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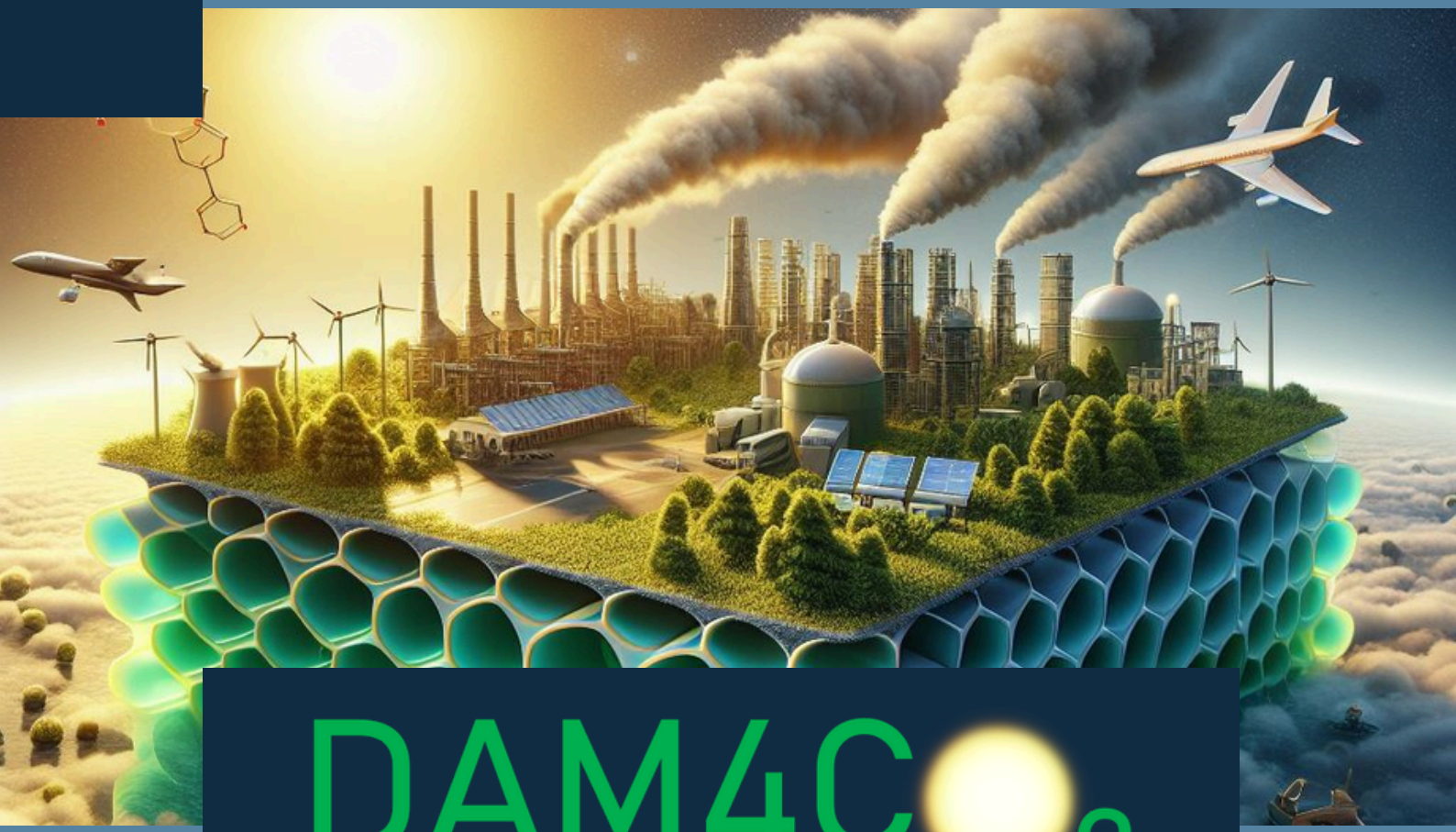
NEWSLETTER



