

AUGUST 2022

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## ADDRESSING THE WORLD WITH EFC PRESIDENT

Dear corrosionists,

After missing 'the real' EUROCORR for two years, I am very happy to welcome you at EUROCORR2022. We are able again to meet in person and we can restart, continue, and initiate networking. We can discuss much better the newest scientific research of our friends from industry and academia face to face, this time in the vibrant and exciting city of Berlin.

Douglas Mills, our long time EFC editor, has decided to retire and I am glad that the jury awarded him the Honorary Fellowship. I thank Douglas very much for his outstanding commitment and engagement in the publishing of our EFC newsletter.

EFC has welcomed the Ukrainian Association of Corrosionists as a new EFC member society. Since the beginning of the war in Ukraine, EFC has been exploring ways of how to support our colleagues. This ranges from support to visit EUROCORR, via opportunities to participate in research projects, and foster research project proposals on a larger scale. We all sincerely hope that this unjustified and brutal war will come to an immediate end and that the responsible war criminals will be sentenced.

Back at home, the EFC Board of Administrators is studying how to further professionalise the organisation and how to provide more services for its members. One tool was already installed last year, our EFC Hub. If you have not registered yet, please do so free of charge at [efc.solved.fi](http://efc.solved.fi). This hub makes



collaboration between working parties and experts of all fields much easier. It enhances the visibility of specific interests of experts and makes working together that much easier, as was done during the elaboration of our new white paper on *Corrosion Challenges Towards a Sustainable Society*. Find out how to register and a user guideline at [efcweb.org](http://efcweb.org).

As a next step in our efforts to strengthen the EFC, the President's Advisory Committee, has developed the new EFC position, currently named COO (chief operation officer), who should establish new possibilities to expand EFC activities, support the EUROCORR organisation and its exhibition, maintain relations to exhibitors and sponsors, while also contributing to the workflow of administration between the three EFC offices. Applications will open after the approval of the General Assembly, hopefully in the fourth quarter of 2022.

As I near the end of my presidency, I would like to sincerely thank all the team members who have supported and inspired us to take EFC to the next level of professionalism. Now it is time to celebrate the 'rebirth' of our EUROCORR and I wish you all a fruitful conference with lots of exciting talks, discussions, and exchange of ideas.

Jörg Vogelsang, EFC President

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## BRUSSELS TO HOST EUROCORR 2023

Ahead of this year's EUROCORR in Berlin, it has been announced that Brussels will be the destination for corrosionists at EUROCORR 2023, where the topic of the conference will be *Driving Corrosion Prediction and Protection Towards a Circular Economy*. Turn the page to read more.

## ARJAN MOL WINS RESPECTED AWARD

Professor of Corrosion Technology and Electrochemistry at Delft University, Arjan Mol, will this year be honoured at EUROCORR 2022 as the winner of the prestigious European Corrosion Medal. Discover what the award means to him personally and the wider corrosion community on [page 4](#).

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# BRUSSELS ANNOUNCED AS THE HOST CITY OF EUROCORR 2023

**NEXT YEAR'S TOPIC IS DRIVING CORROSION PREDICTION  
AND PROTECTION TOWARDS A CIRCULAR ECONOMY**



It has been announced that Brussels will become the capital of corrosion in 2023 with the arrival EFC's annual congress EUROCORR - Europe's most renowned corrosion event.

Uniquely in 2023, EUROCORR will focus on the new generation of corrosion engineers. Indeed, the young scientists will have the floor throughout the congress, which this year will be hosted by VOM asbl in collaboration with the University of Mons, the Vrije Universiteit Brussel, Materia Nova, and DECHEMA, who are pleased to invite you to the conference.

**DECISIVE CHALLENGES**

The event at Square – Brussels Convention Centre will focus on the huge impact on metal selection when it comes to topics like the Green deal and Circular economy. New metal surfaces and substrates like recycled metals, additive manufactured metals, new coatings, and new inhibitors are rapidly finding their way to the markets to meet these crucial, essential, and decisive challenges.

This puts the whole corrosion society (both academia and industry) under pressure to define research strategy better, focusing on the

implementation of improved corrosion protection systems supported by relevant predictive models.

The congress will aim to reduce the gap between the academic world and industry, especially in the field of corrosion prediction by advanced measuring, modeling, and monitoring.

And Brussels will provide a welcome backdrop for EUROCORR's delegates. Close to the Grand-Place (right) in the historic heart of Brussels, EUROCORR will offer guests the opportunity to discover the charming historical city centre surrounded by gothic art, modern art and art-nouveau architecture that colours the city.

With more than 800 delegates expected, the aim of the congress is to provide opportunities to create contacts from all countries, to facilitate the networking and to exchange knowledge and the latest findings between scientists, academics, researchers, students and industry related to corrosion. To find out more please visit [www.EUROCORR2023.org](http://www.EUROCORR2023.org).

## WHAT TO EXPECT FROM EUROCORR 2023

Closing the gap between industry and academia in corrosion, science, and prediction, EUROCORR 2023 in Brussels from 27 to 31 August 2023 will offer five days for some of the brightest minds in the industry to share thoughts, ideas, and knowledge in a wide variety of discussions, presentations, and stimulating topics, which have recently been announced.

**TOPICS**

- Corrosion and Scale Inhibition (WP1)
- Corrosion by Hot Gases and Combustion Products (WP3)
- Nuclear Corrosion (WP4)
- Environment Sensitive Fracture (WP5)
- Corrosion Mechanisms, Electrochemical Methods in Corrosion Research and Modelling of Corrosion Processes (WP6 & WP8)
- Corrosion Education (WP7)
- Marine Corrosion (WP9)
- Microbial Corrosion (WP10)
- Corrosion of Steel in Concrete (WP11)
- Corrosion in Oil and Gas Production (WP13)
- Coatings (WP14)
- Corrosion in Refinery and Petrochemistry (WP15)
- Cathodic Protection (WP16)
- Automotive Corrosion (WP17)
- Tribo-Corrosion (WP18)
- Corrosion of Polymer Materials (WP19)
- Corrosion and Corrosion Protection of Drinking Water Systems (WP20)
- Corrosion of Archaeological and Historical Artefacts (WP21)
- Corrosion Control in Aerospace (WP22)
- Corrosion Reliability of Electronics (WP23)
- CO<sub>2</sub> Corrosion in CCS Applications (TF CO2)
- Atmospheric Corrosion (WP25)

- Advances in New Corrosion Protection Methods
- EUROCORR Young Scientist Session
- Corrosion in Additive Manufacturing

**IMPORTANT DATES**

Call for abstracts – on-line forms opening: OCTOBER 2022  
Registration on-line opening: OCTOBER 2022  
Abstract Submission: 16 JANUARY 2023  
Notification of acceptance to authors: 28 APRIL 2023  
Submission of full papers: 16 JUNE 2023

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**INTRODUCING YOUR EUROCORR HOSTS**





# "I'VE ALWAYS BEEN CURIOSITY DRIVEN"

## AFTER WINNING THIS YEAR'S PRESTIGIOUS EUROPEAN CORROSION MEDAL, ARJAN MOL REFLECTS ON HIS PAST AND THE CORROSION COMMUNITY'S FUTURE

"The future is not ours, it's for the young corrosionists," explains Arjan Mol, Professor of Corrosion Technology and Electrochemistry at Delft University of Technology, Netherlands, after he was awarded this year's European Corrosion Medal.

The prestigious prize is given to one recipient each year in recognition of their achievements in the application of corrosion science. And, following an impressive career that has seen him serve as a professor for 16 years at the oldest and largest Dutch public technical university, Mol has every reason to bask in all he has achieved on a personal level, as well as for the corrosion community. Instead, he's taken it as a gratefully received opportunity to look to what the future holds.

"It is indeed a great honour and humbling at the same time," said Mol of the award, which comes with it a bronze medal, a diploma, and a €1,000 prize. "At the same time I feel it's not a recognition of the work of Arjan Mol, personally. It's really another discreet opportunity to thank the people around me who I have been able to work with over the years. It's a moment to stand still and reflect on what we have done so far and also what challenges and opportunities lie ahead.

"So, it's a moment in time to share the appreciation of the work of the people I've worked alongside. Maybe in several interviews I've mentioned that science is not an individual activity, as it's not worth much if you can't work with people, and that goes for BSc-, MSc-, PhD-students, postdocs, industrial partners, or international academic staff."

Clearly, the award has offered Mol an opportunity to reflect and gauge his achievements, as well as his impact on the wider corrosion community, which includes notable work with the EFC. Having served as Chair of the EFC Working Party - Physico-chemical methods for Corrosion Research, and Chair of the EFC Science and Technology Advisory Committee, Mol has also held the position of EFC Vice-President from 2017 to 2018 and EFC President from 2019 to 2020.

Mol has also been Honorary Professor at the University of Science and

Technology Beijing, China and since 2010, Mol has also been the Dutch Representative Member of the International Corrosion Council ICC. Despite this impressive list of personal achievements, Mol isn't ready to rest on his laurels and bask in his achievements just yet. Instead, it appears that he's just getting started, as the only direction he seems to be facing is towards the future – and most importantly in collaboration with his trusted colleagues, particularly the next generation of corrosionists.

### CORROSION CHALLENGES

"The challenges that we are facing in terms of corrosion and corrosion protection are too complex to do by yourself. I cannot do it by myself, so I'm grateful for the things I've been able to do so far," said Mol.

"The people who have given me trust and assurance that I could support and serve the wider corrosion community have been very important, as this has given me the confidence to initiate new ideas within the global corrosion community. At least one of the major highlights is having the Young EFC in place.

"That was an initiative that I shared when I was in a strategic meeting when I was still Chair of the Science and Technology Advisory Committee. I brought up the idea that the future is not ours, it is for the young corrosionists. And we should provide them with pathways to be engaged, because they have fresh, new ideas, which sometimes we have forgotten, but are super important for the youngsters. So I'm super proud of the Young EFC.

"It's something that has shown trust and faith in people, and provided them the opportunity to bring new ideas into the EFC community, which are then self-propelling after the first initiation. So, that in retrospect it fills me with pride, but more pride in the wider corrosion community than in me personally."

This investment in the future is seemingly vital to Mol's outlook. It's an investment in people as much as it is in corrosion science and the European

Corrosion Medal has given him another opportunity to share his forward-facing attitude.

"This honour provides me with a platform to share my thoughts and ideas that I've generated over the years, so I think that the provision of a platform is very helpful," explains Mol.

