- 17.00** **New Approaches for Evaluating the Resistance of Clads under High Temperature Corrosion Conditions**
J. BREZINOVÁ, J. VIŇÁŠ and J. BREZINA
Faculty of Mechanical Engineering, Technical University of Košice, Slovakia

Lounge S1

POSTER SESSION 1 VISIT OF THE EXHIBITIONS

Chairs: P. Lejček, Z. Kuboň

- 16.30** Posters No.: P 01 – P 22
- P 01** **Effects of Ball Milling Time on CoCrFeNiTi High Entropy Sintered Alloys**
A. FUJII¹ and A. NISHIMOTO²
¹ Graduate School of Science and Engineering, Kansai University, Japan
² Department of Chemistry and Materials Engineering, Kansai University, Japan
- P 02** **High-Entropy Alloy AlCoCrFeNi₂ and its Heat Treatment**
A. MÁLKOVÁ, L. KUČEROVÁ and K. BURDOVÁ
University of West Bohemia in Pilsen, Czech Republic
- P 03** **Design and Characterization of High-Entropy Alloys for Hydrogen Storage**
K. NIGUTOVÁ¹, L. OROSZOVÁ¹ and K. SAKSL^{1,2}
¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia
² Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia
- P 04** **Exploring Metal Hydrides for Efficient Hydrogen Storage**
L. OROSZOVÁ¹, K. KUŠNÍROVÁ¹, K. NIGUTOVÁ¹ and K. SAKSL^{1,2}
¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia
² Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

P 05**Ablation Resistance of High-Entropy Carbide Ceramics with the Addition of SiC Whiskers**

L. ĐAKOVÁ¹, A. KOVALČÍKOVÁ¹,
M. HRUBOVČÁKOVÁ¹, P. TATARKO²,
M. HIČÁK² and J. DUSZA¹

¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia

² Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovakia

P 06**Cobalt-Free High-Entropy Oxide (CrMnFeNiCu)_xO_y as a High-Performance Electrode Material for Energy Storage Applications**

D. CSÍK¹, G. BARANOVÁ²,
L. OROSZOVÁ¹, B. BALLÓKOVÁ¹,
Z. MOLČANOVÁ¹, R. DŽUNDA¹ and
K. SAKSL^{1,2}

¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia

² Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

P 07**Development of New High-Entropy Materials for Energy Storage**

M. HODOROVÁ¹, A. FEDOROČKOVÁ²,
D. CSÍK¹, K. GÁBOROVÁ², R. DŽUNDA¹,
G. SUČÍK², D. IVÁNOVÁ², F. KROMKA¹
and K. SAKSL²

¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia

² Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

P 08**Microstructural Insights into Medium-Entropy Alloys**

J. KUBAŠKO¹, M. MATVIJA¹,
K. NIGUTOVÁ², L. OROSZOVÁ²,
Z. MOLČANOVÁ², B. BALLÓKOVÁ²,
R. DŽUNDA² and K. SAKSL^{1,2}

¹ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

² Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 09**Study of Carbon Fibers as an Alternative to Graphite in Lithium-Ion Battery Anodes**

K. GÁBOROVÁ¹, D. CSÍK², M. MATVIJA¹
and G. BARANOVÁ¹

¹ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

² Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 10**Recycling of Zinc-Based Industrial Waste into Nanofibrous Material for Potential Wastewater Treatment Applications**

E. MUDRA¹, I. SHEPA¹, K. NEMESH^{1,2},
J. PIROSKOVA², J. KLIMKO², D. ORAC²,
A. KOVALCIKOVA¹ and F. KROMKA¹

¹ Institute of Materials Research, Slovak Academy of Sciences, Slovak Republic

² Faculty of Materials, Metallurgy and Recycling, Technical University of Kosice, Slovak Republic

P 11**Fracture Surface Morphology and Roughness of Ti-Scaffold Filaments**

J. POKLUDA^{1,2}, J. ESCHEROVÁ² and
M. KIANICOVÁ²

¹ Central European Institute of Technology, Brno University of Technology, Czechia