DAM4CO2

Double-**A**ctive **M**embranes **for** a sustainable CO_2 cycle

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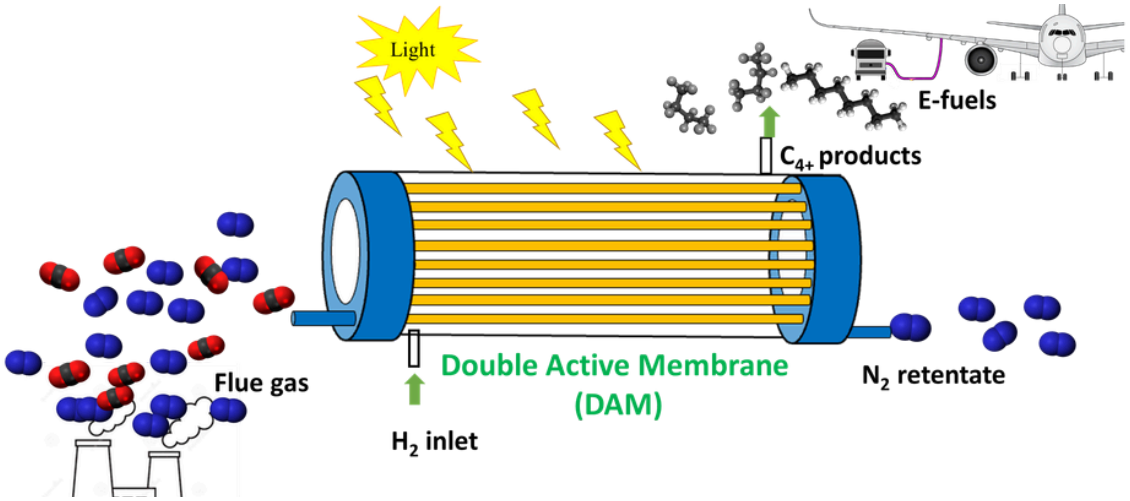
ABOUT DAM4CO2

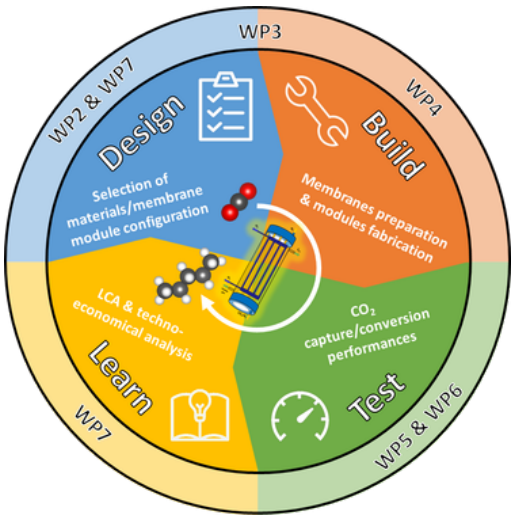


The project "Double-Active Membranes for a sustainable CO_2 cycle" ($DAM4CO_2$) aims to investigate possible ways to convert the carbon dioxide emitted by industries into renewable fuels. It is one of the eight projects, among hundred proposals submitted, funded by the European Innovation Council in the framework of the call "EIC Pathfinder Challenge: Carbon dioxide and Nitrogen management and valorisation" and it is coordinated by the Institute on Membrane Technology of the National Research Council.

The aim of $DAM4CO_2$ is to develop a novel membrane technology, for the simultaneous CO_2 separation and its photocatalytic conversion to C_{4+} molecules, as renewable fuels. The project will deliver a prototype, designed using the design-build-test-learn approach, for a proof-of-concept validation that will be tested in lab-conditions. Close attention is paid to the use of non-critical raw materials at any stage of the process, and the carbon-neutrality in order to reverse the increase of greenhouse gases emissions to mitigate the serious consequences on the global climate and to achieve the goals of the European Green Deal.

Watch the video to have a full overview of the project and follow our YouTube channel.

See on YouTube



Graphical representation of the design-build-test-learn approach that will be used in $DAM4CO_2$

5th PROJECT MEETING

The 24-month Meeting Agenda for the DAM4CO$_2$ project, held on November 11th–12th, 2025, at the Universitat Politècnica de València (UPV) and online , provided a comprehensive review of all project work packages. After the initial welcome by the UPV hosts , the meeting featured intensive technical sessions on WP7 (M. Buaki-Sogó), WP2 and WP3 (M. Carta and V. Crocellà), and WP4, WP5, and WP6 (J.C. Jansen, M.C. Ferrari, and H. Garcia Baldovì). The program also included updates on WP8 and WP9, two General Assembly sessions led by A. Fuoco, and a final afternoon dedicated to the Review Meeting preparation. Each day concluded with social dinners at La Mozaira and Restaurante Zacarías, facilitating further networking among the partners.

6th PROJECT MEETING

The 30-month Meeting of the DAM4CO$_2$ project was held on April 21st–22nd, 2026, in Krakow and online. Hosted by Me-Sep, the sessions covered technical updates for WP7 (M. Buaki-Sogó), WP2 and WP3 (M. Carta, N. McKeown, V. Crocellà), and WP4, WP5, and WP6 (J.C. Jansen, M.C. Ferrari, H. Garcia Baldovì). The second day continued with a joint presentation prepared by A. Fuoco and E. Esposito (CNR), thatupdated the consortium on WP1, WP8, and WP9. The event concluded with informal discussions and networking at Café Oranzeria.

