



**Project No. 101046294**

**Complex chemical reaction networks for breakthrough scalable reservoir computing**

## **Deliverable 4.4**

### **Video series “60 seconds CORENET”**

WP4 – Communication, Dissemination and Exploitation

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## Abstract

This deliverable showcases the scientific knowledge-sharing activities implemented by the project partners through "60 seconds CORENET" videos and selected webinar or workshop recordings. These activities include publicly available videos of each publication generated by the project, dedicated video series to showcase the progress and the advances made in the field of chemical sciences from the PhD students and postdoctoral researchers in their diverse multidisciplinary groups, as well as educational sections from past webinars and workshops. All new journal publications so far have been presented by one of the authors, and the project's findings have been made accessible through short videos to a wide audience. These videos are shared on the CORENET YouTube channel, website, and social media platforms. In the coming months, more videos will be produced and published before the project concludes. The aim of this initiative is to disseminate the results more broadly, reach a wider audience, and provide early-career researchers in the consortium with the opportunity to gain visibility.

## Revision history

Author(s)	Description	Date
Miriam Frances, Luise Gleason (accelCH)	Draft deliverable	16/07/2025
Andres de la Escosura (UAM)	Revision 1	20/07/2025
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## Partner short names

<b>accelCH</b>	accelopment Schweiz AG
<b>CSIC</b>	Agencia Estatal Consejo Superior de Investigaciones Científicas
<b>IBM</b>	IBM Research
<b>SDU</b>	Syddansk Universitet
<b>SRU</b>	Stichting Radboud Universiteit
<b>UAM</b>	Universidad Autónoma de Madrid
<b>UBI</b>	University of Bielefeld

## Abbreviations

<b>CRNs</b>	Chemical Reaction Networks
<b>D</b>	Deliverable
<b>DMP</b>	Data Management Plan
<b>FAIR</b>	Findable, Accessible, Interoperable, and Reusable
<b>M</b>	Month
<b>WP</b>	Work Package

## Executive summary

### Background

Deliverable 4.4 (D4.4) is part of work package 4 (WP4) and describes the development and implementation of the video series "60 seconds CORENET." It showcases the scientific knowledge sharing activities implemented by CORENET partners through publicly available videos of each publication, as well as a dedicated video series about the progress and advances made in the field of chemical sciences by PhD students and postdoctoral researchers in their diverse multidisciplinary groups. It also includes purposefully selected and published webinar and workshop recordings.

### Objectives

CORENET has a clear strategy for public engagement and dissemination of the project results, described in detail in D4.2, "Dissemination and Exploitation including Communication Activities". D4.4 will describe how the consortium is committed to sharing knowledge about the research process with a wider audience and all relevant actors to diffuse the latest findings and maximise the outreach.

### Methodology and implementation

The consortium used various tools, including articles in scientific journals, news items and open presentations at workshops to enhance the project's publicity within the research community.

### Outcomes

The video series "60 seconds CORENET" is a targeted tool that benefits both the scientific community and the general public by spreading the achievements from involved researchers and making the material available on the project's media page as well as on CORENET YouTube and X channels.

### Impact

All recordings of the journal publications and findings have been produced by one of the authors and made accessible through short videos to a wide audience by sharing them on the project's social media channels as well as the official website. This initiative aimed to disseminate the results more broadly, reach a wider audience, and provide early-career researchers in the consortium with the opportunity to gain visibility. The updates of this document are foreseen to be included in D4.6, "Final communication and dissemination activities report" (M48).

### Next steps

We expect to produce and publish more videos in the upcoming months before the project concludes.

## 1 Introduction

Effective science communication requires the ability to understand and relay key components of complex scientific topics to non-experts. Science communication can take on many forms, such as teaching a class, giving a conference talk, writing a blog, discussing science on social media, making a science documentary, and recording short explainer videos. Videos are not only popular among the public but also provide an important venue for science communication as they have a flexible format, can reach an international audience, are relatively easy to disseminate, and can be made free or at a low cost.

## 2 Approach

As stated in D4.2, "Dissemination and Exploitation including Communication Activities", the "60 seconds CORENET" videos were planned as a task as part of the project's open science strategy. The consortium committed to sharing knowledge and data as early as possible in the research process with all relevant actors to diffuse the latest knowledge and maximise the impact of the project. To ensure the effective use of resources, accelCH shared some of their expertise as communications lead in EU-funded projects through a two-hour [training session on science communication](#). Customised to the participants' interests and needs, the session focused on translating complex concepts into accessible information for diverse audiences. Starting from the basics of good science communication, the interactive session also included tips on how to create appealing videos and some brushstrokes on social media, guiding the participants on how to start introducing themselves and their research to the community.