"I've always been curiosity driven, so I was never satisfied when I had a solution for a corrosion protection problem, but didn't know how it worked. I really like to go beyond knowing how, as I need to also know why things are actually working. I hope those sorts of thoughts, ideas, and drivers will inspire others to take certain pathways to do things that they want to do, but maybe do not dare to do."

### FUTURE GENERATIONS

With a focus on future generations, those who enter the industry or academia might be tempted to follow Mol's path, with his specific research focus areas including, local electrochemical analysis of corrosion mechanisms, surface treatment and interfacial bonding of organic coatings on metal (oxide) surfaces, and multi-functional and eco-friendly corrosion inhibitors and the evaluation of active protective coatings. And, thanks to this wealth of expertise and experience, Mol is ready to tackle those challenges that face the corrosion industry and the wider community head on.

"The energy and materials transition is a super important societal challenge that we have ahead of us. We have solar energy, the hydrogen economy, geothermal, and nuclear energy. All these new, renewable energy sources come with corrosion challenges during production, processing, transport, and storage. So, the circular energy demands will be impactful to all of us, as well as our corrosion scientific community," explained Mol.

"There are a few things that I think that can help us, including the fourth paradigm in science. Data based science, big data, and machine learnings will become very important because the complexity of our world is not going to be getting simpler than the available tools that we have to tackle the problem.

"So, to be able to design new materials, to be able to have predictive power for corrosion engineering, and for lifetime predictions could be quite useful. We should not go blindly in that direction though, as we should always be able to rationalise the physical chemistry, and electrochemistry behind all this.

"In terms of new materials design, as well as lifetime prediction and extension of new and existing infrastructures, these are the things that I'd like to focus on. My focus will then be on the experimental input, so reliable data, sufficient data, corrosion monitoring, and sensing are areas that I still want to explore in the near or further future."

In spite of all this applied knowledge though. In spite of all the latest state-of-the-art technological and scientific advances. And in spite of any ability to predict future corrosion trends, Mol has a closely held belief in something far simpler than any applied science - and that's people.

"I have some expertise, which I think is useful for others, but I can learn just as much as others as they can learn from me," said Mol.

"It's very difficult to be an expert in corrosion sensing, as well as in machine learning, so it all comes down to teamwork and collaboration. By ourselves we simply cannot be as effective and impactful, as we are in collaboration."

→ Arjan Mol will be presented with his European Corrosion Medal and certificate at EUROCORR 2022 in Berlin, where he will be invited to give a lecture related to his work.

### ARJAN'S ADVICE FOR ASPIRING CORROSIONISTS

→ Enjoy the ride. We are fortunate to do what we want to do, to see things for the first time, that nobody else has ever seen.

→ Don't strive for anything that you aren't sure will come your way. Build your ship and when the wind comes by then try to catch it.

→ Open your eyes to opportunities.

→ Don't just focus on publishing because of your academic career path. Other things are at least equally important, like your collaborative power and taking on responsibility for the research community.



Arjan Mol has worked for the past 16 years at Delft University of Technology, Netherlands (students pictured working in the university's lab, right) where he currently holds the position of Professor of Corrosion Technology and Electrochemistry after joining the organisation as an Assistant Professor

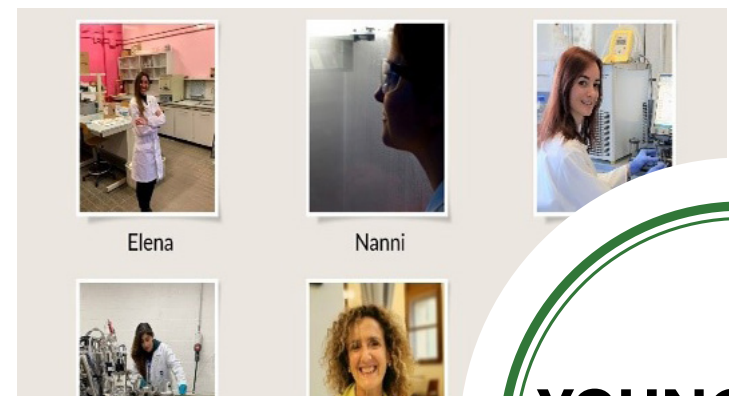


## WOMEN IN CORROSION SECOND EDITION UNVEILED

The Young EFC has launched the second edition of *Women in Corrosion* to celebrate women working in corrosion and in STEM-related fields.

Women working in corrosion were invited to submit a photo and description of their job and daily tasks to set an example for new generations with a total of 18 Ph.D. students agreeing to take part.

Researchers from a wide variety of countries took part such as Spain, The Netherlands, Mexico, France, Italy, Belgium, United Kingdom, Colombia, Slovakia, United States of America, India, Morocco, Spain, and Sweden. The participant's profiles were advertised on LinkedIn to raise awareness within the corrosion community.



## YOUNG EFC IN THE NEWS

How to write  
Interactive Session on Scientific Writing

Invited speaker: Arjan Mol  
Editor-in-Chief of *Corrosion Science*

## SCIENTIFIC WRITING SESSIONS COMING SOON

The Young EFC and Elsevier are organising a series of online sessions for Scientific Writing with the editors of *Corrosion Science*, Prof. Arjan Mol and Prof. Dawei Zhang.

- The pair of online sessions focused on two aspects:
- Advanced Paper Writing: Abstract and Introduction
- Advance Paper Writing: Material and Methods

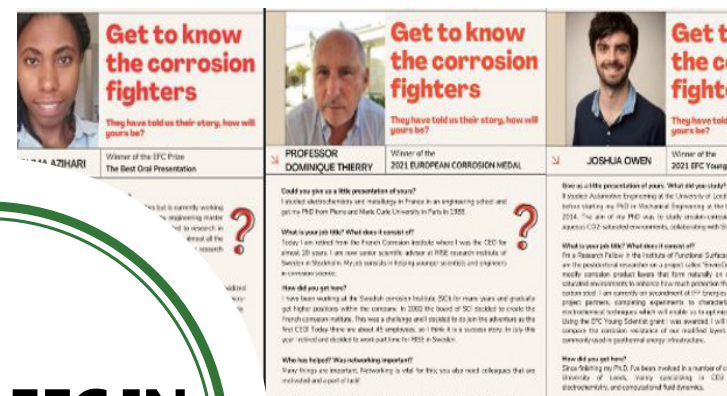
The sessions were successfully conducted on 20th October 2021 and again on 6th April 2022 with new sessions planned for the near future on *How to Write a Review*. A full listing of all the current presentations are available for the Young EFC members under request from YoungEFC@efcweb.org.

## GETTING TO KNOW THE CORROSION FIGHTERS

Created by the Task Force Awards and led by Claudia Pinon, this initiative aims to give more visibility to the winners of EFC awards and attract young researchers and engineers in the field of corrosion, while also encouraging young people to apply for EFC prizes.

Based on short interviews with the laureates of the EFC awards, the *Get to Know the Corrosion Fighters* series of interviews puts the more academic topics to one side and instead focuses on getting to know the people behind the awards.

The interviews are posted regularly in LinkedIn and will also be made available on the EFC website [www.efcweb.org](http://www.efcweb.org).



## CORROSION AWARENESS DAY CELEBRATED GLOBALLY

The Young EFC supported Corrosion Awareness Day 2022 on 24th April for the third time on what proved to be the most diverse event so far.

A total of 21 activities were registered on Corrosion Awareness Day this year by researchers, students, academics, and industrials from 19 countries, including India, Iraq, Spain, Switzerland, United Kingdom, United States, France, The Netherlands, Poland, Canada, Pakistan, Slovakia, Hungary, Bangladesh, Germany, Portugal, Romania, Sweden, Belgium, and Qatar. After two years of Covid restrictions, many efforts were made to promote in-person and hybrid activities instead of the purely online ones. The organisers spread the awareness of corrosion through lectures, panel sessions, webinars, masterclasses, and photo competitions.

## YOUNG EFC NEWS ROUND-UP CONTINUED

### ONLINE EFC CAREER WEBINAR

The Young EFC is happy to announce a new initiative: an online career webinar, in which established as well as early-career corrosionists are invited to discuss their career path.

This new series aims to provide an overview about the diversity of careers within the corrosion community and help to demystify some career pathways.

It was successfully launched on 25th February 2022 with Professor Fátima

Montemor as the first guest. She

discussed her very inspiring career in corrosion and provided insightful tips for a successful scientific path.

The second event was held on 10th June 2022 in which Professor Gerald Frankel provided an amazing retrospective on his career in corrosion science. The recordings

of both events are available on the EFC website and on the EFC Hub.

### EFC ON SOCIAL MEDIA

The EFC LinkedIn Page currently has about 1,945 followers and the number is growing, thanks to the high interaction and engagement with the community. The communication channel was via email to [socialmedia@efcweb.org](mailto:socialmedia@efcweb.org).

The most relevant actions of the EFC social media task force can be summarised as:

→ Collection and diffusion of information about the EFC and EFC networks (events, articles, news), including preparation of posts.

→ Promoting EFC-supported events, programmes and awards, including but not limited to Corrosion Awareness Day, scientific grants, YFC mentorship programmes, webinars, poster prizes and EUROCORR.



## THE EFC EQUALITY, DIVERSITY AND INCLUSION STRATEGY

During the last year an EFC Task Force formed by Prof. Arjan Mol, Dr. Gareth Hinds and Dr. Marta Mohedano has worked on an evaluation of the EFC approach to Equality, Diversity and Inclusion (EDI). Following this analysis, an EFC-customized EDI Charter was proposed that was approved at the recent EFC General Assembly (June 2022).

The EFC EDI Charter states that the European Federation of Corrosion is committed to creating and sustaining a safe, welcoming, diverse and inclusive environment as it builds and supports a world-class corrosion science, engineering and technology community embracing academia, industries, research institutes and other stakeholders.

Through interdisciplinary collaboration, network building, knowledge sharing and by celebrating a diversity of ideas, opinions, knowledge and people, reliable and sustainable corrosion management of products and assets of an advancing global society and economy will flourish.

The aims are focused on developing a dynamic and diverse pool of representatives and talent for the full scope of EFC activities. Diversity within EFC community takes many forms including research discipline, career stage, age, race, ethnicity, gender, sexual orientation, gender identity, disability, nationality and religion. In recognition of this, EFC aspires to cultivate an inclusive environment in which all individuals can thrive, feel they belong and have a voice.

