

NEWSLETTER

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DAM4C₂

Double-Active
Membranes for a
sustainable CO₂ cycle

Partners:



Me Sep PRIMALCHIT

Funded by:

European
Innovation
Council



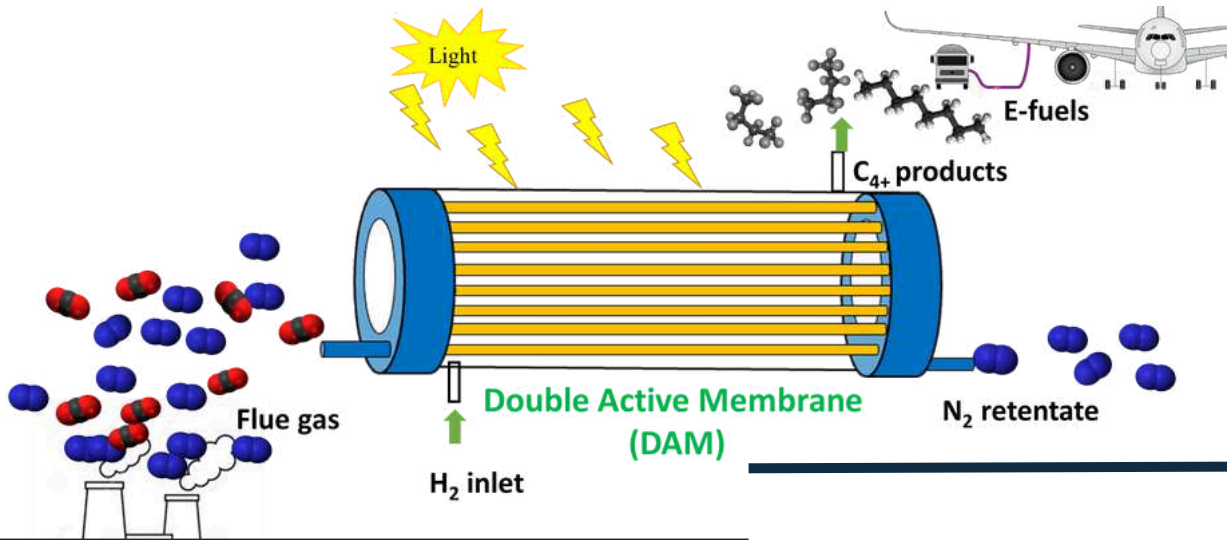
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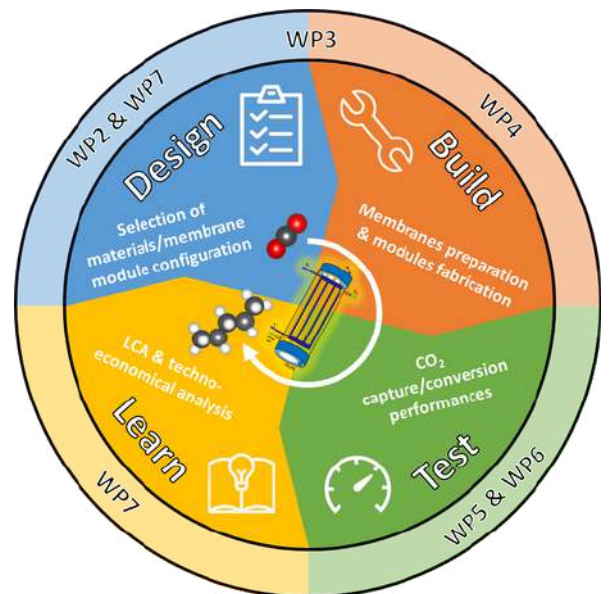
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ABOUT DAM4CO₂



The project “Double-Active Membranes for a sustainable CO₂ cycle” (DAM4CO₂) 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 DAM4CO₂ is to develop a novel membrane technology, for the simultaneous CO₂ separation and its photocatalytic conversion to C₄₊ 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 will be 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.



