

## NEWSLETTER

#### NOVEMBER 2023

#### efcweb.org

# The personal approach continues to promote ideas

#### Dear corrosionists,

It's only been a short while since EUROCORR 2023 – the largest European corrosion conference – took place in Brussels, where more than a thousand corrosionists from 49 countries met to share knowledge on mechanisms, techniques, and methods we need to fight corrosion.

It was a huge event this year at which it was nice to see an increasing number of participants joining us from all across Europe, as well as from overseas, with strong representation from China, USA, and Japan in particular.

The EFC has organised EUROCORR since 1956 and in that time it has undergone many

changes over the course of almost 70 years. The conference reflects the evolving needs of the corrosion community. In the past, when information took longer to reach audiences and national societies were relatively insulated, the main goal of the conference was to spread knowledge. Indeed, this is still a very important aspect, especially in view of the latest developments in the field of corrosion.

In addition to traditional topics of corrosion research and traditional application areas, we see numerous new trends and forums emerging. Self-healing coatings, corrosion protection of biomaterials, and new corrosion challenges linked to recycling and renewable energies attract a range of researchers and companies.

Consequently, new alliances are being built and the landscape of corrosion research continues to gain momentum. Although information is easily available in journals and more and more also on social media, spending several days in the company of respected colleagues at a good conference like EUROCORR is probably still the most efficient way to keep track with the rapid development and get updates on the main and emerging trends.

> After all, there is something that e-mail, social media, or video conferencing cannot fully replace – and we all know that personal contact is invaluable.

Discussions that happen in-person are much livelier and tend to generate considerably more in the way of ideas. Physically meeting a colleague

and interacting with them creates a deeper connection and opens the way for fruitful collaboration. This year at EUROCORR in Brussels, I witnessed numerous instances where random encounters led to the creation of project consortia, plans for student visits, industrial collaboration and consultancies, ideas for common research, as well as publication plans.

Knowing networking possibilities are the prime asset of EUROCORR, we continue to foster this environment, and provide even more space for such encounters and discussions in future editions.

I promise we will do our best to introduce some of them already at EUROCORR 2024 in Paris.

Yours, Tomáš Prošek, EFC President

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Make a date in your corrosion calendar for the latest events

## All eyes turn to Paris ahead of EUROCORR 2024

The city of love is set to become the city of corrosion protection next year when it hosts EUROCORR 2024



EUROPEAN CORROSION CONGRESS

Located within walking distance from the Avenue des Champs-Élysées, next year's EUROCORR in Paris not only promises to be an exciting destination, but a conference filled with a wide range of sessions and workshops

In 2024, EUROCORR will take place in Paris, France, from 1 to 5 September 2024. The venue is the Palais des Congrès de Paris, which is ideally located within walking distance from the Avenue des Champs-Élysées, a major Paris landmark, and easily accessible by public transport.

Paris is one of the world's leading tourist destinations and in 2024 will host the Olympic and Paralympic

Games. There is always something new to discover in this spectacular city packed with famous attractions, museums, restaurants, and many fascinating historic and modern neighbourhoods to explore.

After the success of EUROCORR in Nice in 2004 and 2009, and then in Montpellier in 2016, CEFRACOR, a Member Society of the EFC, in cooperation with Chimie ParisTech, has been

selected by the EFC to organise this major event. EUROCORR 2024 will cover all aspects of corrosion science, technology, and engineering, with an emphasis on a main theme: A step forward in societal awareness of material degradation issues.

This will be achieved by bringing together corrosion experts from universities, research centres, and industry. EUROCORR 2024 will provide a forum for presentation and discussion of advances in understanding corrosion phenomena and progress in corrosion prevention.

The programme will include plenary lectures, keynote

lectures, oral and poster presentations in all the areas covered by the EFC Working Parties, with additional joint sessions and topical workshops. A preview of these topics is given to the right.

A large exhibition is planned, which will feature the latest developments in corrosion resistant materials, corrosion research, corrosion monitoring, coatings, inhibitors,

cathodic protection. Social events, including receptions and a conference dinner, will contribute to the exciting and festive atmosphere that you will find in Paris.

We are looking forward to welcoming you in Paris for EUROCORR 2024. Please save the date!

Philippe Marcus (left), Chair of EUROCORR 2024

#### LOCAL ORGANISING COMMITTEE

- $\rightarrow$  Mariana Berthet, CEFRACOR (FR)
- → Pascale Bridou Buffet, Fondation
- Maison de la Chimie (FR)
- $\rightarrow$  Pascal Collet, EFC (FR)
- $\rightarrow$  Hassina Founas, CEFRACOR (FR)
- $\rightarrow$  Gweltaz Hirel, SFV (right) (FR)
- → Vincent Maurice, Chimie ParisTech – CNRS (FR)
- → Jean-Pierre Pautasso,
- CEFRACOR (FR)
- $\rightarrow$  Marcel Roche, CEFRACOR (FR)



#### SPECIAL WORKSHOPS

 $\rightarrow$  Corrosion and corrosion protection issues in additive manufacturing

 $\rightarrow$  Corrosion challenges in the chemical industry towards sustainability

 $\rightarrow$  Design and performance of corrosion resistant high entropy alloys and multi-element alloys

→ Certification in corrosion and corrosion protection

 $\rightarrow$  Durability issues in photovoltaic modules and solar energy systems (special session under WP26)

→ Corrosion management applications in Industry

#### JOINT SESSIONS

 $\rightarrow$  Hydrogen challenges in energy and transport systems (WP5, WP6, WP17, WP22, WP25, TF, WCO)

 $\rightarrow$  Coatings for high temperatures (WP3, WP14)

 $\rightarrow$  Environmentally-assisted crack initiation (WP4, WP5, WP22)

 $\rightarrow$  Corrosion sensoring, monitoring and prediction (WP6, WP8, WP25)

 $\rightarrow$  Cathodic protection in marine environment (WP9, WP16)

- $\rightarrow$  Cathodic protection of steel in concrete (WP11, WP16)
- $\rightarrow$  Polymers in organic coatings (WP14, WP19)