The charter includes, but is not limited to, detailed information on the following aspects:

**RESPONSIBILITIES:** To promote diversity within the EFC community, widen participation in its activities, encourage equality and inclusion and minimise bias.

**RECRUITMENT:** EFC staff responsible for decisions on recruitment will commit to ensuring that equality and diversity are considered and that wider aspects of unconscious bias are addressed in the recruitment process.

**MEASURES OF SUCCESS:** Measures of success: will include broader participation in EFC events and committees, more diverse committees to include event organizers, working committees and grant and award juries, and increasing levels of satisfaction of our community through surveys.

**SPECIFIC EFC TARGETS (3-5 YEARS):** Including among others to increase gender diversity (to at least 30% female) among Members of the Board of Administrators (BoA), to increase gender diversity (to at least 50% female) among Members of the Science and Technology Advisory Committee (STAC) trying to find a balance between the working party (WP) Chair and Vice-chair and to increase gender diversity (to at least 30% female) for Award Selection Panels.

Download the full EDI charter at [https://efcweb.org/efcweb2019\\_media/Documents/About+us/EFC+EDI+Charter.pdf](https://efcweb.org/efcweb2019_media/Documents/About+us/EFC+EDI+Charter.pdf)





# EFC REVEALS TRIO OF HONORARY FELLOWS

**DR. DOUGLAS MILLS, PROF. JUAN J. DE DAMBORENEA, AND PROF. AGNIESZKA KRÓLIKOWSKA HAVE ALL BEEN HONOURED**

Douglas Mills graduated from Cambridge University in the mid 1970s with a PhD in the field of Corrosion and Protection conducted under the supervision of Dr J (Jack) E O Maybe. Jack ran a paint company in London as well as being a Don at Cambridge, which seemed an attractive combination to the young Douglas and may have had an influence on the direction and movement of his working life.

The first 20 years were varied, working in industry, academia and research organisations with two lengthy spells in the USA at Lehigh and North Dakota State universities. He even took a job as classical guitar teacher in schools at one point! However for the past 23 years, he has held the position of Senior Lecturer in Materials Engineering at the University of Northampton, UK.

He has maintained an interest in the conducting of research into corrosion and protection, particularly the use of electrochemical techniques for the monitoring and assessment of corrosion and protection. He has always considered it important to collaborate with industry where possible, so there have been joint research projects with a number of

companies, such as Pronto Paints, Bearwood Engineering, Mott McDonald and DCVG.

Furthermore, until 2022 Mills was an Editorial Board Member of the Journal of Corrosion Engineering, Science and Technology, and he is currently a member (UK principal expert) of the ISO committee TC 35 SC9 WG 29, developing standards for assessment of anti-corrosive paints.

In relation to the EFC award, the jury recognised the outstanding accomplishment

of Douglas Mills in the field of interpretation of electrochemical response of coatings on metals using techniques such as Electrochemical Impedance Spectroscopy (EIS) and Electrochemical Noise (EN). Moreover, the jury underlined his active and long-term involvement in a wide range of EFC Working Parties, in particular in the WP14 on Coatings, but also in WP8 on Physico-chemical Methods of Corrosion Testing, WP21 on Corrosion of Archaeological and Historical Artefacts, WP1 on Corrosion and Scale Inhibition and WP11 on Corrosion of Steel in Concrete.

Furthermore, Mills strongly supported EFC's activities as editor of the EFC Newsletter from 2016 to April 2022 and provided regular scientific EUROCORR reports in the Corrosion Science and Engineering journal. Although he has retired from some of these activities he is maintaining his academic position for at least one more year, as "there are still mysteries about corrosion and protection that need to be solved," according to Mills. The example of Dr Mayne comes to mind, as he was still doing experiments up to a few weeks before he died at the age of 88. So, a few years to go yet!

Head of the Bridge Anticorrosive Protection Team at the Road and Bridge Research Institute, Dr. Agnieszka Królikowska has been recognised for her outstanding accomplishment in the field of atmospheric corrosion and corrosion protection in different environments and for various applications, including steel bridges, electric tractions, refineries and others, with a huge list of publications and many research projects behind her.

In addition, the jury also underlined her positive and long-term devotion to the European Federation of Corrosion since the beginning of her professional career. In particular her involvement as one of the founders of the highly

successful WP14 was recognised. She has also served as a member of the EFC Board of Administrators, President and EFC Representative of the Polish EFC Member Society PSK, and successfully organised the well-received EUROCORR 2018 in Krakow, Poland.

Since 1997, Królikowska has held the position Head of the Bridge Anticorrosive Protection Team at the Road and Bridge Research Institute in Warsaw, Poland.

And since 2002, Królikowska has also acted as the President of the Polish Corrosion Society – PSK, as well as the organiser for the past 16 years of the PSK conference *State-of-the-art Anticorrosion Technologies*.



**DOUGLAS MILLS, UK**



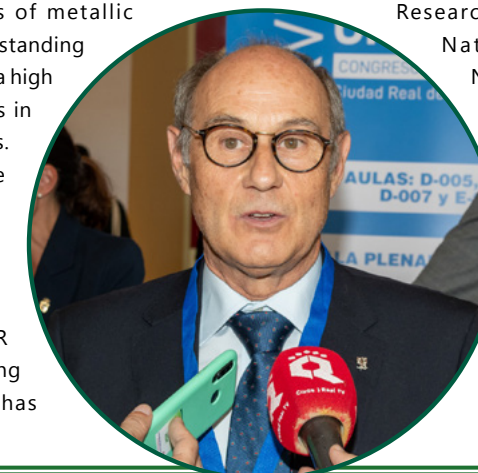
**AGNIESZKA KRÓLIKOWSKA, POLAND**

The Jury recognised Juan de Damborenea's outstanding accomplishment in the field of corrosion of metals, with a particular focus on surface engineering. More specifically, he was recognised for the use of surface modification techniques to improve corrosion resistance and tribocorrosion properties of metallic materials, as well as his outstanding contribution to the field and a high number of reference papers in the most prestigious journals.

In addition, Juan de Damborenea's support and commitment to the EFC was given high praise. As the president of SOCIEMAT he was the Chair of EUROCORR 2019 in Seville, Spain. During this mandate, SOCIEMAT has

created the Corrosion Group, which gives voice to some of the most important research groups devoted to corrosion in Spain through a platform for exchanging ideas and experiences and providing increased visibility to the EFC activities.

Juan de Damborenea holds the position of Research Professor at the Spanish National Research Council - National Centre for Metallurgical Research (CENIM-CSIC) in Madrid, Spain. And since 2017, he has been the President of the Spanish Society of Materials, SOCIEMAT, as well as a member of the programme L'Oréal-Unesco For Women in Science since 2019.



**JUAN DE DAMBORENEA, SPAIN**

**JUAN DE DAMBORENEA, AGNIESZKA KRÓLIKOWSKA and DOUGLAS MILLS** have all delivered significant benefit and impact to the EFC in their roles and activities and are very worthy recipients of an Honorary Fellowship. The trio will be presented their Honorary Fellowship by the EFC President at EUROCORR 2022.

The Honorary Fellow is awarded by the European Federation of Corrosion (EFC) for outstanding achievements in any of the fields of corrosion and engineering science, as well as for outstanding commitment to the European Federation of Corrosion and its committees, and support for its mission and operation.

## WINNER OF THE SEVENTH EFC YOUNG SCIENTIST GRANT HAS BEEN ANNOUNCED

Borhan Bin Mohammad Sultan, of Chimie Paris Tech has been selected for this year's EFC Young Scientist Grant following a quality-based evaluation of the nominations

Borhan Bin Mohammad Sultan, Chimie Paris Tech – PSL Research University, Paris, France will visit Dr. Dominique Thierry and Dan Persson, RISE Research Institutes of Sweden, Kist, for research on *Uncovering the influence of precipitates on the conversion coating of alu-minium alloy using state of the art IR spectroscopic techniques*.

The objective of this grant - introduced by the EFC in 2016 - is to stimulate interaction and collaboration within the international corrosion community by providing financial support to junior corrosionists to enable them to visit and interact with other corrosionists at their home institute abroad.

Each year a maximum of three EUROCORR Young Scientist Grants, up to a maximum of €1,500 each, are awarded. Further information on the grant, including the criteria and rules, can be found on the EFC website at <https://efcweb.org/YSG.html>.

## EUROCORR GRANT EARNS STUDENT EVENT TICKET AND FINANCIAL SUPPORT

The 2022 EUROCORR Travel Grant has been awarded to Andre de Araujo Abilio, an MSc. Student at the University of Alberta, Edmonton, Canada, for the presentation of *Research work on MIC*.

The EUROCORR Travel Grant has been established to help provide financial support of up to €700 and coverage of the EUROCORR registration fee to young corrosionists (not older than 30 years on the 1st of September of the year the Grant is awarded) to facilitate their participation in the EUROCORR conference.

The Grant is intended for students from countries or organisations where they encounter difficulties to travel to the venue of EUROCORR because of financial constraints.

The submission deadline for next year's Travel Grant is 15 February 2023. To be considered, applicants must submit a 400 word motivation letter expressing the benefit of the grant towards their career success and their need of support for attending the EUROCORR, as well as their CV, and an abstract submitted to the forthcoming EUROCORR. More information can be found at [www.efcweb.org](http://www.efcweb.org).



# EFC MEMBER NEWS UPDATE

## THE LATEST NEWS FROM SOCIETIES AND AFFILIATES AROUND EUROPE

### CIDETEC HOST TECHNICAL CONFERENCE

A working day on the AIRPOXY project organised by CIDETEC Surface Engineering was held at Hotel Arima in Gipuzkoa Science and Technology Park on 15th June. The event combined the project's results with talks by renowned experts on trends and needs in composite materials in the aeronautical sector.

They concluded on the need to address a series of challenges that will lead to the consolidation of a circular economy model that envisages the use of sustainable materials, zero waste, multi-functionality, consumption efficiency, material lightening, and reuse, recyclability and efficient waste management systems, among others.

The AIRPOXY project started in 2018 and will end in August this year. Its goal is to advance from TRL3 (proof of concept) to TRL5 (validation in industrial environment) in developing a new family of 3R thermostable resins based on dynamic bonds for aeronautical applications. The consortium, led by CIDETEC Surface Engineering, is formed by Leibniz-Institut für Verbundwerkstoffe,



### ACADEMY & INDUSTRY UNITE IN HUNGARIAN CORROSION SOCIETY

The pandemic has greatly affected our work at the Hungarian Corrosion Society, but last September we had the honour of organising the EUROCORR 2021 Budapest conference, even if only in a virtual format. HUNKOR would like to take this opportunity to thank all involved in this successful event.

