

Converting CO₂ emissions from bio-based industries into sustainable chemicals to mitigate climate change

The European Union awards 7M€ to the CO₂SMOS project for helping bio-based industries developing circular approaches and reducing their carbon footprint

The chemical industry is one of the most energy and CO₂ intensive sectors globally. To reach climate targets, this sector needs to accelerate the transition towards non-fossil, sustainable and more circular and efficient resources. Bio-based industries (BBIs) go in that direction by substituting fossil feedstocks with biological residues and waste to produce greener products. However, this innovative sector has the opportunity to move a step further in creating a circular bioeconomy by also converting biogenic CO₂ emissions into sustainable biochemicals and biomaterials (e.g. bioplastics).

Launched in May 2021, the Horizon 2020 EU project CO₂SMOS - *Advanced chemicals production from biogenic CO₂ emissions for circular bio-based industries*, will, in the next 4 years, develop a set of breakthrough and cost-competitive CO₂ conversion technologies. The CO₂SMOS project will develop solutions to transform the carbon emissions generated from bioprocesses (e.g. fermentation) into different sustainable bioproducts: durable polymers, renewable biochemicals and biodegradable materials. With these compounds it is possible to produce greener end-products such as packaging, coatings, textiles and materials for biomedical applications. The demonstration of the technical, economic and environmental sustainability of the different CO₂SMOS technologies will allow the design of an integrated platform of CO₂ conversion processes for BBIs. This will help achieve zero or even negative carbon emissions as well as replacing fossil-based chemicals with more sustainable ones using renewable sources (green H₂ and biomass) and CO₂ as main raw materials.

The project consortium, led by the CARTIF Technology Center, counts on the wide expertise and high interdisciplinarity of 15 international partners ranging from technology developers (CARTIF, CSIC, FUNDITEC, SINTEF, University of Twente and University of Amsterdam), a waste management and technology transfer company (HERA Group), industrial end-users (Avantium, Novamont and Nadir), interdisciplinary research institutions (CERTH and RWTH Aachen University), a service provider (RINA) and the European Association representing the Carbon Capture and Utilisation community in Europe (CO₂ Value Europe). The scale-up and demonstration of the CO₂-derived intermediates will take place at the Bio Base Europe Pilot Plant.

The consortium will work together with the goal of opening new markets and business models for sustainable industries based on CO₂-derived chemicals, contributing to diversify the economic base of these rising sectors and to mitigate climate change.

Dr. Raúl Piñero Hernanz, Head of the Biotechnology & Sustainable Chemistry Area at CARTIF, said:

“CARTIF Technology Centre leads the coordination of the CO₂SMOS Project which aims to develop a set of innovative cost-competitive CO₂ conversion technologies to transform biogenic CO₂ emissions into high added-value chemicals. Optimization of the lab scale protocols, based on advanced fermentation processes, will be supervised by CARTIF team prior to its validation at pilot scale.”

Prof. Martina Ziefle, Chair of Communication Science at RWTH Aachen University, commented:

“RWTH Aachen University is excited to be part of a project making strides towards carbon neutrality. As acceptance researchers, focusing on public perceptions and users’ requirements for well-accepted technology developments and

end products, we are closely involved with all steps of CO₂SMOS to ensure that the technological innovations developed therein can be successfully rolled out to the market."

Dr. María Balaguer, Postdoc Researcher at The Spanish National Research Council (CSIC), stated:

"CO₂SMOS project pursues the bio based CO₂ conversion into value-added products by the establishment of zero waste biorefineries with negative GHG emissions. CSIC technologies will be based in the combination and integration of biotechnological and electrocatalytic processes."

Dr. Evelien Uitterhaegen, R&D Coordinator at Bio Base Europe Pilot Plant (BBEPP), said:

"Bio Base Europe Pilot Plant is very excited to be part of the CO₂SMOS project, aiming to decrease biogenic CO₂ emissions, while contributing to a circular economy. BBEPP will focus on the demonstration of the CO₂SMOS concept, an essential step in speeding up biobased innovations!"

For more information, please do not hesitate to contact us.

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