 $\rightarrow$  Corrosion during the manufacture, transformation, storage, and use of biofuels and bioproducts (WP15, TF)

 $\rightarrow$  Corrosion issues of electric vehicles and e-mobility systems (WP17, WP23, TF)

 $\rightarrow$  Multi-scale modelling for design of protective coatings (WP6, WP8, WP14, WP17, WP22, WP25, VIPCOAT)

 $\rightarrow$  Sustainability of marine structures (WP9, WP18, WP25, TF)

 $\rightarrow$  Corrosion in molten salts and ionic liquids for energy



Located at Porte Maillot, on the edge of Paris, the 32,000m2 convention centre at Palais des Congrès de Paris (left) includes four amphitheatres and is part of the same complex as skyscraper hotel, the Hyatt Regency Paris Étoile

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applications (WP3, WP4, TF)

 $\rightarrow$  Microbial corrosion and biofouling issues in marine environments (WP9, WP10)

 $\rightarrow$  Future of color coated steel (WP14, WP15)

→ Degradation of orthopaedic joint implants (WP18, TF)

 $\rightarrow$  Corrosion of prepainted (coil coated) materials (WP14, WP25)

#### **IMPORTANT DEADLINES**

Submission of abstracts: **31 January 2024** Notification of acceptance to authors: **22 April 2024** Reduced fee for early registration: **15 June 2024** 

#### **CONGRESS CONTACT**

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#### **EXHIBITION OFFICE**

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# Your guide to sponsoring and exhibiting at EUROCORR

There are a range of options for those looking to get involved with the flagship event of the international corrosion calendar

Attracting thousands of delegates annually, The European Corrosion Congress, EUROCORR, remains the flagship

committee. The EUROCORR 2024 sponsorship team would be delighted to meet with prospective sponsors to discuss

event of the international corrosion calendar when it arrives in a different European city each year – and it's simple to get involved.

Famous for its high technical standard and its popular social programme, EUROCORR offers a wide range of sponsorship packages that provide a unique opportunity to communicate with present, as well as future customers, before and during the conference.

Hosted by <u>CEFRACOR</u> this year, all sponsors will be acknowledged on the congress website, in promotional mailings, as well as in the final programme.

#### **RANGE OF OPPORTUNITIES**

Sponsors of the event will be invited to design their sponsorship package from the wide range of opportunities

available to help meets each and every company's specific marketing needs.

In addition, any further ideas to promote products and services are welcome for consideration by the organising

ALL YOU NEED TO KNOW ABOUT EUROCORR 2024

- → The exhibition area will have
  40 modular spaces from 6m2
  at a minimum
  → It will be hosted in Hall
  Havane on level 2 of the Paris
  Congress Centre (Porte
- Maillot)

 $\rightarrow$  Set up of the conference will begin on Monday 2 September from 9:00 until 17:00

→ The commercial exhibition will run from Tuesday 3rd until Wednesday 4th September 2024

 $\rightarrow$  Dismantling will commence on Wednesday 4th September

options or create tailor-made sponsorship packages specific to all marketing requirements.

Sponsors can select their preferred package to receive acknowledgements, benefits and entitlements according to the level of sponsorship contribution. Sponsorship items will be allocated on a 'first come, first served' basis. There are a range of opportunities to enhance your company's presence at the event with a choice of four packages, ranging from Bronze to Platinum.

Additional promotional opportunities are also available. Contact CREFRACOR at <u>communication@cefracor.org</u> and ask for the Sponsorship Brochure. For all exhibition details, please contact Gweltaz Hirel (SFV) at <u>gweltaz.hirel@vide.org</u>.

<u>Click here</u> to find out more.





#### **BOOTH PACKAGES**

A choice of different booth size with a global solution will be offered (excl. VAT):

• 6 m<sup>2</sup>...... € 3 200 • 9 m<sup>2</sup>...... € 4 100 • 12 m<sup>2</sup>...... € 4 900

#### Exhibit spaces include:

- Modular shell scheme including back and partition walls with aluminum structure (2,5 m x 1 m clear wood panels)
- Stand carpeting
- System fascia with company name + booth number (no logo)
- 1 spotlight per 3 m<sup>2</sup>
- round table and 3 chairs per 6 or 9 m<sup>2</sup>
- 1,5 kW electrical connection



Help turn the eyes of a continent towards your company with one of the selection of booth packages available, which start from €3,200 and come with a wide range of benefits

## The latest news from WP4 on Nuclear Corrosion

EUROCORR 2023 provided the setting for the Nuclear Corrosion session and Working Party business meeting



Many of Europe's foremost corrosion experts who work in the nuclear field met in Brussels for EUROCORR 2023, where they listened to 31 engaging talks and explored four posters, (as well as a few more nuclear-related posters in

other sessions), presented in the framework of the nuclear corrosion session.

The session was opened with an interesting keynote lecture given by the 2023 Henri Coriou Award winner, Damien Féron, and continued with a number of talks on environmentally-assisted cracking, nuclear waste disposal and Gen-IV corrosion issues, corrosion of fuel cladding materials, and on a variety of other type of corrosion topics. The Fall Business Meeting of the WP 4 was

held on the Wednesday and was attended by 27 people. The meeting started with handing over the 2023 Honorary Medal of the WP 4 for outstanding contributions to corrosion science and engineering in the nuclear field to Damien Féron (CEA/INSTN, France) and continued with awarding two further prizes (see the next page), election of the WP Chair and Vice-Chair, as well as discussion on past and future WP 4 activities.

#### LOOKING TO THE FUTURE

During next year's EUROCORR in Paris, a nuclear corrosion session and a special joint session on 'Corrosion in molten salts and ionic liquids for energy applications' will be organised, so don't forget to submit your abstract no later than January 2024.

WP4

All presenters in the nuclear corrosion session may submit a full paper to a special issue of the Corrosion Reviews journal (impact factor:

3.2) until 1 November 2024. The paper will undergo a regular review process and an earlier version of this paper may additionally be submitted for the conference proceedings until 31 July 2024.