Annual Portfolio Meeting

EIC - CO_2 and Nitrogen Portfolio

Representatives of the EIC CO_2 and Nitrogen Portfolio took part in the European Innovation Council event "Scaling renewable fuels and chemicals for a resilient European industry – from scientific creativity to innovation", held on March 26–27, 2026, at the European Commission's Champ de Mars building in Brussels. Organized by the European Innovation Council and co-organized with eChemicles, the two-day gathering brought together researchers, startups, industry representatives, investors, and policymakers to discuss the scaling of renewable technologies. Within this framework, A. Fuoco and Luigi Vaccaro from the DAM4CO_2 project participated actively in the discussions, contributing their expertise to the dialogue on creating new markets and resilient industrial solutions.

EVENTS DAM4CO2

DAM4CO$_2$ will be featured in a special section within MELPRO 2026 (May 17–20, 2026, Prague), where Alessio Fuoco, Elisa Esposito, and Elena Tocci will actively lead discussions and workshops. The initiative stems from the strong scientific synergy between the MELPRO community and the project's core themes, specifically the development of double-active membranes for the separation and photocatalytic conversion of CO2 into renewable fuels

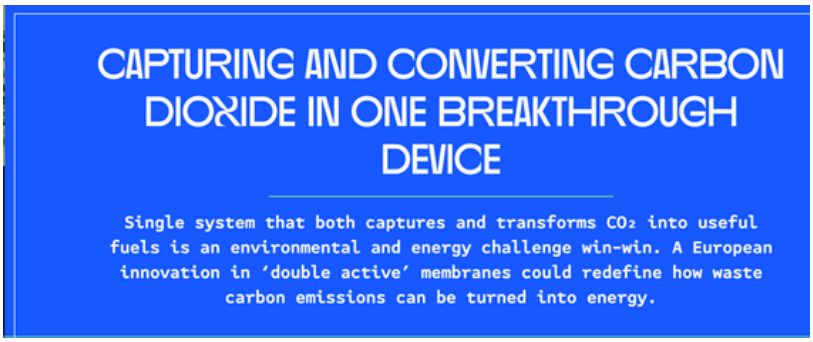
The proposed program for this session will include keynotes and oral presentations on topics of particular interest for the consortium, structured into two parts with a coffee break in between to foster networking and technical exchange. The detailed program will be available soon. To register for the conference, please use the link below.

registration
Click here

COMMUNICATION ACTIVITIES

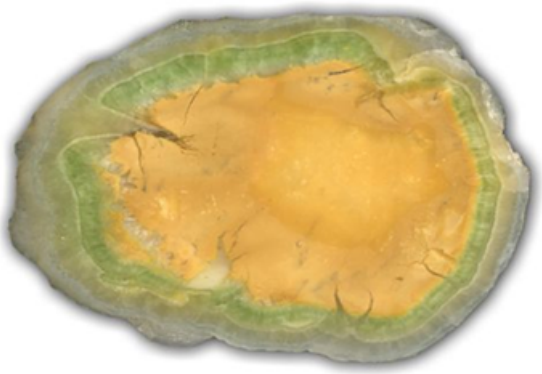
January 2026, the DAM4CO2 concept and key project results were presented at Future Tech Week 2026, the annual event organized by DeepSync that brings together researchers, innovators, and technology developers working on breakthrough solutions.

Alessio Fuoco participated virtually in this initiative, which provided an excellent platform to showcase our approach and exchange ideas within a dynamic community focused on future-oriented technologies and impactful innovation.



Our coordinator, Alessio Fuoco, was recently interviewed by DeepSync, where he shared insights into his role as an EIC Coordinator and the vision behind our project. In the interview, Alessio discusses the challenges and opportunities of coordinating a European innovation initiative, as well as the groundbreaking approach of our technology, which integrates carbon dioxide capture and conversion into a single device.

Interested in learning more? Read the full interview on DeepSync's website



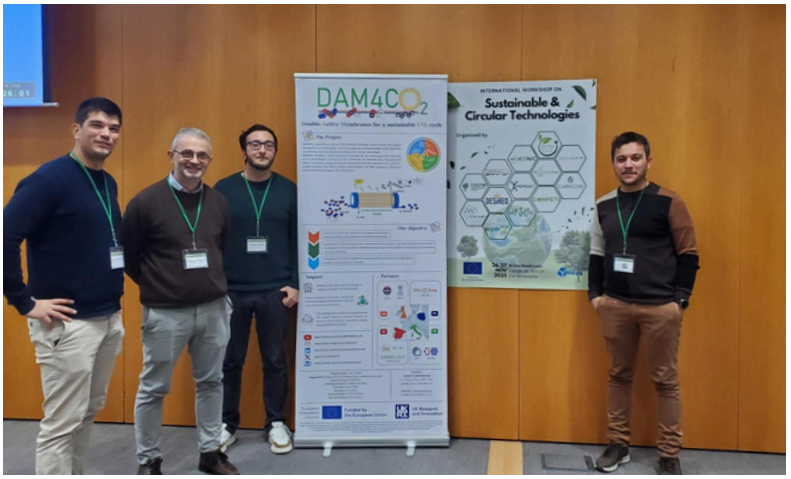
On January 30, Alessio Fuoco took part in the workshop "CCS & Carbon Mineral Storage", where he presented our technology for carbon management and valorisation. The event provided a valuable opportunity to engage with key industry stakeholders, including CARBFIX, ENI, SNAM, Saipem, Heidelberg Materials, and HERA, fostering meaningful dialogue on innovative solutions for carbon capture and storage.