The HUNKOR presidency aims to develop an operational system that is sustainable, so that they are expanding their membership with companies interested in corrosion protection. Members support the society with contributions and aid financial sustainability. In return, their expert database is available for industrial stakeholders.

HUNKOR have recently set up several working committees to ensure efficient operation and would like to highlight the formation of the Education and External Relations Working Group, which aims to develop professional corrosion trainings in line with the Hungarian education system, and is supported



Coexpair, EURECAT, ÉireComposites, IDEC, Sonaca, University of Ioannina, Altair, Arttic and the Spanish Association for Standardization, totalling 11 partners from six European countries.

The day was attended by more than 50 experts and was divided into sessions dedicated to new materials, manufacturing and sustainability. The welcome by Andrés Catalán, Secretary General of Spanish Aerospace Technology Platform was followed by 11 presentations by representatives of Airbus, Huntsman, Leibniz-VW, Altair, Idec, Sonaca, Aernnova, University of Ioannina, and Specific Polymers. On behalf of CIDETEC, Nerea Markaide introduced the AIRPOXY project and Alaitz Ruiz de Luzuriaga presented the raw materials and 3R intermediate products developed in the project.

The attendees were very positive about the conclusions and the standard of presentations during the event.

by the relevant professional chambers.

The Hungarian Corrosion Society arrange lectures in the framework of the Industry and Academy event series to encourage inter-sectoral collaborations and communication between academy and industry. Interest in their events is growing, as they reach out to university students through factory tours.

At the invitation of the YEFC this spring, HUNKOR launched Corrosion Awareness Day, for the third successive year, which involved a photo competition. They received 16 entries from national and international applicants, with two photos announced as the winners, who were awarded by a gift.

HUNKOR has delegated a member to the EFC Board of Administrators until 2022. We congratulate the newly elected officers and wish them great success. HUNKOR continues its activities at national and international level and is open to collaboration with fellow societies and professionals.



## NEWS FROM ASSOCIAZIONE PER LA PROTEZIONE DALLE CORROSIONI ELETTROLITICHE

APCE hosted an event from 21 to 22 April on the use of anticorrosive paints and coatings for both applications in sea water (naval and industrial) and soil (oil and gas application) at the University of Udine Polytechnic Department of Engineering and Architecture.

Used as a first defence against corrosion of metals, polyolefin paints and coatings are widely used in preserving the integrity of assets in the industrial, oil and gas, naval sectors, and in all sectors where corrosion drives safety risks, in addition to presenting high costs for maintenance and repairs. Their function is to create a barrier between the assets and the electrolytic environment that allows the establishment of electrochemical corrosion reactions.

The event was arranged to alternate technical and scientific presentations and respect specific industrial experiences, with a particular emphasis on the checks necessary for the qualification of products and their application in the field. It also focused on the



### SEMINAR ON SUSTAINABLE CORROSION PROTECTION

Tackling the challenges of sustainable corrosion protection, ATV-SEMAPP has announced it will host a seminar on the subject on 6 September 2022, DTU, Lyngby, Denmark, in which a handful of European corrosion specialist speakers from industry and academia will share their knowledge.

Corrosion not only results in defective materials and unnecessary costs, but also in unnecessary usage of resources. Therefore, corrosion can have a negative impact on our environment, climate, and human health.

The possibilities for achieving positive sustainability impacts through corrosion protections are numerous. The seminar focuses on sustainable corrosion protection, including aspects like



### ONLINE PROTECTIVE COATINGS EVENT

GfKORR has announced that it will host an online seminar on the Application and Utilisation of Protective Coatings for Electronic Assemblies from 25th to 26th October.

The aim of the seminar is to teach the participants about the GfKORR guideline for the application and properties of a protective coating and the collected knowledge from the related GfKORR



development of innovative materials, as well as the compatibility of coatings with cathodic protection electrical parameters.

Thanks to the availability of the laboratory facilities of the University of Udine and to the instrumentation made available by the partner Elcometer, the participants found the opportunity to test practically all the qualification phases of a product from the adhesion on metal surface, to atmospheric and environmental agents resistance.

Engaged for more than 40 years in the dissemination of the culture of corrosion prevention and conservation of infrastructures, APCE hosts meetings and discussions between industry sectors and the academic world.

For more information, visit <https://www.apce.it/>

biodegradable coatings, corrosion protections through digitization, corrosion prevention through design and the usage of recycled materials.

As a result, the seminar will provide inspiration for how to improve the possibilities of achieving sustainability goals through corrosion protection.

Experts at the seminar: Lisbeth Rischel Hilbert - MetriCorr; Michael Hauschild - DTU Management; Anders Rosborg Black - Ørsted; Mads Juhl - DTU Chemistry; Tejasvi Laxminarayan - DTU Chemistry; Claus Qvist Jessen - Damstahl Danmark; Rajan Ambat DTU Construct; Markus Schackmann - Esslingen University of Applied Sciences.

For more information about the programme and registration, visit <https://atv-semapp.dk/sustainable-corrosion-protection/>

working group. This results in a comprehensive understanding of coatings and their possible applications for the functionality of electronic assemblies is achieved.

The seminar is targeted towards production engineering, quality assurance, process technology, analytics, design and construction, and users of coated assemblies. For more information, visit <https://gfkorr.de>

## PSK HOST ANNUAL CONFERENCE & INDUSTRY DISCUSSION

The annual PSK PRAKTIKOR STAL-BETON 2022 conference took place from 1st to 3rd June 2022 at the Holiday Inn in Józefów, near Warsaw.

A total of 19 papers were delivered and nearly 100 participants took part at EFC Event No. 484, where Grand Corrosionist Medals were presented to Jerzy Kosior and Marek Dardzikowski.

There were four plenary papers, including *Where atmospheric corrosion takes place?*, presented by Tomáš Prošek (below), *Struggle with galvanic corrosion, history marked with errors* by Andrzej Królikowski, *CORNET projects implemented by PSK* presented by Małgorzata Zubielewicz, and

*Macroeconomic environment of the corrosion protection industry - current state and prospects*, presented by Anna Bialecka.

The next sessions were: *Corrosion and protection of reinforced concrete*, *Coatings on steel and Passive fire protection coatings*, while the surface cleaning demonstration took place outside the hotel.



## RESEARCH INSTITUTE DEVELOPS MARINE STATIONS

A sustainable use and exploitation of the oceans will be absolutely necessary to eventually solve the climate crisis and secure the future of our earth, including allowing Europe to solve the problems of resilience for food and energy aspects (EU initiative financing the transition are: Green Deal; Circular Economy Action Plan; Green Hydrogen Strategies; REPowerEU - with €210b financing).

This sustainable blue economy includes multiple sectors such as shipping, fish farming, marine biomass, offshore/floating wind and PV, and marine renewable energy. Developing these sectors will imply the need to deploy a huge amount of materials in the oceans during the coming decades, with an inherent risk of pollution and early failures, due to the harsh condition of the marine environment. It will therefore be essential to develop and test environmentally friendly and reliable corrosion protection systems, to ensure a long lifetime of marine installation and avoid deterioration of the ecosystem.

RISE and its subsidiary, the French Corrosion Institute are working with these issues through national and international R&D projects, both public and industrially financed. RISE has more than 20

years expertise in seawater testing, monitoring, sensors (corrosion, biofilm, cathodic protection), field data acquisition, fouling/antifouling testing and modelling (corrosion, galvanic protection) in seawater. They have adapted and developed new technologies to match industrial needs, particularly in the field of sensors and monitoring, starting to include Artificial Intelligence. They have also recently increased their focus on environmental risk assessment of the different solutions proposed, both established ones and emerging techniques. Using different testing and environmental assessment technologies to measure and characterise the emission of biocides, metallic ions and microplastics from coatings, and cathodic protection systems, they assess the environmental profile of the different systems, creating solutions that shorten the way from an idea to a product on the market.

For the first time at the 15th Scientific and Technical Conference of PSK PRAKTIKOR STAL-BETON, a new form of transferring knowledge and discussing was created with the Discussion Panels. The first Discussion Panel concerned problems that companies from the anti-corrosion industry may encounter in contractors work in clash with technical realities and the law in Poland.

The second Discussion Panel was titled *Understand fire protection. Which side is the responsibility on?* The role of the investor and the problems encountered by the designer, the supervision inspector, contractors and suppliers of intumescent were analysed.

Elsewhere, PSK organized the free webinar *Powder paints and their scope of application* in the second edition of that topic, with nearly 200 participants attending.

In addition, a new free webinar *Obscure origins of corrosion awareness II* took place on 21 April to highlight the Corrosion Awareness Day, and *Chemical preparation of metal surfaces prior to powder coating* was the topic of webinar held in the same month.

The third webinar was titled *Tradition or modernity? Or maybe a modern tradition? Contemporary iron phosphating baths and alternative methods of chemical surface preparation prior to powder coating* and dedicated to the topic of powder coatings.

They have also developed courses and training (including practical marine station work) in the fields of marine corrosion, cathodic protection, coatings and other topics linked to the blue economy.

Most actual is a cathodic protection education with certification provided both in France and Sweden.



## EFC UNVEILS WHITE PAPER

### EFC IN COLLABORATION WITH THE WCO HAVE SHARED THEIR INDUSTRY-LEADING IDEAS ON COMPLEX CORROSION PREVENTION IN THEIR LATEST WHITE PAPER



The European Federation of Corrosion (EFC) and the World Corrosion Organization (WCO) have revealed their latest white paper titled *Corrosion Challenges Towards a Sustainable Society*, which has enlisted some of the brightest minds from the industry to provide an overview of corrosive threats, from additive manufacturing corrosion to oil and gas production. Focusing on the highly complex science of corrosion prevention, the paper highlights the importance of sharing between individuals and societies throughout the world to help further understand the science and deterrence of corrosion and to bring the need for research and the consequences of corrosion into the public and political focus.

This meeting of minds and sharing of ideas in the white paper is vital to the industry, as the 2001 U.S. Federal Highway Administration cost of corrosion study, *Corrosion Costs and Preventive Strategies in the United States*, found the annual direct cost of corrosion to be a staggering \$276 billion—or 3.1% of the gross domestic product.