### Well received WP 4 sponsorship set to continue

WP 4 is pleased to announce the sponsorship of the prizes by Elsevier (EFC Green Book No.69 'Nuclear Corrosion: Research, Progress and Challenges'), Cormet (€100 gift voucher for Amazon) and Paul Scherrer Institute

(backpack, drinking bottle and Swiss army knife) is gratefully acknowledged and set to continue at EUROCORR 2024, where the prizes will be awarded again.

The prize rules can be found on the EFC WP 4 website.

# Best poster presentation prize awarded in Brussels

The Paul Scherer Institute employee accepted the honour in Brussels and has some astute advice for fellow young corrosionists

Annesha Das (Paul Scherer Institute - PSI, Switzerland) was awarded the prize for the Best Poster Presentation of the 2023 Nuclear Corrosion Session at EUROCORR for the poster Assessing the role of surface conditions in SCC susceptibility of Alloy 182 in simulated LWR environments, which was co-authored by H.-P. Seifert, S. Ritter (both PSI, Switzerland)

"To me, the award brings a sense of validation from the experts in my field who found my work and my presentation to be worthy of recognition," explained Das. "As an early career post-doc, it is encouraging to feel that acknowledgement.

"This sort of an honour adds a feather to your academic hat. You will also find more people recognising your work and remembering you in future communications, fostering successful networking. Not to mention the pat on your back from your supervisor!" Ahead of next year's event in Paris, Das has some sage advice for fellow young corrosionists.

"Firstly, practise being succinct. You do not have a lot of space or time to work. Secondly, be creative! Conference posters and presentations allow you a

unique opportunity to present your work in ways that journal publications do not. Do not be afraid to take that advantage and communicate your work in your own, interesting way. You will find a wider (and more curious) audience."

## Presenter prize "a big honour" for winner at EUROCORR

Giacomo Gregori was chosen for the presentation on electrochemical determination of thermodynamic properties of corrosion products

The prize for Best Young Presenter of the 2023 Nuclear Corrosion Session at EUROCORR has been awarded to Giacomo Gregori (SCK CEN, Belgium) for the presentation Electrochemical determination of

thermodynamic properties of corrosion products in leadbismuth eutectic cooled nuclear systems, which was co-authored by A. Aerts, J. Lim (SCK CEN, Belgium) a n d Th. Doneux (Université Libre de Bruxelles, Belgium).

"This prize represents a very big honour for me and I would like to thank the EFC and EUROCORR for this unique opportunity," said Gregori (left) of the prize. "I feel this represents a unique personal satisfaction. It was an impressive feeling seeing all that work and effort during the last four years of my PhD were really appreciated by the EFC.

"For young corrosionists looking ahead to the next EUROCORR, I would like to say that corrosion is a fundamental research for our society, and it's going to play a key-role in our technological development, as well as in facing the main challenges of the future.

"Winning is both an achievement for my career, as well as a personal win. In fact, at EUROCORR 2023 I basically presented the whole results of my PhD work. So, winning such a prize represented a unique recognition of the value of the results we obtained in our research. Considering that I am really motivated to continue working in corrosion science and engineering, and specifically in nuclear corrosion, I am sure that such an important achievement will only boost my career in corrosion."



## Every picture tells a story at EUROCORR 2023

For the first time in the conference's 43 year history, EUROCORR was held in Belgium and the event in the historic city centre proved to be a huge success

More than a thousand international participants from academia and industry gathered at the 43rd edition of EUROCORR in Brussels. This year, corrosion in the green industry attracted particular attention. From recycling and 3D printing of metals, the role of metals in energy transition (wind turbines, batteries, hydrogen storage and transport, new nuclear power plants) to CO2-free production.

The organisers, VOM asbl, in co-operation with the University of Mons (UMONS), the Free University of Brussels (VUB), Materia Nova, Congres Organiser Guarant, and DECHEMA can reflect on a successful edition of EUROCORR, which they hosted from 27 to 31 August at the SQUARE Congress Centre in the historic centre of Brussels.

With a focus on data capture and artificial intelligence to predict the behaviour of corrosion, EUROCORR 2023 welcomed international keynote speakers who shared their knowledge from various sectors on how data capture is the basis of good modelling.

The annual conference was also an important networking opportunity for all within the EFC, as many specialists from around the world engaged with the EFC Working Parties on specific subjects, ranging from microbial, galvanic, and atmospheric corrosion to current research areas such as 3D printing and hydrogen economics.

#### EUROCORR 2023



EUROCORR 2023 organisers Marjorie Olivier, Umons, and Herman Terryn, VUB (above) with EUROCORR 2023 organiser Philippe Marcus (centre), CEFRACOR. Veerle Fincken (right), VOM, EUROCORR 2023 Local Organiser addresses the crowd





#### EFC Newsletter November 2023

EUROCORR 2023





Young EFC plenary speaker, Viacheslav Shkirskiy (top), ITODYS, Université Paris Cité, France, and guests (above) take in the attractions at the AutoWorld Museum



#### EUROCORR 2023







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## **Buying EFC Green Books now only two clicks away**

There's a new look to the web marketing of EFC Green Books, which has made the purchasing process even easier



The EFC Green Books page on Elsevier has a new look thanks to a refreshed landing page that includes links to all the published titles in the series by Woodhead Publishing/ Elsevier so far.

This major change is designed to better value the contribution of the Working Parties involved and also to make it easier to browse and purchase the EFC Green Books marketed by Elsevier. Within the online introduction, an overview of the EFC is presented with an emphasis on the activities of the nominated Working Parties and a reference to the EUROCORR congress. This renewed design makes browsing the EFC Green Books series a more pleasant and functional experience. <u>Click here</u> to find out more

#### **MEMBER DISCOUNT**

The entire Green Book series is available on the EFC website (click on the title to read the abstract) and any member of an EFC member organisation qualifies for a 30% discount when ordering via Elsevier – ask your EFC Member Society for the discount code.

### Featured Green Book: Corrosion in Amine Treating Units (EFC46) Second Edition

Updated in 2021, the second edition of Corrosion in Amine Treating Units presents a fully updated resource with a broadened focus that includes corrosion in not only refining operations, but also in oil and gas production.