Graphical representation of the design-build-test-learn approach that will be used in DAM4CO₂

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

<https://youtu.be/ku8nt9M7JFw>

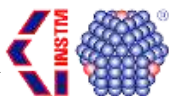


THE PARTNERS:



NATIONAL RESEARCH COUNCIL OF ITALY

The National Research Council of Italy (CNR) is the coordinating institution of the DAM4CO₂ project. It is the largest public research organization in Italy with ca. 8500 employees. In DAM4CO₂, the CNR is present with two of its 88 Research Institutes, both belonging to the Department of Chemical Sciences and Materials Technology: the Institute on Membrane Technology (ITM) and the Institute for the Chemistry of Organometallic Compounds (ICCOM). CNR-ITM is active in the field of membrane science, technology, and engineering for gas separation and conversion, water and liquid treatment, bioartificial organs, biotechnology, food and agriculture. CNR-ICCOM is dedicated to the development of fundamental and applied research in the fields of advanced and functional materials, renewable energies, and sustainable chemistry. In DAM4CO₂, CNR puts in place the skills in membranes preparation, characterization and modelling of Alessio Fuoco, Elisa Esposito, Elena Tocci, Marcello Monteleone and John Jansen, as well as the solid state NMR competences of Lucia Calucci and Elisa Carignani.



NATIONAL INTERUNIVERSITY CONSORTIUM OF MATERIALS SCIENCE AND TECHNOLOGY



INSTM (National Interuniversity Consortium of Materials Science and Technology) is the largest consortium of its kind in Italy, drawing on the expertise of 50 universities and all those who operate in Italy in research on advanced materials and technologies. About 2000 professors, researchers, post-docs and PhD students are associated to INSTM and the number thereof is continuously increasing. In DAM4CO₂ the INSTM consortium gather the competences of Dr. Valentina Crocellà, Dr. Matteo Signorile, Prof. Silvia Bordiga at the Department of Chemistry (University of Torino), of Prof. Marco Taddei and Prof. Marco Lessi at the Department of Chemistry and Industrial Chemistry (University of Pisa) and of Prof. Ferdinando Costantino and Prof. Luigi Vaccaro at the Department of Chemistry, Biology and Biotechnology (University of Perugia). The expertise of the research unit ranges from the synthesis of materials for carbon dioxide capture to the characterization of adsorbents and catalysts, including the application of advanced methods to disclose the finest structural details and the functional behavior of the investigated samples.



POLYTECHNIC UNIVERSITY OF VALENCIA

The **Universitat Politècnica de València (UPV)** is a public, dynamic and innovative academic institution that maintains strong links with the social environment helping students to reach out excellence. This is reflected in the UPV's position in the Shanghai Ranking, listed among the top 400 in the world in Chemistry and Chemical Engineering. FOTOHET is a research group that belongs to UPV and the Instituto de Tecnología Química (ITQ-CISC), and it is located in Valencia, Spain. FOTOHET group is led by Hermenegildo García, full Professor at the Instituto de Tecnología Química of the Technical University of Valencia and has been working in the field of heterogeneous catalysis with porous solids as well as in the photocatalytic production of solar fuels having published over 900 articles (H index 129 GS). Prof. Garcia is Doctor Honoris Causa from the University of Bucharest, Spanish National Research award (2021), Janssen-Cilag award of the Spanish Royal Society of Chemistry (2011), Jaume I prize for Novel Technologies (2016) and member of the Spanish Royal Academy of Natural Sciences. The research group has participated in more than 50 R&D projects related to catalysis and photocatalysis; and it is formed by national and international researchers specialized in the preparation of new catalysts based on metal oxides, MOFs, COFs and graphitic type materials among others and applied in several photocatalytic, thermocatalytic and electrocatalytic reactions.



THE UNIVERSITY OF EDINBURGH

The **University of Edinburgh**, founded in 1582, is the sixth oldest university in the English-speaking world and one of Scotland's ancient universities. Consistently ranked one of the top 50 universities in the world, the University was recently ranked 22nd in the 2024 QS World University rankings. One of Britain's leading research universities, Edinburgh is also ranked 4th in the UK for research power, based on the 2021 Research Excellence Framework (REF) by Times Higher Education.

The College of Science and Engineering (CSE) is one of the three academic Colleges at the University and, with nearly 2,900 staff and 10,800 students is one of the largest science and engineering groupings in the UK. It consists of seven academic schools (Biological Sciences, Chemistry, Engineering, GeoSciences, Informatics, Mathematics and Physics & Astronomy) and two Centres of Excellence (EPCC and The Bayes Centre). In the most recent (2021) REF results, CSE was classed as world-leading in terms of the originality, significance and rigour of its research – with 96% of research outputs classed as either world-leading or internationally excellent.



SWANSEA UNIVERSITY

Chemistry at Swansea University offers an excellent environment for learning and research at our purpose-built laboratories which draw on expertise from our Engineering, Medical and Science departments.

The newly opened (2017) Department of Chemistry at the Faculty of Science and Engineering of Swansea University has a steadily growing number of staff, and a large number of national and international Post-Docs, PhD, Master and bachelor students. The Department is composed of six between associate and full professors and ten between lecturers and senior lecturers. The institution has excellent, purpose-built modern laboratories with access to a wide range of instrumentation, ideal for organic synthesis and the developing of the proposed research. Suitable office space is available for the project with computer and IT support. These research efforts are supported by a strong and tight collaboration with the College of Engineering, which ranked second in the UK in research environment.