## 3 Development

Throughout the duration of the project, partners remained dedicated to creating publicly available videos of each publication generated by the project. Short (60-second) explainer videos were recorded by one of the authors, often including additional visualisations on whiteboards. Moreover, interviews with project partners were conducted by accelCH during meetings and assemblies and then prepared for dissemination across various channels, including YouTube, the official website, and social media platforms. Lastly, webinar and workshop highlights were uploaded to allow open and extended access to shared information.

## 4 Monitoring

To effectively monitor and evaluate implemented CORENET activities throughout the project's duration, including the publicly available videos presented in this report, the consortium utilises the **accelCOCKPIT Project Communications**. This customised tool, developed by accelCH, enables the tracking of performance and details related to communication and dissemination activities. It is made available to all project partners on accelCLOUD, enabling continuous updates of the tracker and a compilation of necessary inputs. By keeping the document up to date, the consortium stays informed about outreach-related activities. Additionally, accelCH, who is responsible for managing the project's digital presence, is also monitoring the performance of various channels and incorporating data from Google Analytics and social media statistics into accelCOCKPIT Project Communications. This approach streamlines the data collection process and ensures the accuracy of the results for further analysis.

## 5 Videos

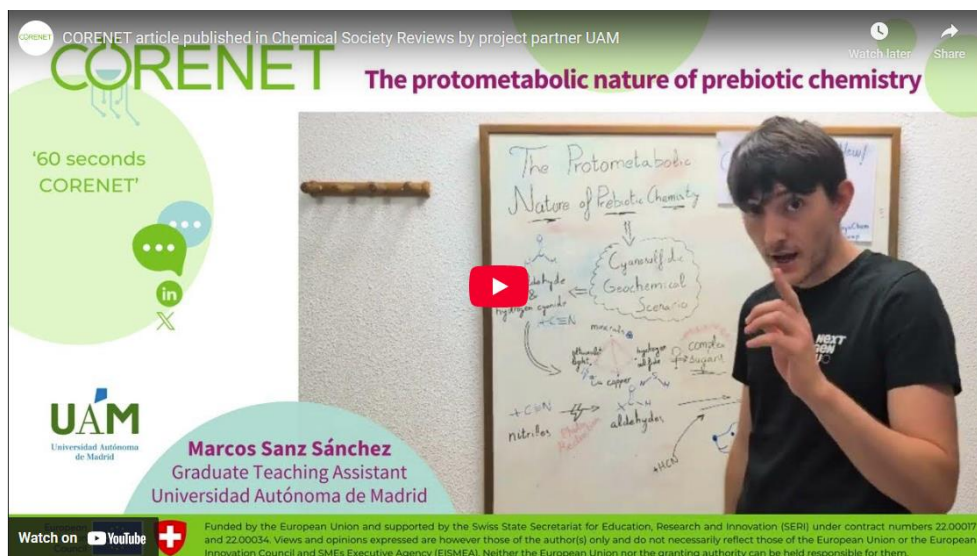
This section presents all public videos created throughout the duration of the project that were used to disseminate the highlights of journal publications, communicate the progress of partners to a wider audience and enable access to information shared during webinars and workshops.

### 5.1 Scientific Publications

As of July 2025, the CORENET project has published eight scientific publications, of which five are presented by one of the authors in short (60-second) explainer videos that illustrate the main findings and key highlights. Each video demonstrates a creative approach to the task and often includes further visualisations for easier understanding that make it even more attractive to different audiences.