New sections have been added on inhibition, corrosion modelling and metallic coatings, while the second edition also features more detailed descriptions of the degradation mechanisms and Integrity Operating Windows (IOW).

In addition, there is more in-depth information on

guidelines for what sections and locations are most vulnerable to corrosion and how to control corrosion in amine units, such as using corrosion Loop descriptions and providing indicative integrity operating windows for operation to achieve a suitable life expectance. Find out more at the Elsevier Book Store.



## YEFC show that the future's bright at EUROCORR 2023

The early career professionals at the YEFC were very busy in Brussels with a number of awards presented to dedicated young corrosionists



#### Akbarzadeh, Can Özkan, Noémie Ott, Marta Mohedano, Andressa Trentin, and Reynier Revilla in attendance at EUROCORR in Brussels



#### **ANNUAL MEETING**

The 9th annual meeting of the Young EFC on Tuesday 29th August during EUROCORR 2023 attracted a fantastic audience with more than 100 early career corrosionists present. The annual meetings have demonstrated strong engagement of young (or young at heart) professionals with an increasing number of participants each year. This is reflected in the YEFC community that counts more than 490 members, as well as EFC's LinkedIn account which has more than 3.6k followers.

#### YEFC PLENARY LECTURE

Viacheslav (Slava) Shkirskiy (ITODYS, Université Paris Cité, France) was selected as YEFC plenarist by a jury of YEFC board members and seven external jury members based on

a three minute video presentation of his research. His plenary lecture on Unsupervised Discovery of Corrosion Mechanisms by Optical Microscopies provided insights and challenges of advanced multi-microscopy methods using machine learning algorithms.

#### **BEST ORAL PRESENTATION AWARDS**

Ricardo Biella (TU Delft, Netherlands) and Johanna-Maria Frenck (University of Kassel, Germany) were awarded the Best Oral



Presentation prize at EUROCORR, where 11 corrosionists demonstrated outstanding presentation skills. Ricardo (below) is an aerospace engineer doing a PhD in organic anticorrosion coatings, while Johanna-Maria (below) is a research assistant in electrochemical corrosion studies of iron-based shape memory alloys. The early-career corrosionists were pre-selected for the competition final based on their topics and a three minute video. The YEFC would like to thank all jury members for their support and the Materials Institute of UMons (Belgium) for donating the awards.

#### **REFRESHING NETWORKING**

A YEFC networking event took place during the EFC Corrosion Summer School at Vrije Universiteit Brussel. On the Saturday of the event, participants enjoyed a beer tasting in the heart of Brussels and the YEFC wishes to raise a glass to all in attendance on an enjoyable evening.

#### **CORROSION AWARENESS DAY**

On 24th April 2024, join the YEFC for the Corrosion engineering vs. corrosion management webinar. Ali Morshed, an esteemed expert in the field, will share his extensive knowledge and practical insights for effective corrosion management strategies, addressing the challenges faced by industrial partners and highlighting potential solutions.

### Applications for EFC Young Scientist Grant open as last year's winners are honoured at EUROCORR

It is time to find a host institution if you are considering applying for the EFC Young Scientist Grant. The grant will support a scientific visit abroad to interact with a senior corrosionist at their home institute. Make full use of the EFC network (EFC Hub and EFC Linked group) to find a potential host institution.

The call for the next EFC Young Scientist Grant and EUROCORR Travel Award will open in December and application deadline is Thursday 15th February 2024.

#### WINNERS PRESENTED

The 2023 EFC Young Scientist Grant winners were presented with their prize by the Chair of the YEFC Noémie Ott at EUROCORR, who welcomed Jonathan Apell (TU Chemnitz & FSU Jena, Germany) and Ester López Martinez (Universidad Complutense de Madrid, Spain) to the stage in Brussels.

Chair of STAC Stefan Ritter also presented Aleyna Bayatlı (Konya Technical University, Turkey) and Ana Carolina Santa Chalarca (Metropolitan Institute of Technology, Colombia) with their 2023 EUROCORR Travel Awards.

Want to hear more from previous winners? <u>The Corrosion</u> <u>Fighters series of short interviews</u> on the YEFC website aim to give greater visibility to the winners of EFC awards, and attract young researchers and engineers in the field of corrosion.

#### YEFC MEMBER PLATFORM ON THE EFC HUB

The newly created Young EFC member platform on the EFC Hub has been established to provide younger members of the corrosion community with networking, collaborating, learning, upskilling, and feedback opportunities.

More experienced corrosionists are also encouraged to join to help provide support to early career professionals within the field of corrosion.

#### WOMEN IN CORROSION

This year, within the frame of the International Day of Women in Science, the YEFC will celebrate women working in corrosion with Jenifer Locke (Fontana Corrosion Center, Ohio State University, USA), who will discuss and highlight her career path and background on Thursday 15th February at 2pm (CET).

#### FEEDBACK WANTED

The Young EFC aims to support career development and help the organisation improve they are welcoming feedback until Wednesday 29th November. Scan the QR code to share your thoughts.





#### MEET THE NEW MEMBERS OF THE YEFC BOARD

The YEFC board welcome new members from academia and industry. **Sajjad Akbarzadeh** (UMons, Belgium), **Annesha Das** (PSI, Switzerland) and **Reynier Revilla** (VUB, Belgium) will support **Marta Mohedano** (Universidad Complutense de Madrid, Spain), **Noémie Ott** (OST, Switzerland), **Can Özkan** (Delft University of Technology, Netherlands) and **Andressa Trentin** (VTT, Finland) in exisiting YEFC activities.

Arthur Boidot (NOF Metal Coatings Europe SA, France), Fabio Cova Caiazzo (Petronas Lubricants International, Italy), Bartlomiej Guzik (Mankiewicz Gebr. & Co, Poland) and Mirsajjad Mousavi (Teijin Aramid BV, Netherlands) will co-ordinate new activities to support and encourage entrepreneurship, foster collaboration and engage with partner organisations.















**3M PLENARY LECTURE COMPETITION** 

The YEFC invites you to participate in the 3M Plenary Lecture Competition and get the chance to present your work during a plenary lecture at EUROCORR 2024 in Paris. The call is now open and applications are due by 7th January 2024.