ME-SEP

Me-Sep is an innovative research and engineering company specializing in membrane technology. We provide technical solutions for researchers and engineers, with a focus on lab and pilot scale projects. Our team of specialists designs and manufactures custom-made machines for the membrane industry, supporting businesses in technology transfer for membrane production, module manufacturing, and construction of separation systems. For our customers, we offer support in technology transfer for flat sheet and hollow fiber membrane production, membrane module manufacturing, and construction of separation systems for gas and liquid mixtures. Me-Sep team specializes in capillary/hollow fiber membrane spinning for UF/MF/NF applications, TFC coating on flat sheet and capillary membranes, development of spinning, casting, and coating equipment, QC tests, and filter potting systems.



PRIMALCHIT

PRIMALCHIT SOLUTIONS

PRIMALCHIT SOLUTIONS S.L in a Technology-Based Innovative Enterprise (EBT for its acronym in Spanish) born in 2019 in Valencia, Spain. Its business strategy is mainly focused on technology research and development as well as strategic consultancy for project deployment under the principles of "Sustainable or Green Chemistry". Owing two patents under PTC scope, Primalchit has contributed in projects to develop catalysts for NO_x reduction in static effluents, photochemical processes for the elimination of combustion flue gases, and catalysts for low-temperature methane decomposition. Primalchit's founding team has over 30 years of background developing Innovation Projects. Moreover, PRIMALCHIT counts with senior researchers with experience in materials chemistry, energy storage and environmental technology. PRIMALCHIT participates in hydrogen related projects in collaboration with reference technologic centers and in the last years, PRIMALCHIT has been awarded with national projects related to hydrogen production where its role is the scale-up of materials and electrode development. PRIMALCHIT participates in the European project DAM4CO₂ leading the working package aimed at Multiscale Modelling & Life Cycle Assessment (LCA). Its role, is in the LCA to determine the environmental impact of the proposed technology.

Kick-off meeting



The project started on November 1st 2023, and its kick-off meeting took place on November 27th - 28th 2023, in Amantea, Italy. The KOM focused on the planning of the next three years of the project, with particular focus on the first 6 months. It was the right place to glue the different teams and to build a solid project network.



PAST EVENTS

The **kick-off meeting** of the CO₂ and Nitrogen Management and valorization **portfolio** on November 22th- 23th 2023, in Brussels, Belgium. The KOM of the portfolio was attended by all the PI of the selected project, as well as the project officers and project managers for the EIC.



Few of us have also attended the “**1st Workshop of the Italian PhD Program in Catalysis**” on December 2023, Perugia, Italy. The PhD program is coordinated by Prof. Luigi Vaccaro, who is part of the INSTM team.

People hired on the project

Letizia Trovarelli, graduated cum laude in Chemical Sciences at the University of Perugia in September 2023, worked on MOFs (metal-organic frameworks) during her thesis under the supervision of Prof. Ferdinando Costantino. First as a Junior 1 Researcher and then, from January 2024, as a PhD student, she is involved in the European project "Double Active Membranes for a sustainable CO₂ cycle" (DAM4CO₂). Her project is supervised by prof. Ferdinando Costantino and prof. Valentina Crocellà. Her current research interest concerns the synthesis and characterisation of metal-organic frameworks based on non-critical raw materials.



Maria Sole Notari, graduated cum laude in Chemical Sciences at the University of Perugia in September 2022. She has already worked on MOFs for CO₂ adsorption during her undergraduate studies. For one year she worked as a research fellowship in the PRIN2020 project "doMino". From March 2024, she joined the European project "Double Active Membranes for a Sustainable CO₂ Cycle" (DAM4CO₂) supervised by Prof. Ferdinando Costantino as a research fellowship. Her main task within this project is to deal with the synthesis scale-up of metal-organic frameworks based on non-critical raw materials.

Francesco Della Croce, graduated cum laude in Chemistry at University of Pisa in January 2024 under the supervision of Prof. Marco Taddei. Starting from February 2024, he took on a role as a Junior 1 Researcher in the European project "Double Active Membranes for a sustainable CO₂ cycle" (DAM4CO₂), under the supervision of Prof. Marco Lessi and Prof. Marco Taddei. Currently, his research interest concerns the synthesis and characterization of Metal-Organic Frameworks based on non-critical raw materials.