#### 5.1.1 The protometabolic nature of prebiotic chemistry

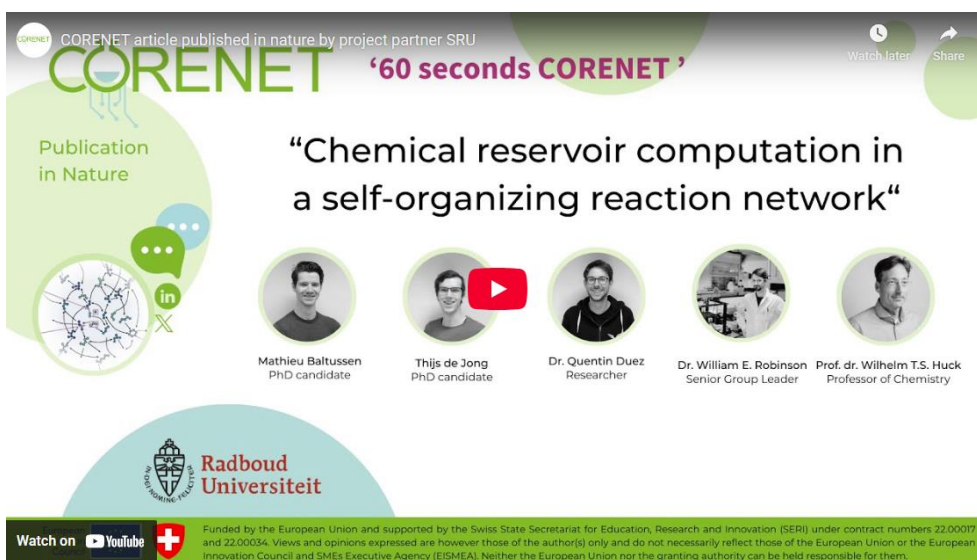
This [review article](#) was published on 19 October 2023 in [Chemical Society Reviews](#) by Noemí Nogal, Marcos Sanz-Sánchez, Sonia Vela-Gallego, Kepa Ruiz-Mirazo and Andrés de la Escosura. It argues that prebiotic chemistry likely functioned as a protometabolic system, where interconnected synthetic pathways and dissipative autocatalytic cycles under fluctuating environments could have driven the formation of self-sustaining networks foundational to early life. Co-author Marcos Sanz Sánchez, a graduate teaching assistant from the Universidad Autónoma de Madrid (UAM), recorded a [video](#) of himself explaining how photochemical reduction reactions—particularly those involving nitrate as an electron source—could have driven the formation of key prebiotic compounds such as aldehydes, hydrogen cyanide (HCN), and formaldehyde (Figure 1).



**Figure 1:** Video of co-author Marcos Sanz Sánchez explaining highlights of the scientific article “The protometabolic nature of prebiotic chemistry” published in Chemical Society Reviews.

### 5.1.2 Chemical reservoir computation in a self-organizing reaction network

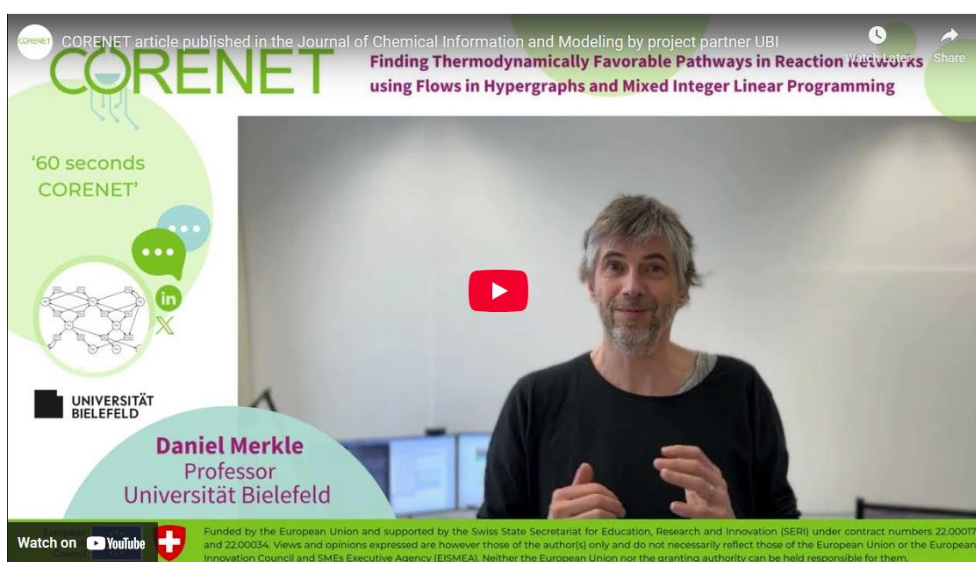
This [article](#) was published on 26 June 2024 in [nature](#) by Mathieu G. Baltussen, Thijs J. de Jong, Quentin Duez, William E. Robinson and Wilhelm T. S. Huck. It discusses how formose reaction, a self-organizing network that turns formaldehyde into sugars, is used as a chemical “reservoir computer.” In a continuous stirred tank reactor, the Huck Research Group from the Stichting Radboud Universiteit (SRU) fed controlled inputs (formaldehyde, dihydroxyacetone, NaOH, CaCl<sub>2</sub>), then monitored hundreds of chemical species in real-time using ion-mobility mass spectrometry. The created [video](#) highlights important aspects and broader impacts of the study (Figure 2).



**Figure 2:** Animated video listing important aspects and broader impacts of the scientific article “Chemical reservoir computation in a self-organizing reaction network” published in nature.