#### **KEY DATES**

Registration opens: **November 2023** Application due: **7th January 2024** Finalists announced: **February 2024** 3M video due: **10th March 2024** Finalist announced: **31st March 2024** 

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## WP 3: Corrosion by Hot Gases and Combustion Products

The world's leading experts descend on Bavaria for The High Temperature Corrosion and Oxidation 2023 Workshop



The international event in picturesque Bavaria brought together leading scientists, researchers, and industry experts from 13 countries to discuss the critical topic of high temperature corrosion and oxidation

The picturesque town of Marktheidenfeld (pictured), nestled along the banks of the River Main in Germany, provided a platform for knowledge exchange and collaboration among experts at the High Temperature Corrosion and Oxidation 2023 Workshop from 25th to 29th September 2023.

This international event brought together 100 of the world's leading scientists, researchers, and industry experts from 13 countries to discuss the critical topic of high temperature corrosion and oxidation.

The workshop was held against the backdrop of pressing challenges in energy production, particularly in the context of shifting from fossil fuels to renewable and carbon-neutral processes.

A range of different talks highlighted the necessity of developing innovative material solutions capable of withstanding the harsh environments associated with renewable energy processes and pushing the efficiencies, and thus process parameters, at elevated temperatures.

#### **KEY TOPICS**

Discussions centred on the impact of novel process conditions and media, such as nitride, carbonate or chloride

salt melts, supercritical CO2, and changing compositions of process gases. A key topic was higher levels of hydrogen (H2) and water vapour (H2O) when moving towards a hydrogen based economy.

> Many discussions covered the impact of new additive manufacturing techniques on the microstructure, chemistry and finally the oxidation and corrosion resistance of parts for high temperature components.



The workshop developed key takeaways and formed future directions in high temperature corrosion and oxidation research. The event underscored the critical role of materials science and engineering in addressing the pressing challenges associated with the transition to renewable

energy sources. It also established that collaborative efforts, international partnerships, and multidisciplinary research approaches are essential components of future progress.

As the workshop came to a close, it left attendees inspired and motivated to continue their pursuit of materials solutions that will shape the energy landscape of the future.

Click here to find out more.

# **IOM3 release latest issue of their scientific publication**

Volume 58, No. 8 of Corrosion Engineering, Science and Technology features a wide range of scientific contributions

The Institute of Mineral, Materials & Mining (IOM3) have released their latest issue of Corrosion Engineering, Science and Technology, which focuses on depth profiles of akaganéite, goethite and maghemite on A1010, as well as HPS and weathering steel panels after wet-dry corrosion tests.

Boriana Tzaneva and Vasil Kostov's article on Corrosion behaviour of heterogeneous antimony-copper layers in chloride media leads Vol. 58, No. 8 of the publication, which also features an article on depth profiles of akaganéite, goethite and maghemite on A1010, HPS and weathering steel panels after wet-dry corrosion tests by Jerzy A. Sawicki.

Chenglong Zhang, Min Zhu, Yongfeng Yuan, Shaoyi Guo, and Guoying Wei co-author an article on the effect of pH on corrosion behaviour of CoCrNi MEA imposed by alternating current in Na2CO3/NaHCO3 solution, while Robert E. Melchers and Mike Y. Tan have penned an article on long-term corrosion of abandoned offshore steel infrastructure. There's also room for Jaber Neshati, Mohsen Saremi, and Golnoush Mashhadi's article on a new approach in top-of-line corrosion studies in CO2/H2S environment.

#### MATERIAL WORLD

Established in 2002, IOM3 exists to promote and develop all aspects of materials science and engineering, geology, mining and associated technologies, mineral and petroleum engineering and extraction metallurgy, as a leading authority in the worldwide materials and mining community.

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### The New Wave of Corrosion Monitoring

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# AIM course on protection of metallic materials announced

The Italian Association for Metallurgy will host a course on corrosion and protection of metallic materials after success of their February conference



The new basic course on corrosion and protection of metallic materials follows the success of the first School on Electrochemical Techniques for the Study of Corrosion (right), which was held at the University of Ferrara in February

Following the success of the School on Electrochemical Techniques for the Study of Corrosion, dedicated to Cecilia Monticelli and held at the University of Ferrara in February 2023, the Italian Association for Metallurgy has announced that it is organising a general basic course on corrosion and protection of metallic materials.

The course will be held in Milan from January to March 2024 and will be divided into four modules of two days each, with the following main topics:

 $\rightarrow$  **MODULE I** General aspects, investigation and monitoring methods

→ **MODULE II** Corrosion in the atmosphere and in concrete

→ **MODULE III** Corrosion in soils and waters

researchers

→ MODULE IV Corrosion in the industrial applications

The scheduled lessons aim to provide the basics of corrosion in MODULE I, followed by a comprehensive overview of the most important phenomena, taking into account the typical combinations of metal materials and environments. Furthermore, the key strategies of corrosion protection will be covered.

This training proposal is intended for professionals, technicians, and engineers from a range of different industrial sectors, as well as students and young researchers who want to enhance their expertise in this field.

Lecturers from universities and companies will provide an application-oriented approach by illustrating and discussing various case studies throughout the course.

Click here to find out more.



## MTECH 2023 - International conference on materials

The conference in Cavtat, Dubrovnik provided an inspiring environment for an exchange of knowledge and experience



The international conference on the Adriatic Coast of Croatia, southeast of Dubrovnik featured lectures from renowned scientists, a range of poster presentations, and an exhibition of companies dealing with materials and their testing

Cavtat in Croatia played host to the 4th International Conference on Materials, MTECH 2023, from 2nd to 5th October 2023.

Organised by the Croatian Society for Materials Protection, together with the Croatian Society for Heat Treatment and Surface Engineering, Croatian Society for Materials and Tribology, and Croatian Centre for Nondestructive Testing, the conference had a

CLUSTER

global audience.

Participants from Croatia, Germany, USA, Bulgaria, Hungary, France, Italy, Slovenia, and Serbia gathered to discuss recent research, innovation, and development in the field of corrosion, heat treatment, materials, materials testing, and tribology.