Matteo Bartalucci, was awarded the PhD in Chemical Sciences with excellence in April 2024 from the University of Perugia, working on the design and synthesis of PROTACs aiming to explore and expand the toolbox of hijackable E3 ligases for TPD. Since April 2024, he has been involved as a Junior Researcher in the European project "Double Active Membranes for a sustainable CO₂ cycle" (DAM4CO₂), under the supervision of Prof. Luigi Vaccaro. His current research interest concerns the development of novel catalyzed processes in flow using solid catalysts.

Dr Mireia Buaki-Sogó holds a degree in Chemical Engineering from the Technical University of Valencia and a PhD from the same university. Her background is in the field of nanomaterials for catalysis, sensors, and energy storage. She joined PRIMALCHIT in 2023 in the R&D area to carry out activities related to project management, business and technological development. She has 15 communications at conferences and has participated in 17 research projects, in 6 of them as principal investigator. She has published a total of 25 articles in scientific journals with an h-index of 13.



Alireza Nazari Khodadadi, completed his M.Sc. degree in bioorganic chemistry at Sharif University of Technology under the guidance of Prof. Hamidreza Kalhor in 2018. Then, he worked in R&D at the pharmaceutical company CinnaGen Group. In 2021, he commenced a Marie Curie Ph.D. fellowship (STiBNite) under the supervision of Prof. Luigi Vaccaro at the University of Perugia, Green S.O.C. In April 2024, Alireza transitioned to the role of Junior Researcher within the HORIZON-EIC-2022 "DAM4CO₂" project, where continues to contribute to research within the same research group.



C. Grazia Bezzu, in February 2024 joined the Carta group in Swansea University as a research officer to work on the DAM4CO₂ project. She obtained her PhD in Chemistry in 2009 from Cardiff University under the supervision of Prof. Neil McKeown. Thereafter, she worked as a Post-Doctoral Researcher in the McKeown group, where she investigated novel microporous organic materials. In 2018 she joined the Bonifazi group at Cardiff University, where she worked at the preparation and supramolecular assembly of chalcogen containing aromatic molecules.

Martina Vaccaro, completed her MSc. in Pharmacy at the University of Calabria in October 2023, with an experimental thesis in collaboration with CNR-ITM. She is very glad to continue the work on membranes within the framework of DAM4CO₂, and specifically to work on the "Preparation and characterization of mixed matrix membranes for capture and/or conversion of CO₂" under the supervision of Dr. Alessio Fuoco and Dr. Johannes Carolus Jansen.



Emanuela Accardo obtained her Bachelor's degree in Chemistry and Chemical Technologies in 2022, conducting a brief research on colloidal CoFe₂O₄ magnetic nanoparticles. Additionally, from 2020 Emanuela is also a student of IANUA High School of University of Genoa in Sciences and Technologies of sustainability receiving a first-level diploma in 2023. At the present, she is finishing her Master degree at the University of Genoa in Solid-state chemistry applied to materials and energy. Since 2024, thanks to Erasmus fellowship, she is carrying out her Master's project on photocatalysts for N₂ fixation in the Hermenegildo Garcia's group at the Technical University of Valencia. Finally, expected starting date of Emanuela's contract related to DAM4CO₂ project will be June.

Events organized by us:



Past events


We have organized the inaugural lecture of the vertical webinars organized as action of the EIC portfolio “CO₂ and N-compounds Management and Valorisation”. The first section focused on the role on Membrane Science and Technology in the sector, with presentations from Prof. Gallucci (Eindhoven University of Technology) and Dr. Mamaghani (X-MEM). Dr. Matteucci (PM at EIC) gave an overview on the EIC actions.

To know more about the vertical webinars, check the program for the next sessions here:

<http://www.dam4co2.eu/index.php/eic-portfolio> 🔍

Future events





**Funded by
the European Union**



PRIN 2020


International Workshop and NIS Colloquium
Sponsored by doMino and DAM4CO₂ projects

Towards Carbon Neutrality
New frontiers in carbon dioxide capture and valorization

Wednesday 19th June 2024
Aula Darwin - Molecular Biotechnology Center
Via Nizza, 52 - Torino (Italy)

Local organizers: Valentina Crocellà, Matteo Signorile, Silvia Bordiga, Virginia Guiotto, Alberto Ricchebuono, Melodj Dosa, Gabriele Deplano

Registration is free of charge at:
https://www.nis.unito.it/colloquia/NIS_2024_06_19.html 🔍