COMMUNICATION ACTIVITIES

Lucia Calucci and Alessio Fuoco gave invited talks the GIDRM Day on Porous materials for gas separation and ion exchange membranes: insights from NMR. This event, organised by Elisa Carignani, was held in Pisa, Italy, on November 17, 2025. A big group of DAM4CO2 researches participated to this event. In the picture: Andrea Scarperi, Lucia Calucci, Elisa Carignani, Francesca Nerli, Siria Bertolozzi, Marco Taddei, Alessio Fuoco.

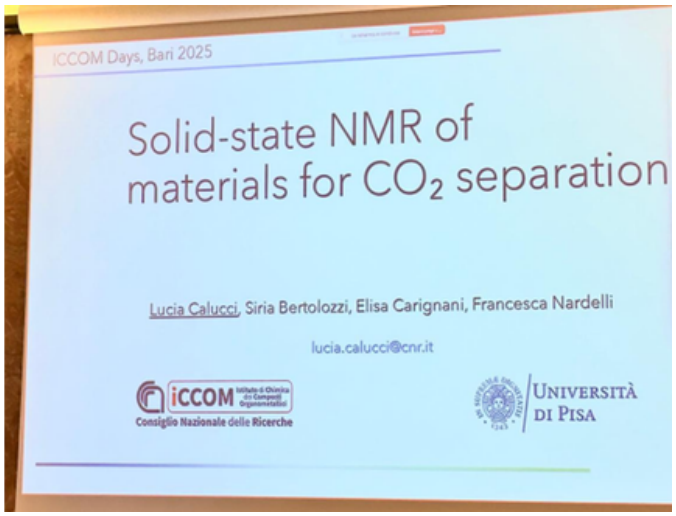
COMMUNICATION ACTIVITIES

Strong participation by DAM4CO2 at the workshop LumiMOF in Sesto Fiorentino (Florence, Italy) on January 22, 2026. Talks by Virginia Guidotto, Francesca Nerli and Ferdinando Costantino. All the participants in the group picture: Ferdinando Costantino, Giulio Bresciani, Francesca Nerli, Valentina Crocellà, Francesco Della Croce, Elisa Carignani, Andrea Scarperi, Siria Bertolozzi, Virginia Guidotto.

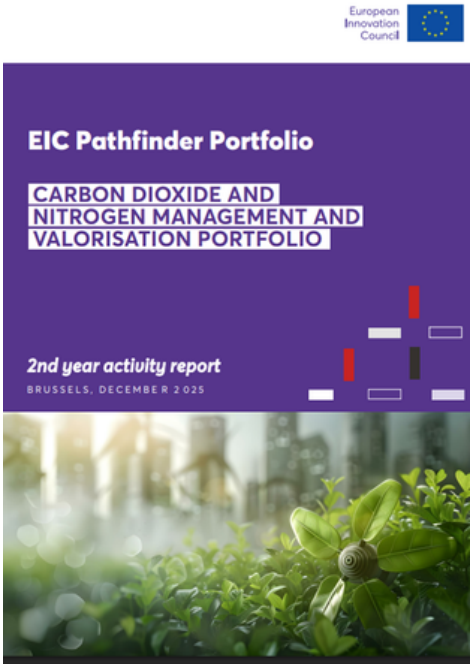


November 2025: Alessio Fuoco, Ferdinando Costantino, Hermenegildo Baldovì and Vincenzo Vigna represented r the DAM4CO2 consortium at the International workshop on Sustainable and Circular Technologies, Eindhoven 26-27 November 2025 with oral contributions and pannel discussion. It was a great moment to discuss and exchange ideas with portfolio partners and other project funded in calls of interest

Lucia Calucci gave a talk entitled “Solid state NMR of materials for CO2separation" at the ICCOM Days Workshop in Bari (October 9–10, 2025)