² Faculty of Special Technology, Alexander Dubček University of Trenčín, Slovakia

P 12**The Influence of Chemical Composition and Plastic Deformations on the Microstructure, Mechanical and Corrosion Properties of the Mg₄Zn Alloys**

B. BALLÓKOVÁ¹, Z. MOLČANOVÁ¹ and
G. BARANOVÁ²

¹ Institution of Materials Research, Slovak Academy of Sciences, Slovakia

² Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

P 13**Optimizing Mechanical Strength and Corrosion Resistance of Rapidly Solidified Biodegradable Mg-Zn-Ca Alloys: The Ytterbium Addition Impact**

Z. MOLČANOVÁ¹, B. BALLÓKOVÁ¹,
D. ZALKA² and K. SAKSL³

¹ Institution of Materials Research, Slovak Academy of Sciences, Slovakia

² National Synchrotron Radiation Centre SOLARIS, University Kraków, Poland

³ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

P 14

The Microstructure and Mechanical Properties of Mg-Zn Alloy Processed by ECA-Pressing

M. FUJDA¹, R. KOČIŠKO¹, P. PETROUŠEK¹, Z. MOLČANOVÁ², I. CUPEROVÁ¹, M. MATVIJA¹, R. DŽUNDA² and K. SAKSL^{1,2}

¹ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

² Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 15

The Microstructure and Mechanical Properties of Zn Alloy Processed by Severe Plastic Deformation

I. CUPEROVÁ¹, M. FUJDA¹, M. MATVIJA¹, R. KOČIŠKO¹, P. PETROUŠEK¹, Z. MOLČANOVÁ², R. DŽUNDA² and K. SAKSL^{1,2}

¹ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

² Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 16

Application of Industrial Computed Tomography (CT) in Dentistry on 3D Printed Co-Cr Dental Bridge

A. BRLIĆ¹, S. ČIMIĆ², J. KOS³, I. SALARIĆ^{2,4}, I. KESER⁵ and T. BRLIĆ⁶

¹ Dental practice Andreja Brlić, Croatia

² School of Dental Medicine, University of Zagreb, Croatia

³ Topomatika Ltd., Croatia

⁴ Department of Maxillofacial and Oral Surgery, University Hospital Dubrava, Croatia

⁵ Keser Dental Studio, Croatia

⁶ Faculty of Metallurgy, University of Zagreb, Croatia

P 17

Verification of Concepts for Robotic and Real-Time Etching in Metallography

O. AMBROŽ, J. ČERMÁK and Š. MIKMEKOVÁ

Institute of Scientific Instruments of the Czech Academy of Sciences, Czechia

P 18

Analysis of Damage Causes of the Steam Heating Element from Tantalum
R. MORAVČÍK

Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava, Institute of Materials Science, Slovakia

P 19

Metallographic Analysis of the Cutting Zone and Comparison with Numerical Simulation

M. MARTINKOVIČ¹, M. NECPAL¹, T. VOPÁT¹ and M. DOMÁNKOVÁ²

¹ Institute of Production Technologies, Faculty of Material Science and Technology in Trnava, Slovak University of Technology in Bratislava, Slovakia

² Institute of Materials, Faculty of Material Science and Technology in Trnava, Slovak University of Technology in Bratislava, Slovakia

P 20

Influence of Growth Rate on the Microstructure and Properties of EuBCO Bulk Superconductors Prepared by Top Seeded Melt Growth Process

L. VOJTKOVA and P. DIKO

Institute of Experimental Physics, Slovak Academy of Sciences, Slovakia

P 21

Correlation between Additive Composition, Microstructure, and Superconducting Properties in EuBCO Systems

V. KUCHAROVÁ, P. DIKO, D. VOLOCHOVÁ and M. RAJŇÁK

Institute of Experimental Physics, Slovak Academy of Sciences, Slovakia

P 22

Setup and Optimization of a Single Cell PEM Electrolyzer to Produce Green H₂ Using Effective and Cheap Non-Platinum Catalysts