Each day, the conference started with a plenary session featuring lectures held by renowned scientists and experts, including Dr. rer. nat. J. Wilhelm Erning (BAM, Germany), Dr. Mathew T. Mathew (University of Illinois College of Medicine, USA), and Dr. Stefan Valkov (Technical University of Gabrovo, Bulgaria).

#### **FAMILIAR FACE**

The guest speaker at the event was Mr. Pascal Collet (pictured), EFC CEO, who represented the European

Federation of Corrosion. The lectures were complemented by a range of poster presentations, during which researchers and in particular PhD students were able to present their work and results.

The conference also included an exhibition of companies dealing with materials and their testing, which contributed to the conference's success as it enabled a practical

exchange of experiences. The conference's programme was complemented by four thematic workshops:

→ Tribocorrosion Basics

→ Application of Vapour Phase Corrosion Inhibitors in Industry

 $\rightarrow$  Evaluation of Ultrasonic Flaw Indications in Welds according to ISO 17640

→ Testing of Mechanical Properties of Materials and Calibration of Equipment

> The conference was organised in partnership with the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb. The fifth MTECH conference will take place in Croatia in 2025.

By Ivan Stojanovic. <u>Click here</u> to find out more about MTECH. **C-Cube and H2O Drones dive** into underwater inspection

The collaboration between the two companies aims to change the way underwater coating degradation is monitored



With a focus on safety, reliability, and efficiency, C-Cube and H2O Drones believe that the technology's potential application includes offshore drilling platforms. underwater pipelines and maritime vessels

Beneath the serene surface of the world's oceans lies a complex web of structures, pipelines, and vessels, each coated with protective layers to withstand the forces of water, salt, and time. These underwater coatings play a vital role in preserving the integrity of maritime infrastructure, but they face an ongoing battle against degradation. In response, C-Cube and H2O Drones have joined forces to develop technology that has the potential to change the way underwater coating degradation is monitored.

The technological star is an underwater drone equipped with electrochemical sensors. These sensors provide the drone with the ability to measure and evaluate the condition of coatings beneath the ocean's depths. According to the manufacturers it has capacity to translate the data collected into detailed digital representations of degradation, which is then transformed into predictive models capable of swiftly determining the remaining lifespan of the coatings.

#### **PILLARS OF PROGRESS**

The development of this technology is underpinned by five core values that have been central to the work of C-Cube and H2O Drones:  $\rightarrow$  1. Safety: Being safe while working is

paramount in the world of underwater inspections. By reducing the need for human intervention in hazardous

underwater environments, the drones claim to offer riskfree inspections in the most challenging conditions.

 $\rightarrow$  2. Reliable Data: Equipped with electrochemical sensors, the drones provide reliable and accurate data collection. C-Cube state that coatings and the objects can be assessed with a level of precision that was previously unimaginable.

 $\rightarrow$  3. Efficient Data Collection: The drones have been designed for optimal data collection to ensure that



inspections are conducted with maximum efficiency, with the aim of faster inspections and quicker reporting.

 $\rightarrow$  4. Robust and Reliable: To navigate the unpredictable and often turbulent underwater world, it's claimed that the **Remotely Operated Vehicles** created by C-Cube and H2O Drones will be able to dive deeper and feature advanced stabilisation technology.

→ 5. Improved Maintenance: By providing a digital representation of degradation and structural integrity, the manufacturers believe the technology will empower clients to make

informed decisions about maintenance strategies. Visit the C-Cube and H20 websites to find out more.

# HEGGEL tackle challenge of the copper industry head on

A copper production facility provides the location for HEGGEL's solution to acid overflows and corrosion damage

In the copper industry, electrolytic refining stands as a cornerstone, seamlessly integrating both the extraction and purification processes. During the refining process, an impure copper anode and a pure cathode are immersed in an electrolyte made of Copper (II) Sulfate (CuSO4) and sulfuric acid. With an electric current, copper ions move from the anode to the cathode. Impurities either settle as anode slime or stay in the electrolyte based on their reactivity. Over time, the anode reduces in size, and the cathode accrues pure copper.

As refining progresses and copper ion concentration decreases, sulfuric acid aids in dissolving more copper from the anode and enhances electrolyte conductivity for optimal ion transfer. Impurities, including gold and silver, either settle as slime or remain dissolved. This rigorous process allows the production of copper cathodes with a purity often exceeding 99.9%.

#### **COUNTERACTING CORROSION**

Located on the ground floor of a copper production facility, the electrolysing cells, integral to the electrolytic refining process, periodically grappled with overflow, and drainage issues. These overflows resulted in leakages of 22% sulfuric acid, a vital component of the electrolyte. Drainage caused the unintended release of corrosive electrolyte components. Notably, these leakages, seeping through the open spaces beneath the cells, were finding their way to the floor. The direct contact of the acid with the facility's floor led to pronounced corrosion and extensive mechanical damage, thereby compromising the structural integrity and longevity of the facility's infrastructure.

To find a solution that would provide long-term protection to the facility's flooring from acid overflows and prevent corrosion damage, HEGGEL FRP 333 was introduced a protective lining, installed in two layers on the flooring due to its high-performance in corrosive environments.

HEGGEL FRP 333 was used as an advanced solution tailored for industries facing corrosion and infrastructure challenges. Its combination of mineral and organic molecules provided corrosion resistance against a variety of substances, including acids, alkalis, and solvents.

Adding to its effectiveness is the interpenetrating network, which combines high-performance resin with a fibre-reinforced structure, ensuring a durable surface protected from corrosive agents and external damage. A key attribute is its strong adhesion capability, particularly to concrete, to the extent that it surpasses the inherent tensile



strength of concrete. This furan-based laminate system provides varied resistance to changing temperatures and a wide range of chemicals.

Enhanced by modern technology, its mechanical properties make it resilient against external impacts and the natural stresses from concrete's movement. The material has a shelf life of at least two years, which can be extended with proper storage. This highlights its versatility in storage and quick repair advantages. Its two-component design streamlines the application, facilitating a smooth process from installation to upkeep. <u>Click here</u> to find out more.