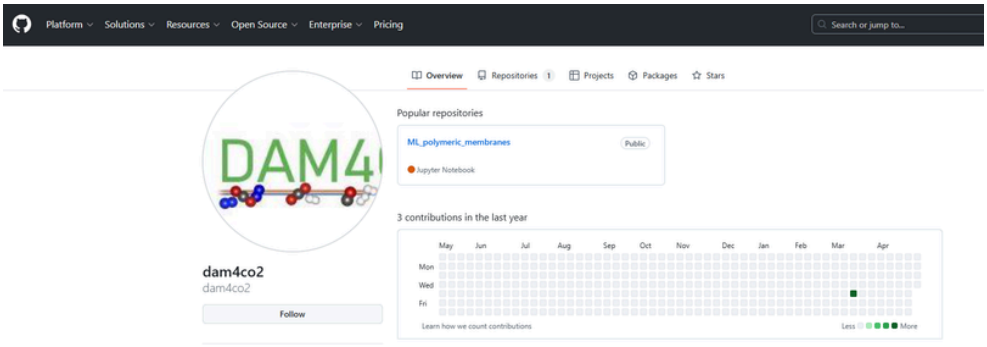


COMMUNICATION ACTIVITIES



The Strategic Plan for the European Innovation Council (EIC) Pathfinder Portfolio on Carbon Dioxide and Nitrogen Management and Valorisation (C/N portfolio) outlines the approach to addressing critical environmental challenges through innovation and collaboration for all portfolio partners. Participants from all 8 portfolio projects contributed to this joint document entitled: EIC PATHFINDER PORTFOLIO CARBON DIOXIDE AND NITROGEN MANAGEMENT AND VALORISATION PORTFOLIO Strategic Plan. Throughout 2024-2025, the C/N portfolio strategically promoted a network of synergies and collaborations , moving beyond individual project goals to address the complex challenge of CO2 and nitrogen valorisation through a unified approach.

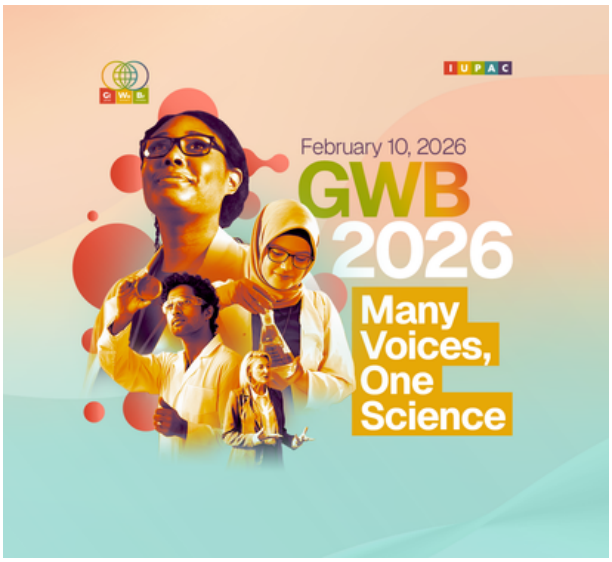
We have launched an official GitHub profile to host the various machine learning codes developed during the project, as well as other upcoming software resources



Click here to find out more

DAM4CO$_2$ Celebrates Diversity: The 2026 Global Women's Breakfast

On February 10th, 2026, the DAM4CO$_2$ project proudly joined the Global Women's Breakfast (#GWB2026), an international initiative dedicated to dismantling gender barriers and promoting diversity and inclusion in the scientific community. The project organized three local events held simultaneously across Italy, bringing together researchers, students, and professionals in Turin, Pisa, and Rende.



A Synchronized Scientific Celebration

The event opened with an inspiring keynote lecture by Professor Silvia Bordiga, which was streamed live to all participating units: *"The wonder of chemistry: organizing empty spaces in microporous materials such as zeolites and MOFs."*

Local Highlights and Speakers

Following the keynote, the program continued at each site with dedicated workshops and presentations led by the project teams:

- **Rende** (CNR-ITM): Serving as a key hub for the initiative in Southern Italy, the local session featured a presentation by Elisa Esposito, who led the discussion on gender equality challenges within European research projects.
- **Pisa** (INSTM-UniPI & CNR-ICCOM): Scientific and outreach contributions were presented jointly by Elisa Carignani, Lucia Calucci, and Marco Taddei, Siria Bertolozzi, Lucia Calucci, Elisa Carignani, Marco Lessi, Francesca Nerli, Andrea Scarperi, Marco Taddei who shared their expertise and professional experiences with the audience.
- **Turin** (INSTM-UniTO): The event was organized by Virginia Guiotto, Margherita Cavallo, Federico Panagini, Matteo Signorile, Valentina Crocellà, and Silvia Bordiga, with featured talks by Virginia Guiotto and Margherita Cavallo

EVENTS

Alessio Fuoco and Elisa Esposito actively participated in science outreach initiatives aimed at engaging younger audiences. In collaboration with the SuperScienceMe project, they visited several high schools, bringing science and innovation directly into classrooms. Notably, within the framework of these activities, Elisa Esposito supported the IV classes of the Liceo Scientifico of Roggiano Gravina, who earned third place at the National Case Conference 2026 for their exceptional work on the P.A.C.M.A.N. project.