C. BERA, A. GUBŮOVÁ and M. STREČKOVÁ

Institute of Experimental Physics, Slovak Academy of Sciences, Slovakia

19.00

Grill and Beer Dinner
(Hotel Restaurant)

**SCIENTIFIC PROGRAMME OF THE
19th SYMPOSIUM ON METALLOGRAPHY,
FRACTOGRAPHY AND MATERIALS SCIENCE**

Thursday, April 24, 2025

10.00 – 12.00 Registration
(Conference Registration Desk)

10.00 – 14.00 Visit of the Exhibitors
(Lounge S1)

MORNING SESSIONS

Congress Hall Gerlach

**PLENARY SESSION 2
INVITED LECTURE**

Chairs: L. Kučerová, K. Saksl

09.00 Ceramography and Fractography in
Dual-Phase High Entropy Ceramics
Research

J. DUSZA

Institute of Materials Research, Slovak
Academy of Sciences, Slovakia

CONFERENCE SESSION 2

Chairs: L. Kučerová, K. Saksl

09.30 Novel ASC Refractory Design and
Installation for Improved Energy
Efficiency and Corrosion Resistance in
Industrial Applications

D. CHUDÍKOVÁ¹, A. MAŠLEJOVÁ²,
V. MIŠANEKOVÁ¹, R. HIRJAK¹,
B. BULKO², P. DEMETER², J. LEGEMZA²
and M. HRUBOVČÁKOVÁ²

¹ RMS s.r.o. Slovakia

² Faculty of Materials, Metallurgy and
Recycling, Technical University of Košice,
Slovakia

09.50 Active-Screen Plasma Nitriding of Small
Thin Rolled Stainless Steel Plates

K. SUMIYA¹, S. TOKUYAMA¹, T. AOKI¹,
J. FUKUI¹, A. NISHIYAMA² and
A. NISHIMOTO³

¹ Hatta Kogyo Co. Ltd., Japan

² Mikitec Co., Ltd., Japan

³ Department of Chemistry and Materials
Engineering, Faculty of Chemistry,
Materials and Bioengineering, Kansai
University, Japan

10.10 Roman Bronze Objects from the
Archaeological Site of Burg in
Burgenland, Austria

S. STROBL and R. HAUBNER

Technische Universität Wien, Institute of
Chemical Technologies and Analytics,
Austria

10.30 Coffee/Tea Break (Lounge Bar)

Congress Hall Gerlach

CONFERENCE SESSION 3

Chairs: A. Kovalčíková, R. Moravčík

11.00 **A Bronze Button from Late Bronze Age Site of Inzersdorf ob der Traisen**

R. HAUBNER and S. STROBL
Technische Universität Wien, Institute of Chemical Technologies and Analytics, Austria

11.20 **Copper Test Melts with Additions of Pb, Bi, As, Sb and Sn**

R. HAUBNER and S. STROBL
Technische Universität Wien, Institute of Chemical Technologies and Analytics, Austria

11.40 **Enhancement of Mechanical Properties in $Al_{0.35}CoCrFeNi$ Complex Concentrated Alloys Through Grain Size Tailoring**

K. ULYBKINA^{1,2}, K. KAMYSHNYKOVA¹, T. PELACHOVÁ¹ and A. KLIMOVÁ¹
¹ Institute of Materials and Machine Mechanics, Slovak Academy of Sciences, Slovak Republic
² Faculty of Materials Science and Technology in Trnava, Slovak University of Technology, Slovak Republic

Lounge S1

POSTER SESSION 2

Chairs: M. Dománková, M. Nosko

12.00 **Posters No.: P 23 – P 44**

P 23 **Effects of Gas Composition and Layer Number on the Mechanical Properties of Multilayered Si-DLC/DLC Coatings**