### 5.1.3 Finding thermodynamically favourable pathways in reaction networks using flows in hypergraphs and mixed integer linear programming

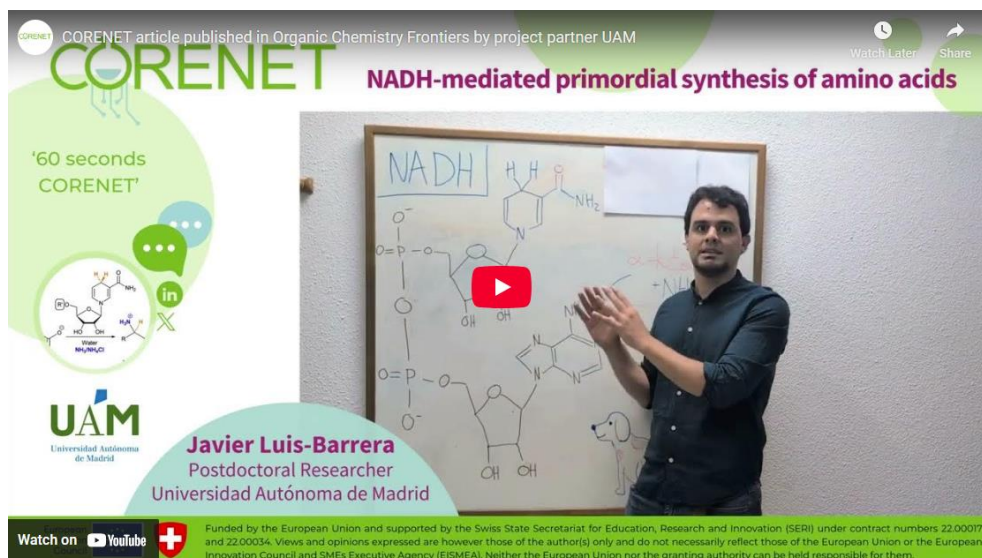
This [article](#) was published in the [Journal of Chemical Information and Modeling](#) in 2025 by Aditty Pal, Rolf Fagerberg, Jakob Lykke Andersen, Christoph Flamm, Peter Dittrich and Daniel Merkle. It introduces a mixed-integer linear programming framework that incorporates thermodynamic constraints into hypergraph-based searches for reaction pathways. Co-author Prof. Daniel Merkle from the Universität of Bielefeld (UBI) recorded a [video](#) discussing how the method identifies both known and novel pathways that are thermodynamically favourable and chemically plausible (Figure 3).



**Figure 3:** Video of co-author Daniel Merkle explaining highlights of the scientific article “Finding Thermodynamically Favorable Pathways in Reaction Networks using Flows in Hypergraphs and Mixed Integer Linear Programming” published in the Journal of Chemical Information and Modeling.

### 5.1.4 NADH-mediated primordial synthesis of amino acids

This [article](#) was published on 14 February 2024 in [Organic Chemistry Frontiers](#) by Noemí Nogal, Javier Luis-Barrera, Sonia Vela-Gallego, Fernando Aguilar-Galindo and Andrés de la Escosura. It discusses the enzyme-free reductive amination by Nicotinamide Adenine Dinucleotide (NADH) under prebiotic conditions, giving a plausible route to early amino acid synthesis. Co-author Dr. Javier Luis-Barrera, postdoctoral researcher from UAM, explained in a [video](#) how NADH, in the absence of enzymes and under mild prebiotic conditions, can facilitate the reductive amination of  $\alpha$ -ketoacids to produce amino acids (Figure 4).

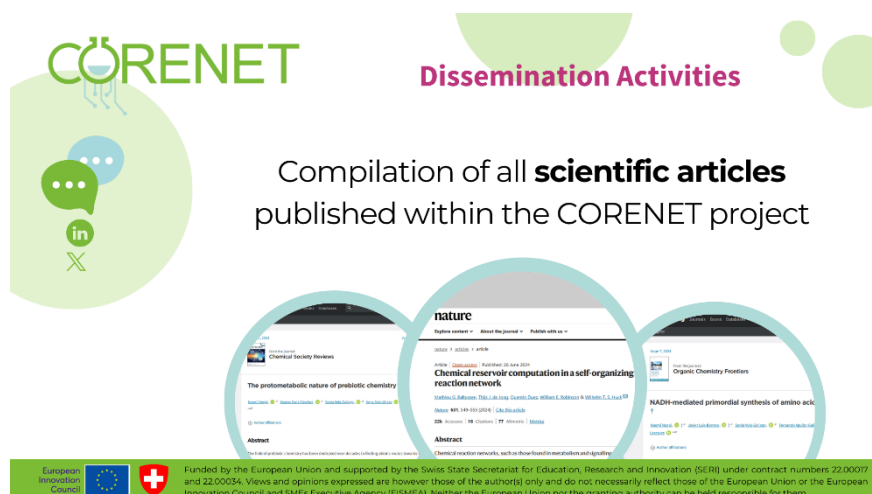


**Figure 4:** Video of co-author Javier Luis-Barrera explaining highlights of the scientific article "NADH-mediated primordial synthesis of amino acids" published in Organic Chemistry Frontiers.