With this in mind, the EFC has gathered the thoughts of industry leaders from across world, including Reynier I. Revilla and Iris De Graeve from the Research group of Electrochemical and Surface Engineering at Vrije Universiteit in Brussels discussing additive manufacturing corrosion, as well as Polina Volovitch, Steve Paterson, and Damien Feron explaining the merits and limitations of solar energy.

Materials and Corrosion Adviser, Steve Paterson also contributes to the discussion on geothermal energy, as well as on the WCO White Paper on

renewables. Marc Wilms, Gareth Hinds, Paterson, and Damien Feron also contribute to the renewables overview that takes in wind and wave/tidal solutions.

Elizabeth Szala, J.O. Nilsson look into the impact of the reduction of GHG emissions in metal production and its consequences on corrosion performance; Szala and Theo Hack explore lightweight design in transportation to reduce CO2 emissions; while Maros Halama investigates renewable energy and decarbonisation of industry corrosion in battery and hydrogen technologies.

This commitment to sharing of ideas and solutions is reflected in EFC's partnerships with international associations of societies and organizations involved within corrosion management and control, including The European Federation of Corrosion, the Australasian Corrosion Association, the Chinese Society for Corrosion and Protection, and Association for Materials Protection and Performance.

This need for global collaboration has led to the establishment of the World Corrosion Organization (WCO), the leading entity for raising public awareness of corrosion, identifying best practices, providing expertise, and establishing global standards. The EFC and WCO meet regularly to work on important initiatives to minimize the effect of corrosion in every country.

To download the full white paper, visit [https://efcweb.org/efcweb2019\\_media/Documents/WCO+ +EFC+White+paper+ +Materials+and+Corrosion-p-2134.pdf](https://efcweb.org/efcweb2019_media/Documents/WCO+ +EFC+White+paper+ +Materials+and+Corrosion-p-2134.pdf)

## SUSTAINABLE CORROSION PROTECTION IN A MARINE ENVIRONMENT

RISE has been developing two marine field stations located in Kristineberg (west coast of Sweden) and in Brest (Brittany, France), as being able to test in real seawater is essential, because artificial water cannot reproduce the field conditions accurately.

The Swedish research institute perform open sea exposures and laboratory exposures using fresh sea water, allowing the environmental parameters, such as temperature, salinity, pH, dissolved oxygen, flow velocity, chemical treatments, and other factors to be controlled in exposure tanks and flow loops, which can be adapted for any type of seawater applications from small to full scale.

In addition to their field stations, they also have a worldwide framework for exposures in a large variety of seawaters (tropical sea, North Sea, Baltic



Sea, etc.) as well as their own developed system allowing exposure in deep sea down to 3000 meters in any locations.

They also work actively for creating a European network with all the other European RTOs, managing marine test beds for facilitating testing and validation of innovative sustainable materials to be launched to the single European market and in different European sea basins.



# AN INNOVATIVE ALTERNATIVE FOR CORROSION MONITORING IN INNER SURFACE OF ABOVE GROUND STORAGE TANKS

## A CASE STUDY FOCUSING ON CORROSION MONITORING IN INNER SURFACE OF THE ABOVE GROUND STORAGE TANKS

Corrosion, due to weather and operation conditions, is the main cause of above ground storage tanks integrity degradation. Monitoring corrosion is therefore mandatory. The use of Non-Destructive Testing (NDT) is a well-known methodology for corrosion monitoring and discontinuities detection in a large number of industries: oil & gas, automotive, aerospace, etc. In fact, NDT is the only inspection technique that ensures the condition of the assets without modifying their properties.

The corrosion and degradation of tanks is a persistent problem in the industry. Inspections are a useful way of assessing assets integrity but might severely impact normal plant operation. In 2006, Chang et al. [1] conducted a study on storage tank accidents which concluded that 74% of reported accidents occurred in petrochemical refineries, and 85% of them had caused fire and explosions. Approximately 60% of the accidents are due to crack, rupture, and subsequent leakage as a result of corrosion. Monitoring corrosion is, thus, a key issue. Historically, most of the efforts for ensuring adequate lifespan of above ground storage tank have focused on two main strategies:

→ 1. Design tanks by applying oversizing coefficients to ensure a specific lifespan and apply a replacement maintenance policy without performing any inspection.

→ 2. Perform NDT inspections to monitor corrosion periodically, whose intervals will depend on the severity of the estimated damage:

→ 2.1. High performance inspection techniques need access to the inner wall and floor, therefore, requiring emptying and cleaning the tank for inspection.

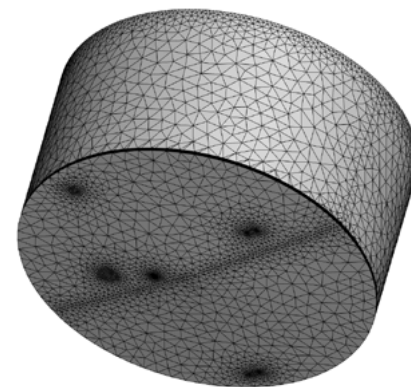
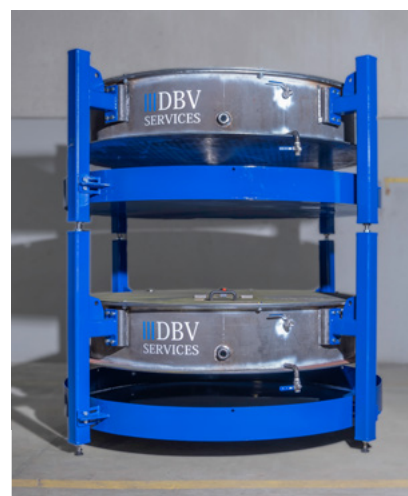
→ 2.2. NDT techniques that do not need access to the inner floor can provide an estimation of the corrosion activity based on experimental procedures.

Nowadays, the corrosion monitoring strategy has shifted towards a combination of both, an oversized design and replacement maintenance, and periodical NDT inspections, with the aim to ensure the integrity of the assets while avoiding incurring costs associated to maintenance or inspections that require access to the tank, which

would only be planned for a small fraction of extreme corrosion cases.

Unfortunately, although NDT is able to detect damage within the tank, it usually fails to provide extended information about the nature of such damage, such as its location, extension or severity. Without this characterization, real damage assessment is normally based on weak models that produce under or overestimated values, introducing high uncertainty that results in non-optimal maintenance scheduling and, most of the time, reduces the lifespan of the assets.

Therefore, inspecting the interior of the storage tank is crucial (e.g. crack propagation typically initiates on the inner part). Monitoring the inner wall of the tank floor is always challenging either due to inaccessibility or because the tank must be thoroughly cleaned, neutralizing the chemicals first and removing the accumulated slug. The degree and frequency of inspections will depend on how the tank has been operated and the scheduled maintenance plan. Considering this, the CORUS project (CORrosion prediction and detection by UltraSonic testing in metallic tanks and piping with chemicals) aims to develop a reliable method based on



Left to right: CORUS Project tools, VOLTA, CORUS demonstrators, and FEM simulations

[ 1 ] Chang, J. I., & Lin, C. (2006). A study of storage tank accidents. Journal of Loss Prevention in the Process Industries, 19(1), 51-59



Inspecting the interior of the storage tank is crucial, as crack propagation typically initiates on the inner part, while monitoring the inner wall of the tank floor is challenging due to inaccessibility or because the tank must be thoroughly cleaned

ultrasonic EMAT (Electro Magnetic Acoustic Transducer) technology for inner wall/floor corrosion detection in a qualitative and quantitative way that will not require access to the inner walls of the tank, therefore, avoiding emptying the tanks. The technology focuses mainly on inspecting the tank bottom floor, which is the more susceptible area to experience corrosion. The results of CORUS project will include a new set of tools that would enable to schedule an optimized maintenance plan for the existing assets, and will help in improving the design of new tanks and piping. These results include a new EMAT based inspection solution, featuring a novel sizing algorithm and a tool for corrosion and mechanical strength prediction, which will assist plant operators in the decision-making process regarding assets integrity and maintenance planning.

Although CORUS solution targets the Oil & Gas market, the technology could be easily adapted to any other industry with similar corrosion problems in tanks or other structures. Above ground storage tanks are a necessary asset to ensure the worldwide fuel demand and it is estimated that there are more than 750.000 tanks worldwide. EU standards enforce full internal inspection on intervals from 5 to 20 years, with 10 years being the most common inspection period. This means that no information is gathered for a large expand of time and abnormalities might be overlooked and allow to evolve to a problem during inter-inspections periods. The CORUS solution will provide a cost-effective assessment method to collect data more frequently with no impact on plant operation, therefore, allowing for an early detection of any degradation that might occur within the tank walls.

The CORUS project has been co-funded by the Center for the Development of Industrial Technology (CDTI) and the Flemish Agency for Innovation and Entrepreneurship (VLAIO) in the framework of the Eurostars-Eureka research and innovation program under grant agreement

ID 113807. It is coordinated in collaboration with 3 partners (ELSYCA NV, Design Business and Verification Services and CIDETEC Surface Engineering) by Innerspec Technologies, a pioneer in commercial applications of electromagnetic acoustic transducers (EMAT). Innerspec has positioned itself as the world leader in this technology with hundreds of systems installed worldwide. Its mission is to provide the most effective non-destructive inspection solutions using advanced research and engineering. ELSYCA NV, experts in computer modeling of electrochemical processes such as corrosion, offers unique solutions through the design and development of digital twins for a wide variety of industries ranging from consumer goods to medical, oil and gas and aerospace. With over 20 years of experience, ELSYCA has ensured the integrity of various industrial assets, reduced operating costs and increased production capacity. Design Business and Verification Services is an expert in engineering for the development of integral projects from the conceptual idea to the project implementation.

DBV has extensive experience in the execution of technological projects, design, development and optimization of products in the fields of defense, energy, automotive, petroleum and aerospace. CIDETEC Surface Engineering is specialized in providing innovative solutions along the entire value chain for the automotive, aerospace and extreme environment sectors, among others. CIDETEC's facilities are fully equipped for corrosion control, characterization and monitoring, as well as for applying formulations using a wide range of technologies at laboratory and industrial scale. Indeed, the role of CIDETEC in the CORUS project is related to the development of a methodology based on electrochemical fundamentals in order to promote well-controlled defects that mimic real damages. Such realistic defects enable the validation of the EMAT technology for the field inspection on storage tanks.



## NEWS ROUND-UP FROM THE WORKING PARTY 4 ON NUCLEAR CORROSION

### HENRI CORIOU AWARD 2022

This year's honorary medal of the WP 4 was awarded to Pål Efsing (below, right) from Ringhals AB, Sweden, during the annual meeting of the ICG-EAC last May in Tampere, Finland.