# Slovenia hosts global materials and technology conference

The three-day international materials science conference welcomed participants and renowned scientists from 12 countries



Young researchers at the international event were given the opportunity to present their work, with the best scientific presentations awarded prizes by the conference Chair

The 28th International Conference on Materials and Technology was held in Portorož, Slovenia from 11 October to 13 October 2023 and it proved to be an international affair as it welcomed 90 participants from 12 countries.

Chaired by Professor Matjaž Godec, the director of host Institute, the Institute of Metals and Technology (IMT) in Ljubljana, Slovenia, the three-day conference attracted toplevel scientists, featuring up-to-date topics in the field of materials science, ranging from 3D printing to surfaces and interfaces of metallic materials, biomaterials, composite materials, ceramics, nanomaterials, simulation, and modelina.

The afternoon session of the first day was traditionally dedicated to young researchers who had the opportunity to present their work in short, 10-minute presentations or as poster presentations.

Their scientific performance was evaluated by senior scientists who selected the best three oral presentations and the best poster presentation. The awards were presented at the conference's social event by the conference Chair.

On the second day, in parallel with all the oral contributions of the participants, there was a Slovenian Industrial Meeting with over 100 attendees from the Slovenian industrial sector, including the President of the

Chamber of Commerce and Industry of Slovenia, Vesna Nahtigal (below). The main idea of the meeting was to address the concerning reduction in the field of materials production industry in the EU, especially in the metallic sector, which remains crucial in industries such as automotive, construction, electronics, aerospace, and space.

#### PARALLEL SESSIONS

The last day of the conference featured two parallel sessions: one dedicated to metallic materials and the other

to another growing field in materials science, biomaterials. The International Symposium on Biomaterials provided a forum for academics, clinicians, researchers, and practicing engineers to meet and exchange innovative ideas and information on all aspects of material-processing technologies.

> The conference's social event, which enabled additional networking among participants, was held at the Wine Fountain in Marezige, where the participants had the opportunity to sample local food specialties and wine. The conference was organised by IMT, co-

organised by SDM and JSI, and endorsed by EFC (Event No. 499). The golden sponsor of the conference was ITR-LAB.

Visit the IMT website to find out more.

# New vehicle decarbonisation initiative aims high

MAST3RBoost project aims to address the challenge of decarbonisation in the transport sector



The MAST3RBoost project is funded in the topic HORIZON-CL4-2021-RESILIENCE-01-17 by the European Health and Digital Executive Agency, and by the European Union

Carbon dioxide emissions are a problem across the world, with the transport sector being a big producer. In Europe they constitute one third of all CO2 emissions with over 1,000m tons, representing a threat to human health and a significant contributor to climate change. Decarbonisation of the economy and, in this case, of the transport sector is urgent. In case of Hydrogen Storage on board based on compression (at 700bar), the problem is that, at the moment, the state-of-the-art technology for them has reached 25 gH2/lsys, a number which is still low considering that the market-entry goal is to fit 5kg of H2 in a gasoline equivalent tank (80kg/90 l). In fact, the complexities associated to an efficient H2 storage are causing a slow penetration of Fuel Cell Electric Vehicles (FCEVs).

MAST3RBoost, Maturing the Production Standards of Ultraporous Structures for High Density Hydrogen Storage Bank Operating on Swinging Temperatures and Low Compression is a European project which aims to provide a solid benchmark of cold-adsorbed H2 storage (CAH2) at low compression (100 bar or below) by maturation of a new generation of ultraporous materials (Activated carbons, ACs, and Metal Organic Frameworks, MOFs) for mobility applications like H2-powered vehicles, including road and railway, air-borne and water-borne transportation. MAST3RBoost's goal is to reach at least 33 gH2/Lsys, which would help to provide the market with an actual FCEV replacement to the current internal combustion engines, which are big contributors to the EU's greenhouse gas emissions. Based on a new generation of Machine Learning-improved ultraporous materials - such as Activated Carbons (ACs) and high-density MOFs (Metal-organic Frameworks). Recycled raw materials for the manufacturing of the ultraporous materials are being pursued, both from waste agroforestry biomass and solid urban waste.

The standout objectives of MAST3RBoost project include the design and manufacturing of a pressure vessel for the storage of 1kg of H2 at 100 bar and main components, and the development of standards for the repeatable and scalable production of ultraporous structures with controlled textural and chemical profiles. This includes the development of an adhoc and cost-efficient Wire Arc Additive Manufacturing (WAAM)-process, using materials suitable for cryogenic temperatures and coatings to cope with chemical compatibility. Coatings able to withstand cryogenic temperatures are being developed and will be scaled up by CIDETEC to protect the inner part of the lightweight vessels.

MAST3RBOOST gathered 13 partners for the project from academia and industry, strengthening the collaboration between eight countries: Envirohemp S.L. (Spain); Contactica S.L. (Spain); Agencia Estatal Consejo Superior de Investigaciones Científicas (Spain); CIDETEC Surface Engineering Institute (Spain); Spike Renewables SRL (Italy); EDAG Engineering GMBH (Germany); Nanolayers OU (Estonia); LKR Leichtmetall Kompetenzzentrum Ranshofen GMBH (Austria); University of Pretoria (South Africa); Council For Scientific And Industrial Research (South Africa); Stellantis (old PSA Groupe) (Portugal); TWI (UK); University of Nottingham (UK).

 $\rightarrow$  Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the EU or the European Health and Digital Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

## Stay up to date with EFC events 2023-2025

Make a date in your corrosion calendar for all the latest EFC events and conferences from around the world



#### **CORROSION & PREVENTION 2023**

Perth, WA, Australia, 12-16 November 2023 EFC Event No. 502

Organised by the Australasian Corrosion Association **Scope:** The preeminent corrosion conference for the Australasian region. We host seminars, plenaries, social events, Awards, networking opportunities and more. It draws international crowds and contributors and attracts some of the most esteemed figures in the industry. To find out more, visit the <u>conference website</u>.