A. OKANO¹ and A. NISHIMOTO²
¹ Graduate School of Science and Engineering, Kansai University, Japan
² Department of Chemistry and Materials Engineering, Kansai University, Japan

P 24 **Investigation of Al-Si Coating Behavior on 22MnB5 Boron Steel During Heat Treatment**

A. DUCHÁČ and P. KEJZLAR
Technical University of Liberec, Czech Republic

P 25 **Tribological Behavior of $ZrO_2-3Y_2O_3$ Ceramics in Dry Reciprocating Sliding against SiC Counterparts**

D. MEDVEĎ, J. ANDREJOVSKÁ, and M. VOJTKO
Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 26 **Tribological Behavior of $Al_2O_3-ZrO_2+3Y_2O_3$ Composites**

J. ANDREJOVSKÁ, D. MEDVEĎ and M. VOJTKO
Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 27 **Gas Pressure Infiltration of Porous Ni- Al_2O_3 -Al Compacts with Molten Aluminium**

A. OPÁLEK, S. KÚDELA J.R., M. ŠTEPÁNEK, N. BERONSKÁ and K. IŽDINSKÝ
Institute of Materials and Machine Mechanics, Slovak Academy of Sciences, Slovakia

P 28**Deformation Structure of Powdered Iron Compacted at High Pressure**S. RAVI¹, M. FÁBEROVÁ¹, V. KOSTIUK¹, R. BUREŠ¹, Z. BIRČÁKOVÁ¹, J. FÜZER² and P. KOLLÁR²¹ Institute of Materials Research, Slovak Academy of Sciences, Slovakia² Institute of Physics, Faculty of Science, P. J. Šafárik University, Slovakia**P 29****Metallography of Sintered H13 Steels Produced by the Additive Method**

M. GOCKI and G. MATULA

Scientific and Didactic Laboratory of Nanotechnology and Material Technologies, Faculty of Mechanical Engineering, Silesian University of Technology, Poland

P 30**Comparison of Properties of CeO₂-Doped ZrO₂ Samples Prepared by Conventional Sintering and by SPS**

M. VOJTKO, D. MEDVEĎ, J. ANDREJOVSKÁ and P. TATARKO

Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 31**Microstructure and Hardness Distribution of Laser Powder Bed Fusion-Produced AISI 2507 Super Duplex Stainless Steel**M. J. DAGNAW¹, Z. BRYTAN¹, D. CIMBALA², V. SIMKULET² and S. FITA¹¹ Silesian University of Technology, Faculty of Mechanical Engineering, Department of Engineering Materials and Biomaterials, Poland² Faculty of Manufacturing Technologies of the Technical University of Košice with the seat in Prešov, Slovakia**P 32****Effect of Laser Welding on the Microstructural Behavior of Silicon Steels**M. MOTÝLOVÁ^{1,2}, I. PETRYSHYNETS², L. FALAT², V. PUCHÝ² and F. KROMKA²¹ Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia² Institute of Materials Research, Slovak Academy of Sciences, Slovakia**P 33****Microstructure Characterization of a Dissimilar 14MoV6-3/P91 Weld after Long-Term Service Exposure at 580 °C**

V. VODÁREK, R. PALUPČÍKOVÁ and P. VÁŇOVÁ

VŠB – Technical University of Ostrava, Czech Republic

P 34**Evaluation of the Operational Degradation of TVD Pipeline Welds**

Z. VÁVROVCOVÁ, Z. VESELKA and J. BAJER

ÚJV Řež, a.s., Czech Republic

P 35**Influence of High-Pressure Hydrogen on Tensile Properties of Pipeline Steels Evaluated by Autoclave In-situ Slow Strain Rate Test**J. KANDER^{1,2} and G. ROŽNOVSKÁ¹¹ MATERIAL AND METALLURGICAL RESEARCH, Ltd., Czech Republic² VŠB – Technical University of Ostrava, Faculty of Materials Science and Technology, Czech Republic**P 36****Influence of Thermal Treatments on the Corrosion Behaviour of Nickel-Aluminium Bronze in Freshwater-like Aqueous Environment**P. LINHARDT¹, M. V. BIEZMA², S. STROBL¹ and R. HAUBNER¹¹ Technische Universität Wien, Institute of Chemical Technologies and Analytics, Austria² University of Cantabria, Spain**P 37****Fractography and Microstructural Analysis of Fatigue Crack Propagation in Beta-Annealed Ti6Al4V Alloy after Fatigue Test**