The medal was presented by the Chair of WP 4, Stefan Ritter, who, due to the pandemic, also presented the 2021 medal to Grace M. Burke, (below, left) (University of Manchester, UK, now at Oak Ridge National Lab, USA).

### THIRD NUCLEAR CORROSION ONLINE SEMINAR

Last April, on the occasion of Corrosion Awareness Day 2022, the WP 4 organised an online seminar titled *Environmentally-Assisted Cracking of Structural Materials in Light Water Reactors*, which was already the third edition of nuclear corrosion online seminars.

Peter Andresen (Consultant, retired from GE-Global Research Center, USA) gave a very interesting lecture covering the wide field of environmentally-

assisted cracking in high-temperature water. It was attended by 49 people from all over the world. The recorded video and the presentation slides are available via the WP 4 website and EFC Hub.

### WORKSHOP ON LONG-TERM PREDICTION OF CORROSION IN NUCLEAR WASTE SYSTEMS (LTC 2022)

On June 21-24, the 8th International Workshop on Long-term Prediction of Corrosion in Nuclear Waste Systems (LTC 2022) took place in Baden, Switzerland. A total of 70 participants from 15 countries visited the Grimsel Test Site, Nagra's underground research facility, followed by three days of cutting-edge corrosion science presentations and posters.

The main subjects discussed at the event (below) were the treatment of corrosion issues in various national disposal programmes, the corrosion of disposal canister materials and its long-term prediction, microbial issues, in-situ experiments, passivity, as well as modelling and the use of natural or archaeological analogues.

### NUCLEAR CORROSION SESSION DURING EUROCORR 2022

→ Berlin, Germany, 28 August - 1 September 2022

Don't miss the excellent nuclear corrosion session with more than 30 oral and poster presentations. The session will be held on Monday and Tuesday in Salon 4-5 on the ground floor. The fall business meeting of WP 4 will take place on Wednesday 31 August, 16:30 (please check out the EUROCORR programme at [eurocorr.org/2022\\_program.html](https://eurocorr.org/2022_program.html) for possible last-minute changes).

### NUCLEAR CORROSION SUMMER SCHOOL – NUCOSS-23

Now looking into the future, the third edition of the Nuclear Corrosion Summer School – NuCoSS-23 (the last two being successfully held in 2015 and 2019) is organised by WP 4 (EFC Event No. 488) and will take place from 2 July until 7, 2023, in Špik, Alpine Resort, Gozd Martuljek (Slovenia). For more information and details of the registration, which will open soon, please visit [www.ecg-comon.org/meetings/nucoss](http://www.ecg-comon.org/meetings/nucoss)



## NEWS FROM THE WORKING PARTY 14 ON COATINGS

After a year's postponement due to the pandemic, the 12th International Workshop on "Application of Electrochemical Techniques to Organic Coatings" (AETOC - EFC Event No. 475) took place in Cavalese, Val di Fiemme, Italy, from 29 March to 1 April 2022.

The workshop was created to promote intensive exchanges and fruitful discussions among scientists and engineers who have fundamental and/or applicative research about organic coatings using electrochemical techniques.

In spring 2022, the international workshop took place in the nearby town of Cavalese, Italy, a little village surrounded by two natural parks and stunning Dolomite peaks in the Unesco World Heritage Site.

The conference was arranged by the Corrosion and Coating group of the University of Trento: Massimo Calovi, Andrea Cristoforetti, Flavio Deflorian, Michele Fedel, Stefano Rossi, and

Francesca Russo, supported by the UniTrento Communication Office (below).

The AETOC2022 conference has been the first occasion for the people of the Working Party on Coatings to meet in person, following the travel limitations due to the pandemic. Tired of being forced to switch to video conferencing, the delegates showed a strong willingness to get together, discuss, debate, and enjoy the company of old and new friends.

Along with a debate on electrochemical impedance spectra and their interpretation, many emerging issues, such as the application of robust computational methods to study organic coatings, were brought to the audience. The high quality of the scientific debate and the remarkable involvement of young scientists in the discussion demonstrated that the organic coatings community is prepared to tackle the post-pandemic challenges.

There was also a hiking tour (bottom), which consisted of a walk from the San Pellegrino pass (1,918m) to the Fuciade mountain hut through an 'almost flat' mountain trail. A soft snowfall and a magic haze accompanied the delegates to dinner, which was held at the Fuciade mountain hut, where the delegates had the chance to taste the traditional dishes of Italian Alps.

On behalf of the organizing committee, thanks go to Wolfram Fürbeth (DECHEMA, Germany), Marjorie Olivier (University of Mons, Belgium) and Jörg Vogelsang (SIKA, Switzerland) for their advice and support, in particular during the uncertain times of the pandemic. Special thanks to Anna Fazion and Sara Chinellato from the Organizing Secretariat for their great efforts, hard work, and psychological support.

Finally, good luck to Arjan Mol and his group, who will welcome you to AETOC2024 conference in the Netherlands.





## NEWS FROM WORKING PARTY 15 ON CORROSION IN REFINERY AND PETRO-CHEMISTRY INDUSTRY

The annual spring meeting of the Working Party 15 Corrosion in Refinery and Petrochemistry Industry took place via a Zoom meeting on 24 March 2022.

The meeting was attended by 61 participants from Europe, Middle East, Japan and Australia, who all exchanged information and discussions on corrosion under insulation, corrosion in cooling water systems, corrosion in biorefineries, as well as failure cases on FCC processes.

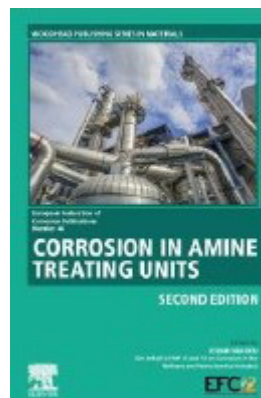
Topics also concerned new inspection and monitoring techniques, corrosion modeling approaches via digital twins. A point has been made on the activities of the joint WP 9 – WP 15 task force on corrosion in sea water circuits.

The next WP 15 Corrosion in the Refinery and Petrochemistry Industry meeting will be held in Berlin, Germany, during the EUROCORR 2022 week on 1st September 2022 and will cover the all the hot

topics affecting corrosion in the refinery and petrochemistry industry.

If you wish to discover more information on the activities of the WP15 group, including all the minutes and presentations of the last meetings, then please visit our homepage and the EFC Hub Platform.

→ In addition, the EFC WP 15 Corrosion in the Refinery and Petrochemistry Industry Group would like to express its thanks to DECHEMA and Ines Honndorf for their excellent organisation of the meeting.



## NEWS FROM THE WORKING PARTY 25 ON ATMOSPHERIC CORROSION

Exposure of samples mimicking products and constructions used in outdoor atmosphere at field sites have always been an important part of efforts to understand atmospheric corrosion and provide manufacturers with the necessary data for the selection of proper corrosion protection methods.

Thanks to the work of site managers - members of Working Party 25 on Atmospheric Corrosion, and with financial support from EFC - it was possible to gather information about 43 European exposure sites in the Exposure Site Catalogue.

The publication covers all types of environment (rural, urban, industrial, marine, and high UV), different climatic zones, levels of industrial pollution, chloride deposition, humidity, and corrosivity categories from C1 to CX as defined in ISO 9223. The catalogue was published in May 2021 and is available free of charge at <https://efcweb.org/WP25.html>.



Based on highly positive feedback from European and international colleagues, the EFC agreed to support the transformation of the catalogue into an online tool. Indeed, any printed source of information on exposure sites is bound to become outdated soon as the corrosivity and climatic data change year by year. Contact information, available size, rack types, and other facts change too. In addition, new sites can open and unfortunately, others disappear. Therefore, an online database of sites is under construction.

Site managers will be able to edit their entries, and users will have more possibilities to find sites with the required characteristics using an advanced search tool. Introduction of a

new site will be an easy task with close to immediate effect. Most importantly, the catalogue will also be able to incorporate non-European sites in the future.

The trial version of the online catalogue will be introduced at EUROCORR 2022 in Berlin.

## EXPLAINING THE EFC WORKING PARTY INDEX

The EFC currently has 23 active Working Parties and one Task Force, each of which are concerned with a different aspect of the corrosion of metals, alloys, and polymer materials.

Activities of the EFC Working Parties and Task Forces include collaborative research and testing programmes, organisation of workshops, seminars and conferences, preparation of state-of-the-art reports, guidelines and proceedings for publication as volumes in the EFC Series, as well as the organisation of sessions at EUROCORR conferences.

Membership to the EFC Working Parties is available as a right to all EFC members belonging to both European and International EFC Member Societies, or to EFC Affiliate Members, including companies or universities/research centres.

Anyone wishing to join one of the Working Parties should apply to the appropriate Working Party Chairs. Please refer to <https://efcweb.org/Scientific+Groups.html> for full details on Working Party activities, or contact EFC Scientific Secretary, Roman Bender ([roman.bender@dechema.de](mailto:roman.bender@dechema.de)).

# NEW SOCIETIES AND A NEW AFFILIATE MEMBER

## EFC WELCOMES TWO NEW MEMBER SOCIETIES AND ONE AFFILIATE MEMBER TO THE FEDERATION

### UKRAINIAN ASSOCIATION OF CORROSIONISTS



The Ukrainian Association of Corrosionists is a non-profit organisation founded in 1992 as a self-governing association of specialists and enterprises working in corrosion protection. Currently, the association unites Ukrainian corrosion scientists from almost 30 research institutions, and organisations, as well as over 100 individual members.

Their main areas of activity include:

- Co-operation of scientists and manufacturers in the protection of metal structures from corrosion and corrosion-mechanical destruction in the domestic market, and the establishment of connections between Ukrainian and foreign companies
- Dissemination of modern methods of anti-corrosion protection of metals and alloys to increase the reliability of equipment and structures

→ Research and examinations of corrosion and corrosion-mechanical durability of materials and equipment during manufacture and operation

→ Scientific support for the creation of new anti-corrosion materials and the preparation of technical documentation for their production. Promotion of the introduction of new technological processes, materials, devices and equipment

→ Preparation of regulatory documents and the publication of periodical and special literature

→ Assistance in the implementation of the state scientific and technical policy in the protection of the metal stock of Ukraine from corrosion

→ Conducting scientific and technical conferences, exhibitions, lectures, seminars, competitions, and consultations for enterprises and specialists

For more information, visit [www.ipm.lviv.ua](http://www.ipm.lviv.ua)

### HEGGEL GMBH, ESSEN, GERMANY



If the protection of surfaces in complicated corrosive process conditions is a problem, HEGGEL GmbH is capable of proposing high-tech innovative lining and coating systems that protect a wide range of substrates against the damaging effects of chemical and mechanical attack.