### 5.1.5 Complex chemical reaction networks for future information processing

This article was published on 13 March 2024 in [Frontiers of Neuroscience](#) by Katja-Sophia Csizi and Emanuel Lörtscher. It proposes that highly interconnected chemical reaction networks (CRNs), which exploit nonlinear dynamics and self-organisation, could serve as sustainable, brain-inspired, energy-efficient information-processing systems, thereby potentially complementing or replacing CMOS-based computing, though practical implementations and real-world applications remain to be demonstrated. Co-author Dr. Katja-Sophia Csizi, postdoctoral researcher from IBM Research, is currently preparing a video that will be shared in a news piece with the main takeaways.

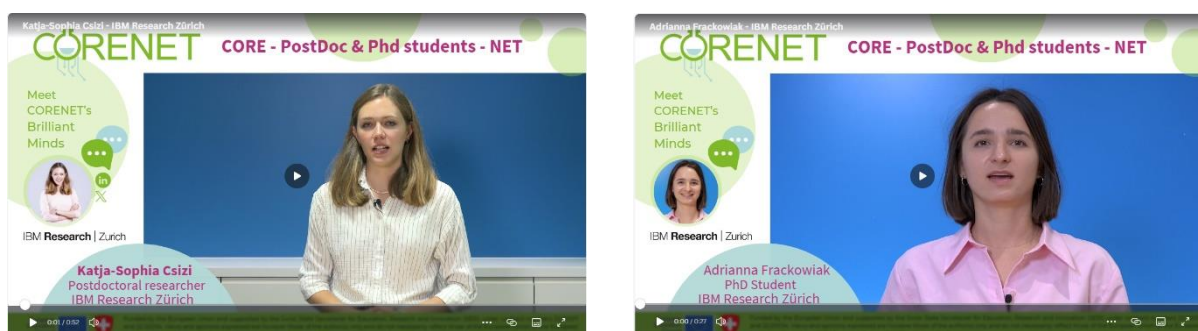
Additionally, a video highlighting all the scientific articles generated by project partners to date is showcased in an interactive infographic that compiles the coverage of the publications (Figure 5):



**Figure 5:** CORENET Publications coverage.

## 5.2 Partner Interviews

Since the start of the project, eleven partner videos highlighting the objectives, roles and progress of PIs, PhD students and postdoctoral researchers in their diverse disciplines within the CORENET project were created and shared on YouTube, the official website and on social media channels to reach key stakeholder groups. This series of short videos is assembled through partner interviews recorded during in-person meetings and assemblies. Newest videos introduce [Dr. Alberto Valdés](#) (published in [news item](#) on website) from the Spanish National Research Council (CSIC), [Dr. Mehmet Aziz Yirik](#) (published in [news item](#) on website) from the Syddansk Universitet (SDU), [Dr. David González Martínez](#) (published in [news item](#) on website) from UAM as well as [Dr. Katja-Sophia Csizi](#) (published in [news item](#) on website) and [Dr. Adrianna Frackowiak](#) (published in [news item](#) on website), both from IBM Research (Figure 6). This set of interviews aims to gain insights into the key objectives and research initiatives of the project, as well as to raise awareness about the important work and successful advancements of the involved researchers.



**Figure 6:** Videos with partner interviews of Dr. Katja-Sophia Csizi and Dr. Adrianna Frackowiak from IBM Research.

A mix of interviews from multiple consortium members with various backgrounds and responsibilities makes this dedicated video series not only comprehensive but also attractive to diverse audiences, especially to the scientific community, students of different ages, industry, and the general public. While these videos are generally shorter than the (60 seconds) explainer videos of scientific publications, their successful implementation is reflected in the high number of YouTube views that have reached close to 200 for some partners.

Going forward, the CORENET communication team will continue using established communication approaches and implementing planned activities to further strengthen the project's reach and engagement across its social media channels to push the overall reach of the CORENET social media channels.