WHERE YOU WILL FIND US: THE UPCOMING EVENTS

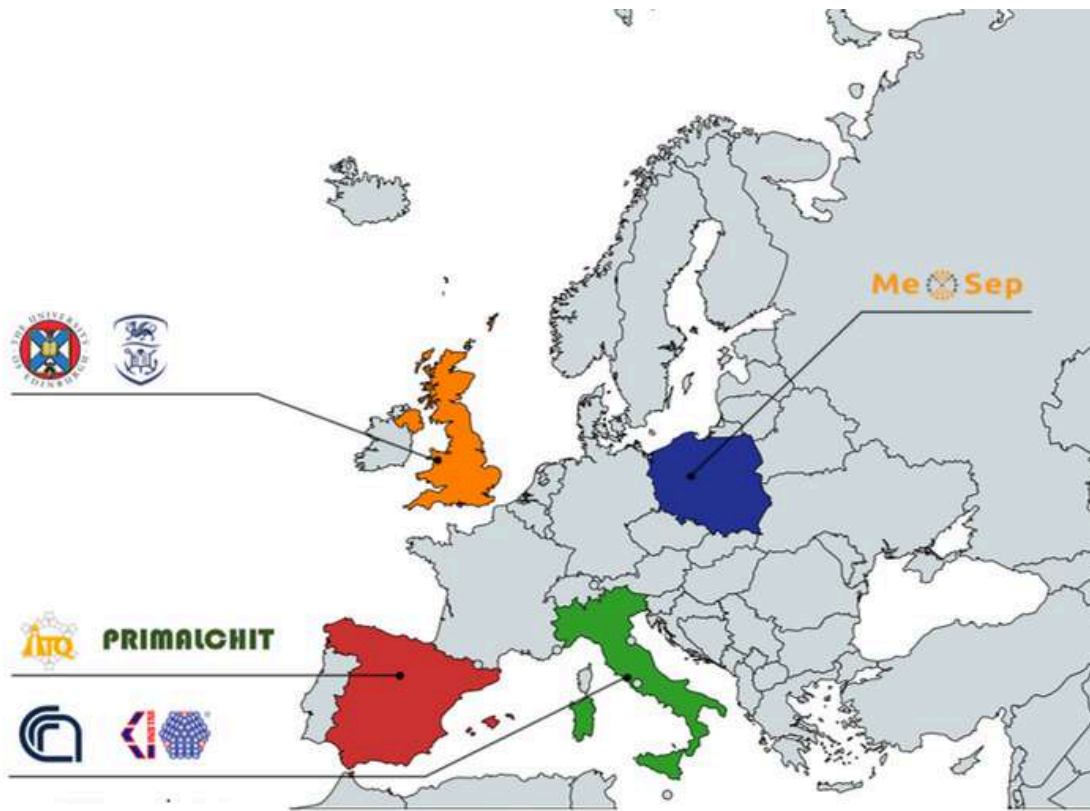


- “Workshop on renewable energy and catalysis”, Perugia – Italy, 3th May 2024.
- XIV INSTM Conference on Materials Science and Technology, Cagliari - Italy, 9th - 12th June 2024.
- 39 EMS Summer School 2024, Louvain-la-Neuve, Belgium, from June 10th - 14th 2024.
- “Polymers of Intrinsic Microporosity (PIMs): versatile materials for gas separation and catalysis”, CNRS in Dijon (France), 28th June 2024.
- EUROMAR – The 20th European Magnetic Resonance Congress, Bilbao (Spain) 30th June - 4th July 2024.
- 9th international conference on “Metal-Organic Frameworks and open frameworks compounds”, Singapore, 15th - 19th July 2024.
- 16th Magnetic Resonance in Porous Media Conference, Tromso (Norway), 26th - 30th August 2024
- SCI 2024 Chemistry: Elements of future. XXVIII National Congress of Società Chimica Italiana, Milano – Italy, 26th - 30th August 2024.
- 51st National Conference on Magnetic Resonance, Florence (Italy), 4th - 6th September 2024.
- Euromembrane 2024, Prague, 8th - 12th September 2024.

PRESS RELEASE



- [Primalchit Solutions SL](#) published in a regional newspaper [Las Provincias](#) online edition on 2023 November 15th
- CNR published a press release on DAM4CO₂ on 2023 November 24th
- A press release on DAM4CO₂ published in a regional newspaper ([Corriere della Calabria](#)) on 2023 November 24th
- A press release on DAM4CO₂ published in a regional newspaper ([Lamezia Terme.it](#)) on 2023 November 24th
- A press release on DAM4CO₂ published on [LaC News 24](#) on 2023 November 24th
- [Swansea University](#) had a press release talking about DAM4CO₂ on 2023 December 4th



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UK Research
and Innovation

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