HEGGEL GmbH offers a range of anti-corrosion products for optimum protection of industrial equipment, including products for enhanced protection in harsh conditions such as chemical exposure, elevated temperature, abrasive condition, mechanical stress or microbiological corrosion.

In this regard, HEGGEL's engineering design approach has been knowledge-based, focused on reliable protection and convenient application, while eliminating hazardous organic chemicals, as well as long installation times.

Among the many highlighted features of HEGGEL surface protection systems, they also offer excellent resistance in tough service conditions at elevated temperatures, as well as providing tremendous adhesion strength.

To find out more about HEGGEL GmbH, visit [www.heggelgmbh.com/en/](http://www.heggelgmbh.com/en/)

### FINNISH CORROSION SOCIETY, SKY



The Finnish Corrosion Association, SKY (Suomen Korroosioyhdistys SKY - Finlands Korrosionsförening r.y.) is an association founded in 1978 to promote the sharing of information related to corrosion and corrosion prevention and the professional competence of its approximate 100 members.

The Association organises training sessions on topical and interesting topics. It aims at maintaining relations with domestic and international organisations and partners in the field. The association's special focus is the promotion of research and development in anti-corrosion.

To find out more about Suomen Korroosioyhdistys SKY, visit [www.korroosioyhdistys.fi](http://www.korroosioyhdistys.fi)

### EFC SOCIETY AND AFFILIATE MEMBERS

The EFC is open to scientific and technical societies and organisations who are in pursuance of the advancement, best practice and education of the science and technology of corrosion.

A full listing of all the European and International EFC Member Societies and the Affiliate Members can be found on the EFC website.



# NEWS FROM THE WORLD CORROSION ORGANIZATION



## GETTING TO KNOW THE ORGANISATION IDENTIFYING BEST PRACTICES IN CORROSION MANAGEMENT ON A GLOBAL SCALE

### WHO WE ARE

The World Corrosion Organization (WCO) is a not-for-profit charitable organization with offices in the US, China and Europe. Its mission is to promote education and best practice in corrosion control for the socio-economic benefit of society, preservation of resources and protection of the environment. The WCO is a non-governmental organization of the United Nations with members all over the world, including the EFC.

### AIMS

- To raise public awareness of corrosion and corrosion control as well as develop and implement an internationally recognized Corrosion Awareness Day (24 April)
- To identify international best practices in corrosion management
- To facilitate the provision of corrosion control expertise to governments, industries, and communities, especially in the developing world
- To normalize corrosion related standards worldwide and to harmonize the standards already used

### FOCUS AREAS

The main advantage of the WCO is its global reach and collective voice, which can be used to influence policy and decision making in government and industry. In general, there has been a lack of sufficient investment in corrosion control and mitigation strategies in many countries over the past decade. There is legitimate concern that this will lead to major infrastructure failures, such as bridge collapses and pipeline explosions, if this situation is not addressed.

A major priority for the WCO is to raise these concerns at the highest possible level so that meaningful action can be taken. This is particularly important in developing countries, where the WCO can also assist with knowledge transfer and technology implementation.

It's also critical that we equip the next generation of corrosion scientists and engineers with the skills and knowledge they need to address corrosion challenges in a changing world. For example, corrosion is a key lifetime-limiting factor for many low carbon energy technologies, such as wind turbines, solar panels, and batteries. Here, material degradation mechanisms are not as well understood and managed as those in conventional fossil fuel technologies. The WCO is committed to promoting outreach and training activities that can support this transition.

### WORLD CORROSION DAY, 24 APRIL 2022

World Corrosion Day has been running annually since 2010 with the aim of highlighting the importance of corrosion protection to the global economy and the safeguarding of the environment. The 2022 edition was one of the most active to date, with events taking place across the globe, including:

- Seminar: Chemistry Behind Corrosion, organised by the Pakistan Chapter of AMPP and the University of the Punjab in Lahore, Pakistan (19 & 21 April)
- Presentation by Damien Feron (Past President, WCO): Moving Towards a Sustainable Society: Corrosion Issues and Challenges, Lehigh University, USA (21 April)
- Webinar: Obscure Origins of Corrosion Awareness, hosted by the Polish Corrosion Society (21 April)
- Corrosion Awareness Day Symposium: Corposium 2022, hosted by Sathyabama Institute of Science and Tech, Chennai, India (22-23 April)
- Forum of Corrosion Control Technology & Industrialization Development in Guangzhou, China (24-26 April)
- Corrosion Awareness Day photo competition organised by the University of Manchester, UK (24 April)
- Webinar: Corrosion, the Perspective Through the Eyes of Women, hosted in Canada (24 April)
- Webinar: Corrosion Awareness Day, hosted by Swerim, Sweden (25 April)
- Seminar: Environmentally-Assisted Cracking of Structural Materials in Light Water Reactors, hosted by EFC WP4: Nuclear Corrosion (25 April)
- Artistic Printing of Corroded Plates by Jean Kittel, IFP Energies Nouvelles, Lyon, France (24 April – 24 May)

### CORROSION AWARENESS HONOUR 2022

The Corrosion Awareness Honour is presented annually by the WCO to pioneering individuals who have made a substantial contribution to increasing awareness of corrosion and corrosion protection among government, industry and the general public. The recipient is selected by a jury made up of representatives from the Chinese Society of Corrosion and Prevention, the European Federation of Corrosion, and the WCO.

The recipient of the Corrosion Awareness Honour 2022 is Prof. Dr. Carlos Arroyave (below), Antonio Nariño University, Colombia, who was selected in recognition of his outstanding contribution to raising the profile of corrosion protection globally, in particular through his Presidency of the Colombian Association of Corrosion and Protection (1997-2001), the Ibero-American Association of Corrosion and Protection (2006-2011) and the International Corrosion Council (2014-2017). Prof. Arroyave will be presented with the award during the opening ceremony of EUROCORR 2022 in Berlin.



### FURTHER INFORMATION

To learn more about the WCO and its activities, please contact [Gareth Hinds](#) (WCO President) or [Willi Meier](#) (WCO Director General).

# CAVALLARO MEDAL AWARDED TO PROF LUCIANO LAZZARI

## THE 2022 CAVALLARO MEDAL HAS BEEN AWARDED TO THE ITALIAN PROFESSOR FOR HIS WORK IN THE FIELD OF CATHODIC PROTECTION

The 2022 Cavallaro Medal has been awarded to Professor Luciano Lazzari, the former professor of Materials Science and Engineering at the Politecnico di Milano

Now retired, Professor Lazzari (right) has been selected for this prestigious EFC distinction due to his important contributions in the field of cathodic protection of metallic structures buried in soil or immersed in seawater, as well as the deep analysis of the influence of DC and AC electrical interference. He's also be honoured for his studies on stress corrosion cracking and hydrogen embrittlement of low alloyed and stainless steels and for his research in the field of reinforced concrete structures durability, with particular reference to the corrosion of steel rebars and its prevention by the use of cathodic prevention and protection.

More recently, his research activity was focused on the development of probabilistic methods and models for the prediction of localized corrosion initiation, and the definition of a mechanistic model for the estimation of carbon steel corrosion rate exposed to any acidic condition, as strong acids, weak and also organic acids. Most of his proposed models are reported in the EFC publication no. 68 *Engineering Tools for Corrosion: Design and Diagnosis, 2017*, where the reader can appreciate Professor Lazzari's effort to rationalize each corrosion phenomenon in the light of theoretical knowledge, in what he always defined as, "the engineering approach to corrosion".

Luciano Lazzari obtained MSc degree in Chemical Engineering from the Politecnico di Milano in 1972 and held various research and industrial positions at the Institute of Physical Chemistry, Electrochemistry and Metallurgy (Politecnico di Milano) and AGIP SpA, (now ENI SpA) as a corrosion engineer from 1973 until 1986.

Since 1985 he has been a teacher by contract in Corrosion and Protection courses at the Politecnico di Milano, where he became associate

professor in 1998, before becoming a full professor in Material Science and Engineering in 2005. From 2009 to 2016, he was responsible for the research group PoliLaPP (Laboratory of Corrosion of Materials «Pietro Pedferri»).

Then in 1994 he co-founded CESCOR Srl,

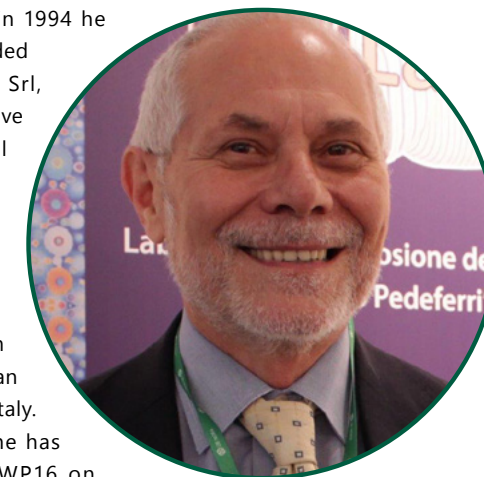
an engineering company active in the field of the material selection, cathodic protection design and inspections.

Professor Lazzari was an elected member of the EFC Board of Administrators from 2013 to 2016 and co-chairman of EUROCORR 2014 at Pisa, Italy.

Furthermore, within EFC, he has been very active in the WP16 on Cathodic Protection and the WP11 on Corrosion of Steel in Concrete.

His impact on both research and industrial applications in corrosion and corrosion protection is reflected in his large scientific publication record, patents and books. Among the latter, is it worth mentioning the book *Cathodic Protection* (2008, PoliPress, Milan), which he wrote with Pietro Pedferri. In 2018, Professor Lazzari also edited the book *Corrosion Science and Engineering* (published by Springer), which was the English translation of the historical books on corrosion and protection by Pietro Pedferri. This publication detailed how the science and engineering of corrosion are merged to help readers perform correct corrosion assessments in both the design phase and plant management phase, and to define the optimal protection techniques.

In consideration of his activity, the quality of his research and teaching, Professor Luciano Lazzari is a very worthy recipient of the 2022 Cavallaro Medal.