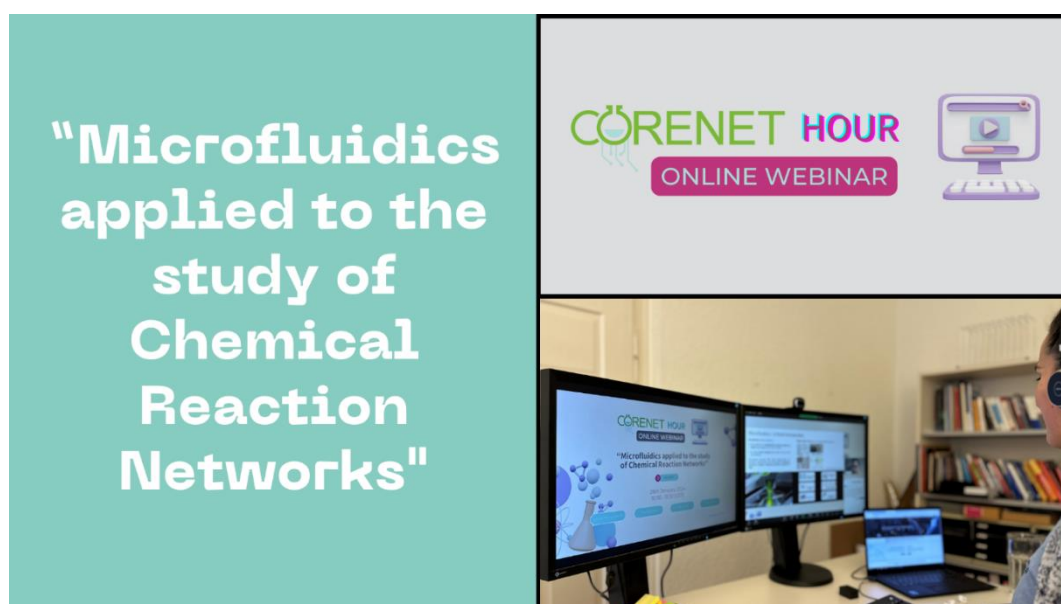
## 5.3 Webinars and Workshops

Online webinars and workshops held by CORENET project partners aim to engage the audience and give an in-depth overview of the project activities and their results. The format of the webinars was defined as Q&A, where at least one presentation is given by a consortium member about the project's latest results and another one by an external invited speaker highlighting a related topic. Two webinars and one workshop were recorded so far and shared via YouTube, the website, and on social media channels to maximise the visibility of the outreach activity and to make it as accessible as possible.

### 5.3.1 Webinar #1: Microfluidics applied to the Study of Chemical Reaction Networks

The [first 'CORENET Hour' webinar](#) was held online on 26 January 2024, and attracted 40 researchers and experts in systems chemistry as well as computational science (Figure 7). It was guided by the project coordinator Prof. Andres de la Escosura from UAM and zoomed in on the topic of microfluidics applied to the study of CRNs through three talks by experts in the field:

1. Prof. Wilhelm Huck from SRU and the Huck Research Group provided insights on '[Reservoir computing using chemical reaction networks](#)'.
2. Dr. Emanuel Lörtscher from IBM Research talked about CMOS compatible microfluidics with relevance to automated laboratories.
3. Guest speaker Prof. Klas Hjort from Uppsala University showcased his team's work on '[High pressure microfluidics in chemistry](#)' and how it can be combined with CMOS technology.



**Figure 7:** The first 'CORENET Hour' webinar titled 'Microfluidics applied to the study of Chemical Reaction Networks' was held on 26 January 2024.

The subsequent Q&A session fostered the knowledge exchange between the audience and the speakers with questions addressing current chances of microfluidics such as:

- How can chemical analysis of complex mixtures be integrated with flow chemistry?
- What inline analytical tools can probe CRNs inside flow reactors?
- What about the logistics of using CNRs to do classification?
- How much complexity is needed for successful mapping of the chemical reservoir computer to a natural CRN?
- What can flow chemistry do better than badge or CSTRs?
- How is it applicable to CRNs and beyond?