J. BELAN, M. UHRÍČIK, M. SLEZÁK and V. CHVALNÍKOVÁ

Department of Materials Engineering, Faculty of Mechanical Engineering, University of Žilina, Slovakia

P 38**Fracture Mechanisms of Aluminum Alloy Caused by Fatigue Tests**

M. UHRÍČIK, P. PALČEK, J. BELAN, V. CHVALNÍKOVÁ, M. SLEZÁK and L. ŠIKYŇA

Department of Materials Engineering, Faculty of Mechanical Engineering, University of Žilina, Slovakia

P 39

Metal Dusting Failure in an Aniline Processing Plant

Z. KUBOŇ, J. KOSŇOVSKÁ and G. ROŽNOVSKÁ

MATERIÁLOVÝ A METALURGICKÝ VÝZKUM s.r.o., Czech Republic

P 40

The Importance of Dislocations in the Work Hardening of Low-Carbon Steel during Cold Plastic Deformation

T. BRILIĆ¹, M. MATVIJA², S. REŠKOVIĆ¹ and M. LISNICHUK^{3,4}

¹ Faculty of Metallurgy, University of Zagreb, Croatia

² Institute of Materials, Faculty of Materials, Metallurgy and Recycling, Technical University of Košice, Slovakia

³ Faculty of Science, University of Pavol Jozef Safarik Kosice, Slovakia

⁴ Institute of Materials Research, Slovak Academy of Sciences, Slovakia

P 41

Metallographic and Fractographic Analysis of Plastic Deformation of Austenitic Stainless Steel AISI 304 after Static and Dynamic Loading

V. CHVALNÍKOVÁ¹, M. UHRÍČIK¹, M. SLEZÁK¹, J. BELAN¹ and T. VLACH²

¹ Faculty of Mechanical Engineering, Department of Materials Engineering, University of Žilina, Slovak Republic

² Faculty of Mechanical Engineering, Institute of Technology and Materials, University Jana Evangelisty Purkyňe in Ústí nad Labem, Czech Republic

P 42

Effect of Solution Annealing and Plasma Nitriding on the Fatigue Life Change of AISI 304 Austenitic Steel

M. SLEZÁK¹, M. URÍČIK¹, V. CHVALNÍKOVÁ¹, J. BELAN¹ and T. VLACH²

¹ Faculty of Mechanical Engineering, Department of Materials Engineering, University of Žilina, Slovak Republic

² Faculty of Mechanical Engineering, Institute of Technology and Materials, University Jana Evangelisty Purkyňe in Ústí nad Labem, Czech Republic

P 43

Failure Analysis of a Copper Pipe Used for Natural Gas Distribution: Investigation of Crack Formation and Fracture Mechanism

P. KEJZLAR, A. HOFMAN and M. PETRZILKOVA

Institute for Nanomaterials, Advanced Technologies and Innovation; Technical University of Liberec, Czech Republic

P 44

Corrosion Resistance of 3D-Printed AISI 316L Stainless Steel in Molten Glass: Microstructural Evolution and Phase Transformations

A. HOFMAN, M. PETRZILKOVA, F. VELE, A. HOTAR and P. KEJZLAR

Technical University of Liberec, Czech Republic

13.00

Lunch (Hotel Restaurant)

AFTERNOON ACTIONS

14.00

Conference Tour (Východná)

17.30

Meeting of H2MobilHydride Project Team (Lounge S2)

19.00

Conference Dinner (Hotel Restaurant)