## WHAT IS THE ORIGIN OF THE CAVALLARO MEDAL?

First presented in 1965, the Cavallaro Medal is awarded to a scientist who is particularly distinguished by their activity and publications in the field of corrosion research. Established by the University of Ferrara, the gold medal is awarded every two years with the help of the European Federation of Corrosion to honour the memory of and the work accomplished by Professor Leo Cavallaro, founder of the Aldo Daccò Study Centre on Corrosion and Metallurgy, now an annexe of the Engineering Department of the University of Ferrara.





# PARIS REVEALED AS HOST CITY OF EUROCORR 2024

THE THEME OF THE EVENT WILL BE 'A STEP FORWARD IN SOCIETAL AWARENESS OF MATERIAL DEGRADATION ISSUES'



It has been announced that EUROCORR 2024 will take place in Paris, France from 1st to 5th September 2024. CEFRACOR, the French Corrosion Society, will host the highly-regarded annual event at the Palais des Congrès de Paris, which is easy walking distance from the Arc the Triomphe, and easily accessible by public transport.

Paris is a world leading tourist destination that is known for its beautiful architecture, monuments, architecture, historic avenues, parks and gardens. In the same year, the Olympic and Paralympic Games will be hosted in Paris and the city has already begun renovating its existing infrastructure, from public transportation, to sustainability, to education, sport, and scientific research.

After the success of EUROCORR 2004 and 2009 in Nice, and EUROCORR 2016 in Montpellier, CEFRACOR, in cooperation with Chimie ParisTech, has been designated by the EFC to organise this major event in the corrosion calendar.

Over 1,000 participants are expected at EUROCORR 2024, bringing together corrosion experts from universities, research centres, and

industries. The general theme of EUROCORR 2024 is: A step forward in societal awareness of material degradation issues.

### FULL PROGRAMME

The planned programme for EUROCORR 2024 will include a variety of 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 hydrogen-based energy systems
- Certification in corrosion and corrosion protection

### NEXT STEPS

For registration details and to find out more information, please visit <https://EUROCORR.org/>



F. Fischer/Photo: J. Jankovsek

Over 1,000 participants are expected at EUROCORR 2024 in Paris, which will see France host the prestigious corrosion event for the fourth time since 2004, following two conferences in Nice and one in Montpellier

# CROATIAN CORROSION CONFERENCE GOES ONLINE FOR 2022

THE CROATIAN SOCIETY FOR MATERIALS PROTECTION HOSTED THE 25TH ANNUAL INTERNATIONAL CONFERENCE, KORMAT 2022

In the frame of International Machine Tools and Welding and Anticorrosion Fairs, the Croatian Society for Materials Protection organised the 25th International Conference of Materials Protection and Industrial Finish, KORMAT 2022, on 26 and 27 April 2022.

The aim of the conference was to present various mechanisms of wear of construction materials and modern achievements in the field of corrosion protection, application of stainless steels and processing, surface preparation and protective coatings, corrosion inhibitors, cathodic protection, prevention of corrosion in concrete and stray current corrosion, testing, and quality assurance.

### GLOBAL PRESENCE

On the first day of the conference, a total of 18 scientific and professional lectures from Croatia, Germany, the Netherlands, and the UK were held. Dr. Vinko Šimunovic presented *Corrosion damage to water pipes*, while Dr. Suzana Jakovljevic spoke on *Processes of wear of construction materials*. A special part of the conference was the student section, which included four lectures.

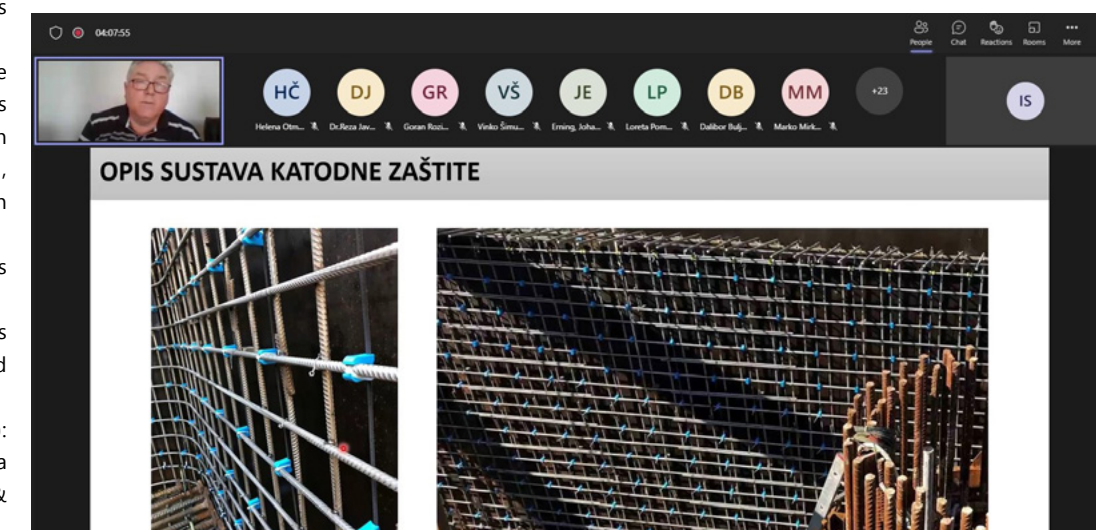
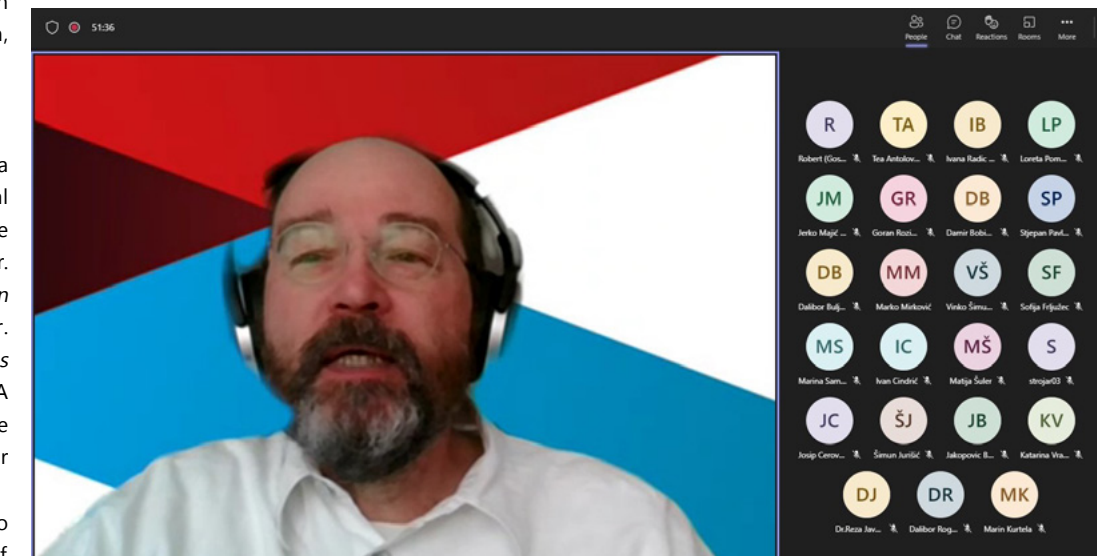
The second day was dedicated to Corrosion Awareness Day, as part of which four popular-scientific lectures were held:

- I. Juraga (Croatia): The importance of the Croatian Society for Materials Protection in education on corrosion and materials protection, knowledge transfer and connection with universities in Croatia
- M. Serdar (Croatia): How safe is Croatian infrastructure?
- J. W. Erning (Germany): Materials in contact with drinking water and regulatory issues
- R. Javaherdashti (Netherlands): Contribution of corrosion to a country's economy, public health & safety

The conference again proved to be a place of connection and cooperation of scientists and experts from the industry in Croatia and abroad, with a total of 48 participants.

The conference was dedicated to the work and memory of Professor Ivan Esih, a founder of the Croatian Society for Material Protection, long-time president, and promoter of the corrosion profession and material protection. Due to epidemiological measures, the conference was held online.

*Ivan Stojanovic, Secretary General of Croatian Society for Materials*





# UPCOMING EFC EVENTS IN 2023

Make a date in your corrosion calendar as we've compiled a list of all the latest EFC events and conferences in 2023 from across the globe, organised by EFC Working Parties, Task Forces and Member Organisations to ensure that you don't miss a thing this year. See you there.

## ALUMINUM SURFACE SCIENCE & TECHNOLOGY (ASST2023)

Saltsjöbaden, Stockholm, Sweden, 21-25 May 2023

**EFC Event No. 489**

Organised by the Royal Institute of Technology (KTH) with support of RISE (Swedish member association)

**Scope:** Several scientific topics focused on aluminium, corrosion, surface treatment and applications  
To find out more, visit [www.asst2023.conf.kth.se](http://www.asst2023.conf.kth.se)

## 3RD NUCLEAR CORROSION SUMMER SCHOOL – NUCOSS-23

Gozd Martuljek, Slovenia, 2-7 July 2023

**EFC Event No. 488**

Organised by the EFC Working Party on Nuclear Corrosion

**Scope:** The summer school will cover all necessary



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topics, starting with fundamental electrochemistry, to provide a self-consistent understanding of nuclear corrosion issues. Internationally renowned experts will give interesting lectures.

To find out more, visit <https://ecg-comon.org/meetings/nucoss/>

For the complete listings of future corrosion events around the world, visit the EFC Calendar of Events <https://efcweb.org/Events.html>

# STAY UP TO DATE WITH THE EFC ONLINE

Wherever in the world you find yourself, you needn't miss out on the latest news, information, and exhibitions thanks to the EFC's online footprint.

## LINKEDIN COMPANY PAGE

EFC's company page hosts regular publications of EFC events and news, so scan the QR code (top, right) to stay up to date.



## LINKEDIN DISCUSSION PAGE

EFC's discussion page (right) is where members of the corrosion community can exchange information particularly on scientific and technical subjects



## THE EFC HUB

<https://efc.solved.fi>

The EFC Hub enables the collaboration of corrosion experts within the EFC and its Working Parties. The Hub is the perfect place to share information, media, and ideas.

In addition, finding relevant activities in all aspects of corrosion topics and getting involved in EFC through a wide variety of Working Party activities is supported by this platform. So, stay in touch and we look forward to seeing you on the LinkedIn EFC pages and the EFC Hub!

## WEBSITE

<https://efcweb.org>

Offering a broader overview of all the latest industry and EFC news.

## LEGAL NOTICE

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