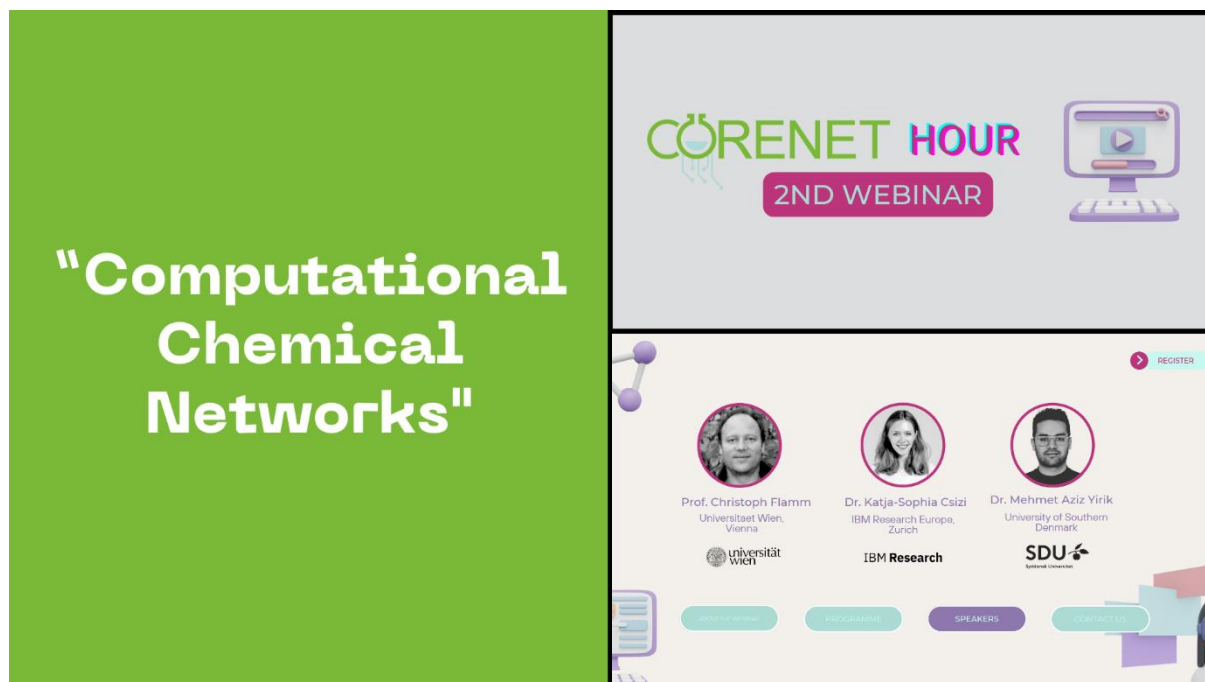
Overall, the first webinar reached a variety of target audiences, shared new knowledge to researchers and resulted in an important impact and outreach among the key stakeholders and potential collaborators, thus creating a positive outlook for the project's progress.

### 5.3.2 Webinar #2: Computational Chemical Networks

The [second 'CORENET Hour' webinar](#) was held online on 28 November 2024 and gathered over 30 researchers and experts in systems chemistry and computational science (Figure 8). It opened with a project overview by project coordinator Prof. Andres de la Escosura from UAM and then featured three expert-led talks highlighting cutting-edge developments in the field:

1. Guest speaker Prof. Christoph Flamm from the University of Vienna delivered an insightful presentation on computational chemical networks with an emphasis on the value of rule-based approaches for modelling reactive chemical systems in deterministic and stochastic contexts.
2. Dr. Katja-Sophia Csizi from IBM Research presented 'First-principles exploration of chemical reaction networks', shared how quantum chemical methods illuminate CRN complexity and introduced *Scine Chemoton*, a tool for rapidly building extensive CRNs.
3. Dr. Mehmet Aziz Yirik from SDU discussed 'In-silico chemical reservoir computing' and detailed advancements in algorithmic cheminformatics, focusing on optimizing modelling frameworks and reservoir computing techniques.

An engaging Q&A session after the professional talks allowed participants again to address challenging questions, calling for and utilising the depth of expertise within the CORENET community.



**Figure 8:** The second 'CORENET Hour' webinar titled 'Computational Chemical Networks' was held on 28 November 2024.

### 5.3.3 Workshop on FAIR Principles

On 19 March 2025, CORENET's young researchers gathered online for an [insightful and interactive workshop](#) focused on the FAIR (Findable, Accessible, Interoperable, and Reusable) principles, a crucial framework for ensuring high-quality data management (Figure 9). Dr. Mehmet Aziz Yirik from SDU led the session with a compelling presentation on FAIR data principles, emphasizing their importance in chemical datasets. He provided real-world examples of how these principles enhance data storage, accessibility, and usability for both scientists and industry professionals. But the session didn't just stop at theory—following the presentation, all participating researchers engaged in an open discussion where each one had the opportunity to present datasets with their current formats, similarities, and differences. Such an interactive exchange sparked a collaborative effort to develop a unified and FAIR-compliant data structure tailored for CORENET's Data Management Plan (DMP).

This workshop marked the first step in an ongoing initiative. The next phase will focus on applying the FAIR principles directly to datasets, refining the DMP, and ensuring that the research data is not only well-structured but also future-proof.