### INTENSIVE COURSE ON CORROSION AND SCALE INHIBITION THEORY, TESTING, APPLICATION

Iserlohn, Germany, 21-23 November 2023 EFC Event No. 505

The course is organised by the EFC Working Party on Corrosion and Scale Inhibition in co-operation with GfKORR, IFINKOR and the World Corrosion Organization

**Scope:** Information on scientific and technical knowledge on corrosion and scale inhibition with special emphasis on application

To find out more, visit the course website.

#### 2024 INTERNATIONAL CONFERENCE ON CORROSION PROTECTION AND APPLICATION (ICCPA2024)

Chongqing, China, 26-28 April 2024 **EFC Event No. 506** Organised by Chongqing Hongzhixin Information Technology Co, Ltd, Affiliate Member of EFC

**Scope**: Corrosion Control in Aerospace; Marine Corrosion; Corrosion in Oil and Gas Production; CO2-Corrosion in Industrial-Applications; Atmospheric Corrosion; Physicochemical Methods of Corrosion Testing; Coatings; Microbial Corrosion; Corrosion of Medical Implants and Devices; Corrosion and Scale Inhibition, and Corrosion in Green & Low Carbon Energy Technologies.

Website currently under construction

### XVI. INTERNATIONAL CORROSION SYMPOSIUM, (KORSEM 2024)

Karaman, Türkiye, 23-25 May 2024

#### EFC Event No. 504

Organised by the Corrosion Association in Turkey, a Member Society of EFC

**Scope**: Invited and free submission papers covering the theoretical and experimental aspects of corrosion and corrosion control methods including material selection and design for corrosion services

To find out more, visit the conference website.

### 3RD CONFERENCE & EXPO - SHARING KNOWLEDGE, THE WAY TO GO!

Genova, Italy, 9-11 June 2024

#### EFC Event No. 500

Organised by the AMPP Italy Chapter (ex Nace Italia Milano Section)

Scope: The Conference is aimed to collect specialists from

Europe and worldwide to discuss topics concerned with any fundamental, engineering and applied aspects in the field of corrosion prevention, while the Expo will present materials, equipment and services addressing corrosion prevention systems.

To find out more, visit the AMPP Italy Chapter website.

#### **ACHEMA 2024 - CONGRESS**

Frankfurt/Main, Germany, 10-14 June 2024 EFC Event No. 498

**Scope:** ACHEMA addresses current issues and developments that move our community. The ACHEMA congress focusses on application-oriented research and the development, from proof-of-concept to the threshold of market entry. Current trends within process technology are highlighted as well. Topics wil include, process innovation, pharma innovation, green innovation, lab innovation, digital innovation, and hydrogen innovation.

Join us at ACHEMA 2024's congress for shaping the future of process industry along our innovation themes.

To find out more, visit the <u>ACHEMA website</u>.

#### **EUROCORR 2024**

Paris, France, 1-5 September 2024 **EFC Event No. 495** 

EFC's annual EUROCORR conference in 2024 is hosted by CEFRACOR, the French Corrosion Society.

**Scope:** The programme will include plenary lectures, keynote lectures, oral and poster presentations in all the areas covered by the EFC Working Parties. In addition, the following topics will be included: Corrosion and corrosion

protection issues in additive manufacturing; Design and performance of corrosion resistant High Entropy Alloys (Multi-Principal Element Alloys); Durability of materials for hydrogesed energy systems; Certification in corrosion and corrosion protection.

To find out more, visit the EUROCORR website.

#### **EUROCORR 2025**

Stavanger, Norway, 7-11 September 2025 EFC's annual EUROCORR conference will be heading to Scandinavia in 2025.

#### 9TH INTERNATIONAL WORKSHOP ON LONG- TERM PREDICTION OF CORROSION DAMAGE IN NUCLEAR WASTE SYSTEMS (LTC 2025)

Sendai, Tohoku Region, Japan, 4-6 November 2025 EFC Event No. 501

Japan Society of Corrosion Engineering (JSCE), Nuclear Waste Management Organization of Japan (NUMO), EFC WP4 on Nuclear Corrosion

**Scope:** Overview on national disposal programmes with an emphasis on similarities, common challenges and different approaches, regulatory issues, and retrievability. Development of and long-term performance assessment of high-level waste disposal containers. Experimentation with candidate materials, including laboratory tests, full-scale demonstration, in-situ testing, methodology, modelling, monitoring and design.

For the complete listings of future corrosion events around the world, visit the <u>EFC Calendar of Events</u>.

# A new award for young WP 10 researchers announced

## Take part in the new WP 10 initiative on microbial corrosion to win your place at EUROCORR in Paris next year

Do you know corrosive microbial fingerprints? Working Party 10 on Microbial Corrosion are hosting a new award for young researchers in the framework of WP 10 that addresses new challenges of microbial corrosion and invite you to share your data with the scientific community to receive free registration for the next EUROCORR in Paris. Further details will soon be available on the <u>EFC WP 10</u> homepage.

**Scope:** To create a common, free, and open access platform that allows participants to discuss microbial fingerprints of biofilms from Next Generation Sequencing data. The idea is to discuss biofilm profiles that characterise MIC cases and/ or relevant conditions for MIC risk assessment.

The platform aims to answer relevant questions, including:  $\rightarrow$  Can a microbiological fingerprint characterise MIC cases?

 $\rightarrow$  Can the microbiological fingerprint characterise an environment (soil, water, underground...) or some critical conditions for MIC assessment?

 $\rightarrow$  Can studying the microbial fingerprints of MIC cases be fascinating (and fruitful) enough for researchers (and industry)?

 $\rightarrow$  Can we assess relevant fingerprints better (or before) than artificial intelligence?

We still do not know the answer to these questions, but we can learn much more about MIC by producing and sharing our own data researching (experiencing) together the microbial fingerprint of corrosion cases.

The microbial fingerprint of corrosion cases put by young researchers on the platform will be discussed during the Microbial corrosion session at EUROCORR 2024 in Paris.

EFC Newsletter November 2023

## And finally....

Everyone at the European Federation of Corrosion and the team working on the Newsletter would like to wish a Merry Christmas to all those who celebrate



#### LEGAL NOTICE

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