In addition, Alessio Fuoco took part in ChimichiAmo, the SCI (Italian Chemical Society) Calabria outreach day, dedicated to promoting chemistry and scientific curiosity among students and the wider public.

Scientific visit

Chiara Ferrari spent 1.5 months visiting Prof Colin Scholes at the University of Melbourne from November 2025

In April 2026, Siria Bertolozzi and Andrea Scarperi will visit the European infrastructure PANACEA, particularly the NMR lab in Nijmegen. In their scientific visit they will take advantage of high field instrumentation to carry out advanced experiments on MOFs developed within DAM4CO2.

New Partnership: ISQCH Joins the DAM4CO$_2$ Consortium

We are pleased to announce a significant evolution in our consortium. Following the transition of Mariolino Carta from Swansea University to the Instituto de Síntesis Química y Catálisis Homogénea (ISQCH), the institute has officially joined DAM4CO$_2$ as an associate partner.

The ISQCH is a joint research institute of the Consejo Superior de Investigaciones Científicas (CSIC) and the University of Zaragoza in Spain. It is internationally recognised for its expertise in synthetic chemistry and catalysis, with strong capabilities in molecular design, advanced characterisation techniques, and reaction development. ISQCH brings significant experience in interdisciplinary research and participation in European projects, making it a well-suited partner to strengthen the scientific and technical scope of the proposal.

EVENTS PAST& FUTURE

- April 2026: 5th meeting of the DAM4CO2 project, Krakow – Poland.
- October 2025: Margherita Cavallo attended the 'INSTM Young Researchers' Forum', organised by the INSTM Consortium in collaboration with the Italian Chemical Society's (SCI) Youth Group. presenting an oral contribution entitled: “Exploring photocatalytic and electrocatalytic CO_2 conversion via IR characterization”
- January 2026: Virginia Guiotto and Valentina Crocellà attended the LUMIMOF workshop that took place in Sesto Fiorentino (FI), Italy. Virginia Guiotto presented an oral contribution entitled: “Effect of Counterions on the Properties of Zn-based UTSA-16 Metal-Organic Frameworks”
- November 2025: Ferdinando Costantino represented INSTM unit under the DAM4CO2 consortium in the International workshop on Sustainable and Circular Technologies, Eindhoven 26-27 November 2025 with an oral contribution entitled: “Aluminum and zirconium fumarate analogue MOFs based on C4 linkers with different functionalities. Structural insights and CO absorption properties”
- December 2025: Silvia Bordiga attended the International Symposium on Metal–Organic Frameworks – A Celebration of MOFs and the Nobel Prize in Chemistry 2025, Stockholm (Sweden) presenting an oral contribution entitled “Combining spectroscopies and molecular modelling to disclose complexity in Zeolite and in MOFs”.
- In January 2026 Silvia Bordiga and Matteo Signorile delivered an outreach talk at “Accademia delle Scienze di Torino” entitled “Development of Metal Organic Frameworks”.
- In March 2026, Silvia Bordiga participated in the science communication event “STEM-ERC Women Stories,” held at the University of Turin, presenting a talk entitled “Taking the challenge of handling and upgrading gases for the energy transition”.
- In March 2026, Silvia Bordiga participated to an online meeting organized by SHELL with the talk “CO_2 capture, New fuels and Quantum chemistry at the Chemistry Department of Turin University”.
- Chiara Ferrari attended IMSTEC 2025 12th International Membrane Science & Technology Conference (In the previous newsletter we said I was attending).

FUTURE EVENTS

Conferences:

- June 2026: Torino will host the XXIV National Catalysis Congress GIC 2026 Torino Catalysis Across Disciplines (Valentina Crocellà is part of the local organizing committee). Margherita Cavallo will attend the congress and present a contribution entitled "Photo-thermal CO_2 Reduction over Cu–Fe Oxide: an Infrared Study of Powder and Membrane Systems". Federico Panagini will attend the congress and present an oral contribution entitled "FeZnCuK Mixed-Metal Oxide Catalysts for Mild CO_2-to-Hydrocarbons Conversion in Double-Active Membranes".
- June 2026: Matteo Signorile and Marco Taddei will attend the 15th INSTM Conference on Materials Science and Technology that will take place in Genova (Italy). Matteo Signorile will participate with an oral contribution entitled: "CO2 conversion to light hydrocarbons on membrane-embedded catalysts". Marco Taddei will present a short talk entitled "A mild water-based route to synthesise UiO-66 from terephthalate esters"
- July 2026: Silvia Bordiga, Virginia Guiotto and Valentina Crocellà will attend the 10th Conference of the Federation of European Zeolite Associations (FEZA 2026) that will take place in Napoli (Italy). Silvia Bordiga will participate as a plenary speaker with a talk entitled "Zeolites and MOFs for Energy Transition and Air Remediation". Valentina Crocellà will participate with an oral contribution entitled "Shaping microporous materials for real-world applications: how 3D printing governs CO2 adsorption in zeolites and MOFs". Virginia Guiotto will present a poster entitled: "From Zeolites to MOFs: Counterion-Driven Adsorption in the Metal-Organic Frameworks UTSA-16"
- July 2026: Marco Taddei will attend the ICCC2026 Conference in Odense(Denmark)presenting a talk entitled "Squarate-Based Isoreticular Analogue Of CALF-20: The MOF That Should Not Be".
- July 2026: Marco Taddei will attend the ECC10 Conference in Antwerp, Belgium presenting a poster entitled "A water-based synthetic route to the metal-organic framework UiO-66 starting from PET derived terephthalate esters".
- Andrea Scarperi will participate to EUROMAR 2026 in Gothenburg, Sweden, (28 June - 02 July 2026) and to the 51st Congress of the Physical Chemistry Division of the Società Chimica Italiana in Bari, Italy, (7-10 July 2026).
- Chiara Ferrari will participate to the ICOM2026, WCCUS, SustainMemPro Conference 2026
- Elisa Carignani and Andrea Scarperi will participate to the 53rd National Conference on Magnetic Resonance in Caserta (Italy) on 9-11 September 2026.

PEOPLE HIRED ON THE PROJECT

Federica Valentini obtained her PhD degree in Chemical Sciences at the University of Perugia in 2020 under the supervision of Prof. L. Vaccaro. Since 2023, she has been employed as research associate at the Green SOC group focusing her research on the design and development of novel heterogeneous catalytic systems for sustainable processes. Starting from March 2026, she joined the European project "Double Active Membranes for a sustainable CO2 cycle" (DAM4CO2) as a Junior Researcher, under the supervision of Professor Luigi Vaccaro.

Francesca Nerli hold a PhD in Chemistry and Materials Science from the University of Pisa (2022–2025), with a thesis entitled "Molecular engineering of Metal-Organic Frameworks for biogas upgrading: from fundamentals to function". She is currently a Postdoctoral Fellow within the Horizon Europe DAM4CO$_2$ project, following prior postgraduate research in solid-state NMR applied to elastomeric materials. She obtained my Master's Degree in Chemistry and Industrial Chemistry (cum laude) in 2021, focused on combined experimental and computational studies of Pt(II) carbene complexes. Her research expertise includes the synthesis and functionalisation of MOFs, discrete organic molecules and PIMs, and the fabrication of mixed-matrix membranes for CO_2 capture. She is skilled in air-sensitive synthesis, defect engineering, multivariate MOFs, and characterisation techniques (NMR, IR, PXRD, gas sorption). She has conducted research in the UK (Swansea; Birmingham/Warwick SSNMR Facility) on PIMs, MMMs and SSNMR of MTV MOFs.

ARTICLE PUBLISHED& UNDER REVIEW

PUBLISHED

- Machine learning as a microscope: Uncovering structure - Property relationships in polymeric membranes for CO2 separation

- Light gas and propene/propane permeabilities of copolymers of intrinsic microporosity containing highly rigid triptycene-like naphthopleiadene or spiropyrimidinone units

- Sustainable Thin-Film Composite Mixed-Matrix Membranes Based on Cellulose Acetate, Bimetallic ZIF-8-67, and Ionic Liquid for Enhanced Propene/Propane Separation

- Enhancement of the gas separation performance of mixed matrix membranes (MMMs) with functionalized triptycene hypercrosslinked polymers of intrinsic microporosity (HCP-PIMs)

- Mostafa Jafari, Kamran Ghasemzadeh, Maria-Chiara Ferrari, Adele Brunetti, Simona Liguori, Rashid Jamshidi,New integrated CCS and CCU schemes with small-scale biogas-fired combined-cycle power plant: A Comparative techno-economic assessment,Fuel Processing Technology,Volume 286,2026,108449

- Yuting L, C. Grazia Bezzu, Anže Zupanc, Luis Simbari, Shrestha Banerjee, Dominik J. Kubicki, Tomislav Friščić, Marjan Jereb, Ross D. Jansen-van Vuuren*, Mariolino Carta*, Stefan Bräse*, 2.2]Paracyclophane-Based Polyimides of Intrinsic Microporosity for Gas Separation, ACS Appl. Polym. Mater. 2026, 8, 7, 5248−5257

- C. Grazia Bezzu*, Natasha Hawkins, Rebecca Foster, Ariana R. Antonangelo, James W. Ryan Anna Williamson, Mariolino Carta*, Hyper-Cross-Linked Microporous Polymers as Cheap and Efficient Catalysts for the Synthesis of Biodiesel, ACS Appl. Eng. Mater. 2026

- F.Nerli, V.Guiotto, F.Nardelli, et al. “On the Role of Linker Fluorination in the Adsorption-Induced Structural Response of CeIV-Based Metal-Organic Frameworks.” Chemistry – A European Journal (2026): e70830.

