Project partners

CSIC
Consejo Superior de Investigaciones Científicas
ITQ Instituto de Tecnología Química · Excelencia Severo Ochoa · Universitat Politècnica de València

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Universitas Studiorum Zagrabiensis MDCLXIX
FSB

KAUST

Key data

Acronym
E-TANDEM

Start date
1 November 2022

Duration
42 Months

Funding by the EC
3.33M €

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101083700

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E-TANDEM

"Developing the first direct process for the selective production of carbon-neutral higher oxygenate e-fuels from CO_2, water, and renewable sources."

www.e-tandem.eu

Funded by the European Union

Key message

Carbon-neutral, high-energy density e-fuels are crucial to de-fossilize:

- long-haul, heavy-duty road
- marine transport sectors
- aviation transport sectors

Current e-fuels face hurdles for a swift market penetration due to incompatibility with current ICE fleets and fuel distribution networks, and/or non-compliance with fuel norms in force. E-TANDEM's ambition is to unlock an efficient and direct production of a new higher-oxygenate diesel-like e-fuel (HOEF) for the marine and heavy-duty transport sectors. This mildly oxygenated and very-high-cetane index diesel-like fuel is directly produced from CO_2 as the sole carbon source, and renewable power as the sole energy input, in a once-through hybrid catalytic conversion process integrating three major catalysis branches: electrocatalytic syngas production coupled to a tandem e-syngas conversion encompassing thermocatalysis with solid catalysts and chemocatalysis with molecular complexes.

E-TANDEM Objectives

- To develop and validate a continuous power-to-fuel process for the direct conversion of CO_2 and water to a higher oxygenate e-fuel (HOEF) based on aliphatic alcohols and their ether derivatives, with high carbon selectivity and energy efficiency, and assess its response to temporal fluctuations in renewable power input at benchtop lab-scale (TRL 4).

- To characterize and benchmark the newly proposed HOEF and assess its blending and drop-in characteristics for current-fleet marine and heavy-duty road internal combustion engines.

- To assess the technical, economic, and sustainability aspects of the new e-fuel production concept and set the basis for further upscaling developments.