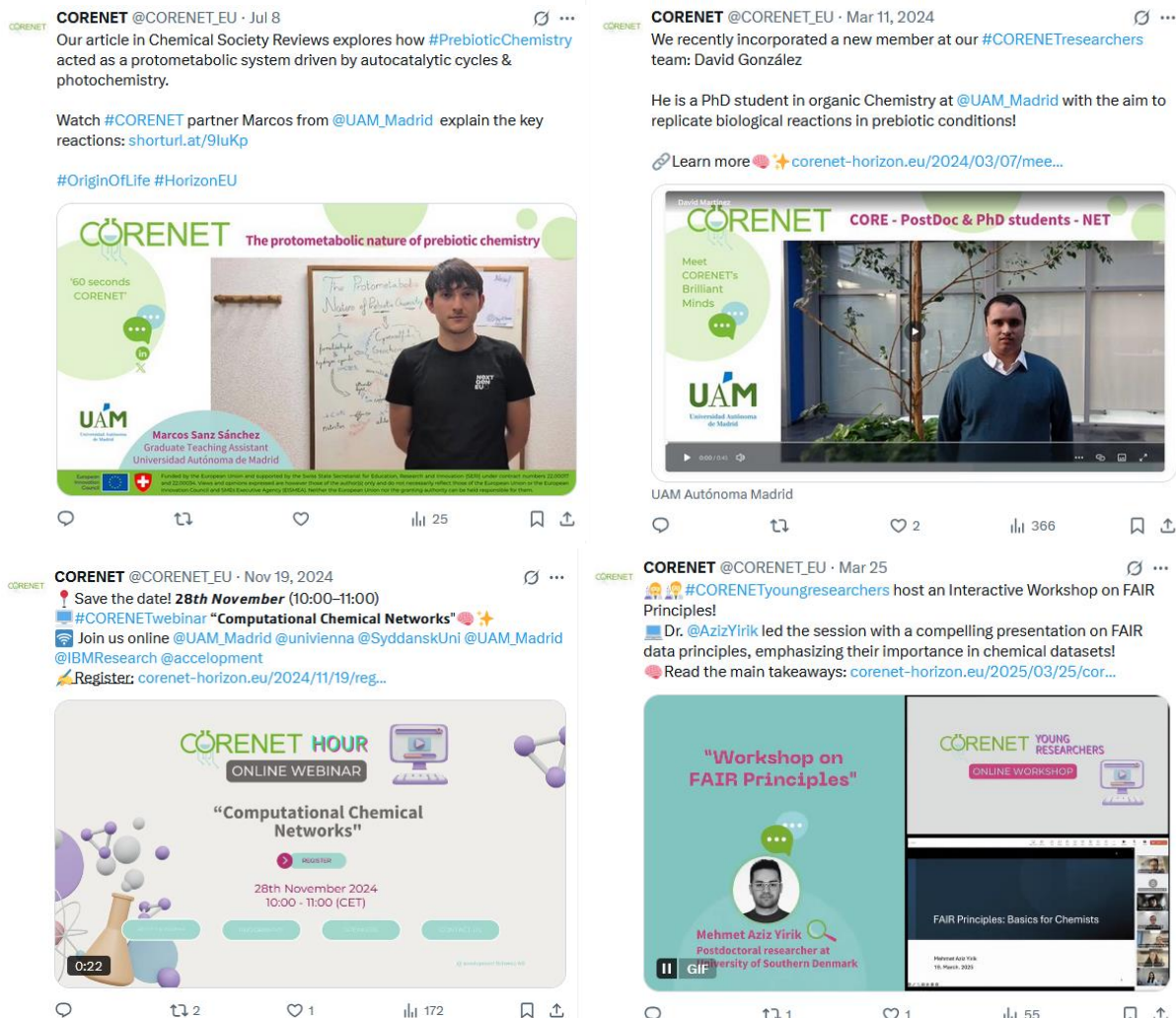


**Figure 9:** On 19 March 2025, CORENET’s young researchers gathered online for an insightful and interactive workshop focused on the FAIR (Findable, Accessible, Interoperable, and Reusable) principles.

## 5.4 Social Media Activity

All short and explainer videos about publications generated by the project, partner interviews and webinar/workshop recordings have not only been uploaded on the project’s YouTube channel but also been shared on [X](#), CORENET’s social media channel of choice (Figure 10). The X account was set up at the beginning of the project and is managed and continuously updated by accelCH with input from all partners. It is used to share information about recent updates and news, as well as to establish meaningful connections with target audiences. It is especially useful for reaching out to the general public, policymakers, the scientific community, civil society, media representatives and young researchers. Via this social media channel, we aimed to create a “CORENET community” to communicate the achieved results in the project.

The social media strategy focused on creating high-quality content provided by all partners. To increase the outreach and visibility of the specific knowledge sharing activity, each post tagged project partners and included project-specific hashtags, for example #CORENETresearchers, #CORENETpartners, #ResearchProgress, and so on. Since many visitors have arrived at the CORENET website from social media, the project’s communication team has successfully used the X channel to raise awareness of the project through tailored posts, strengthening the project's reach and public engagement.



**Figure 10:** Social media posts highlighting publication videos (top left), partner interviews (top right), webinars (bottom left) and workshops (bottom right).

## 6 Future work

We expect to produce and publish more videos in the upcoming months for publications generated by the project partners. The approach will follow the same process, which includes the creation of a video, the announcement in a [news item](#) on the project website, as well as a listing on the [Results page](#), the upload to YouTube and a post on social media.

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