**SCIENTIFIC PROGRAMME OF THE
19th SYMPOSIUM ON METALLOGRAPHY,
FRACTOGRAPHY AND MATERIALS SCIENCE**

Friday, April 25, 2025

MORNING SESSIONS

Congress Hall Gerlach

CONFERENCE SESSION 4

Chairs: M. Martinkovič, P. Horňák

- 09.00** **Impact of Primary Piping Material Conditions on Safe Long-Term Operation of VVER-Type NPPs: Delisa-LTO project**
D. SLNEK^{1,2}, J. PETZOVA¹ and M. ADAMECH¹
¹ VUJE, a.s., Slovakia
² Faculty of Materials Science and Technology in Trnava, Slovak University of Technology, Slovakia
- 09.20** **Evaluation of Microstructure Changes in Alloy F (Cr-Ni) and Inconel A560 Materials before and after Annealing**
M. HAJAS¹ and D. SLNEK²
¹ VUJE, a.s., Slovakia
² Faculty of Materials Science and Technology in Trnava, Slovak University of Technology, Slovakia
- 09.40** **The Impact of Final Turning on the SCC Susceptibility of Austenitic Stainless Steel AISI 304 and AISI 321**
M. KUDLÁČ, M. DOMÁNKOVÁ, K. BÁRTOVÁ, M. GAVALEC and D. SLNEK
Institute of Materials Science, Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in
- 10.00** **The Influence of the Final Machining Process on the Change of the Microstructure in the Surface Region of Austenitic Stainless Steels**
K. BÁRTOVÁ, M. KUDLÁČ, M. DOMÁNKOVÁ, T. VOPÁT, M. GAVALEC and D. SLNEK
Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava, Slovak Republic
- 10.20** **Coffee/Tea Break (Lounge Bar)**

Congress Hall Gerlach

12.30

Closing Ceremony of the Symposium
(Congress Hall Gerlach)

CONFERENCE SESSION 5

Chairs: J. Dusza, V. Vodárek

13.00

Lunch (Hotel Restaurant)

10.50

**Hardness Anisotropy of HfC and TaC
Ceramic Grains**

Y. K. RAVIKUMAR, M. VOJTKO, J. DUSZA
and T. CSANÁDI

Institute of Materials Research, Slovak
Academy of Sciences, Slovak Republic

11.10

**Impact of Dual-Beam Laser Welding
Energy Distribution on the Structural
and Mechanical Properties of DSS
2304 Weld Joints**

L. KOPČANOVÁ^{1,2}, N. BERONSKÁ¹,
T. DVORÁK¹, M. ČAVOJSKÝ¹,
E. HODÚLOVÁ¹ and M. NOSKO¹

¹ Institute of Materials and Machine
Mechanics, Slovak Academy of Sciences,
Bratislava, Slovakia

² Faculty of Mechanical Engineering,
Slovak University of Technology in
Bratislava, Slovakia

11.30

**Evaluation of Interface between
Alumina Dispersion Strengthened
Copper Composite and Precipitation
Strengthened Copper**

F. KROMKA¹, O. MILKOVIČ^{1,2,3},
J. SZABÓ¹, K. ĎURIŠINOVÁ¹,
J. ĎURIŠIN¹ and I. PETRYSHYNETS¹

¹ Institute of Materials Research of Slovak
Academy of Sciences, Slovakia

² RVmagnetics, a.s., Slovakia

³ Institute of Experimental Physics of
Slovak Academy of Sciences, Slovakia

11.50

**Polycrystalline Thermoelectric
Materials with Observed Anisotropy**

F. MIHOK^{1,2}, V. PUCHÝ¹, J. SZABÓ¹,
B. BALLÓKOVÁ¹, R. DŽUNDA¹ and
K. SAKSL^{1,2}

¹ Institute of Materials Research, Slovak
Academy of Sciences, Slovakia

² Faculty of Materials, Metallurgy and
Recycling, Technical University of Košice,
Slovakia