- Letizia Trovarelli, Virginia Guiotto, Maria Sole Notari, Lorenzo Isidoro, Giacomo Provinciali, Concetta Bafaro, Andrea Rossin, Martino Degli Innocenti, Naomi Anna Consoli, Moreno Lelli, Marco Taddei, Matteo Signorile, Valentina Crocellà and Ferdinando Costantino “Structure and Carbon Dioxide Adsorption Properties of a Nanosized Aluminum L-Aspartate Metal-Organic Framework”, ACS Appl. Nano Mater. 2026. DOI: 10.1021/acsanm.6c00412

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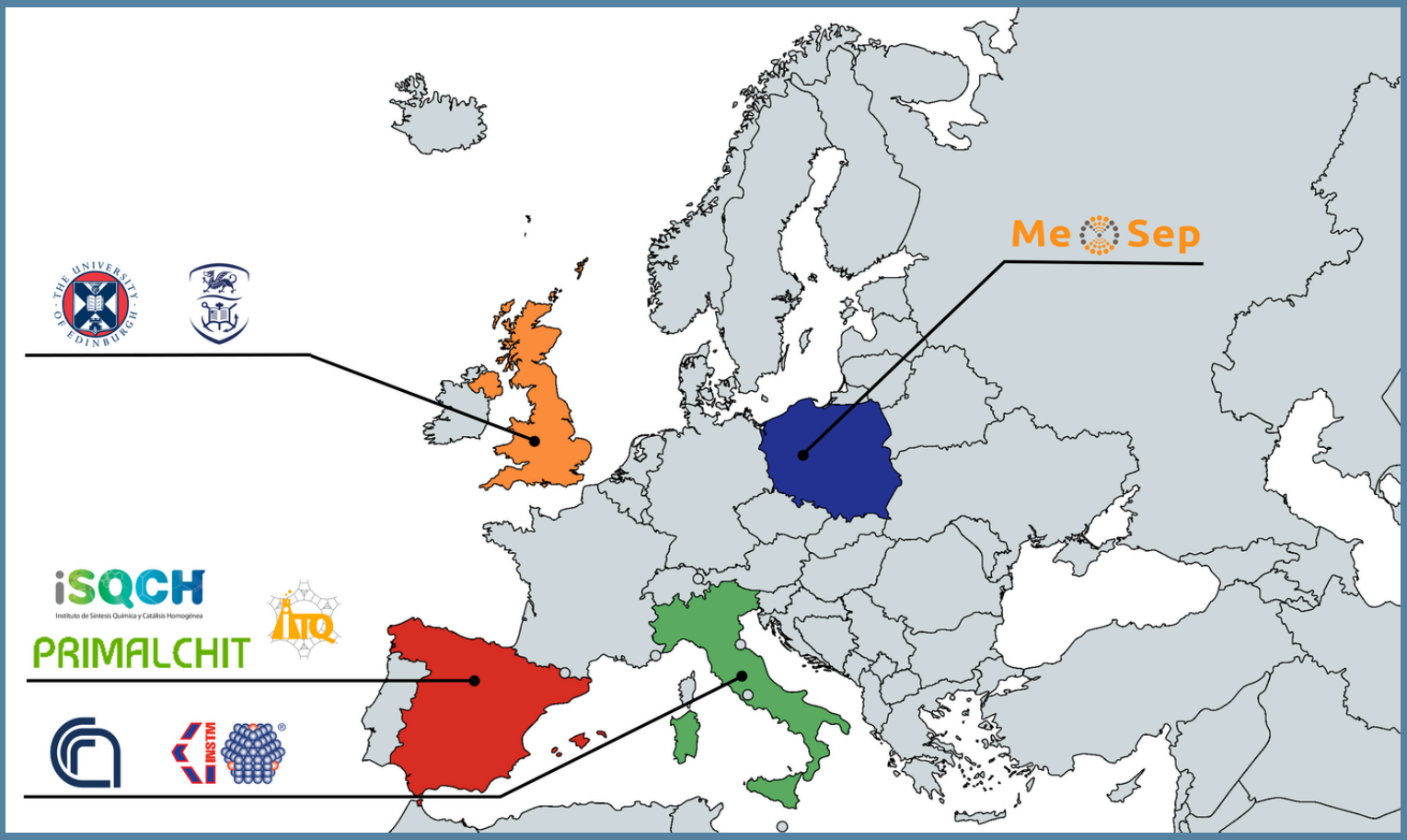

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UK Research and Innovation

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