



ABOUT ECOLEFINS

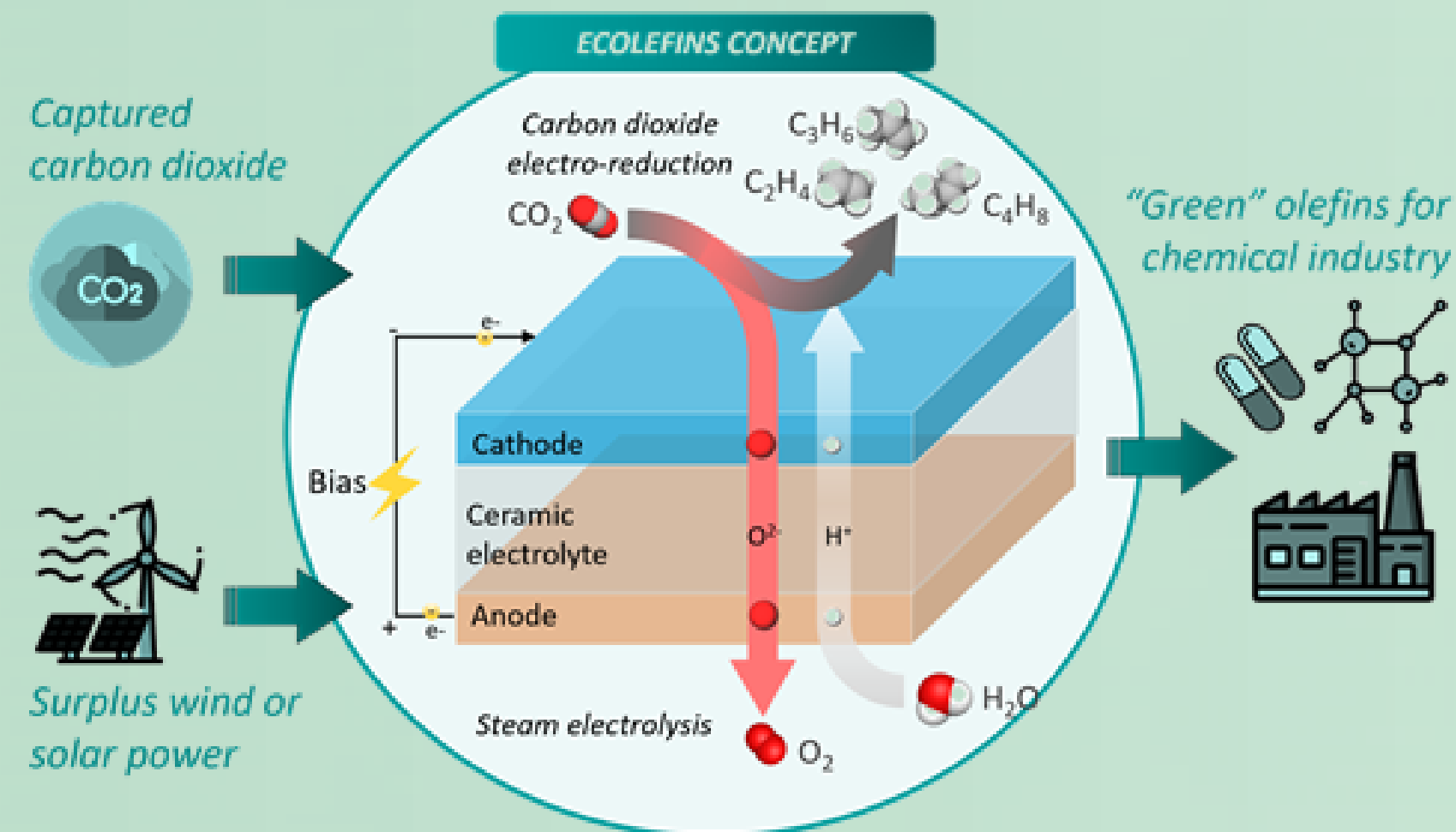
ECOLEFINS (*Nano-Engineered Co-Ionic Ceramic Reactors for CO₂/H₂O Electro-conversion to Light Olefins*) is an EU/UK co-funded **research project** of HORIZON EUROPE, aiming to reverse the **carbon-heavy** footprint of petroleum-based light olefins, and prove an all-electric and petroleum-free route for **carbon-negative ethylene and propylene**.

ECOLEFINS introduces **co-ionic electrolytes**, to merge highly efficient **steam electrolysis to green-H₂**, with **CO₂ selective hydrogenation to light olefins**, over **nano-engineered electrodes** in a **single electrochemical reactor**, for the simultaneous: **(1)** supply of highly active protons (H⁺) to effectively hydrogenate CO₂ at atmospheric pressure and **(2)** withdraw O²⁻ anions from CO₂ in order to: **(a)** activate C=O bonds, **(b)** eliminate H₂O/CO by-products, and **(c)** shift the CO₂ hydrogenation equilibrium, at atmospheric pressure and elevated temperatures >400 °C),

ECOLEFINS IN A NUTSHELL

OBJECTIVE

- prove the concept of high-yield CO₂ electro-hydrogenation to light-olefins, in co-ionic electrochemical reactors



BREAKTHROUGHS

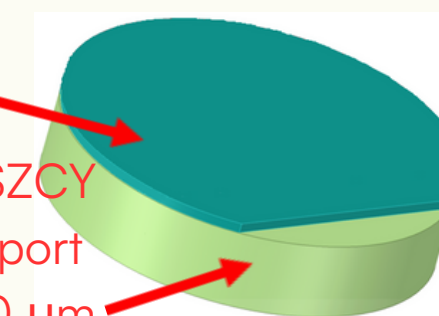
CO-IONIC ELECTROLYTES



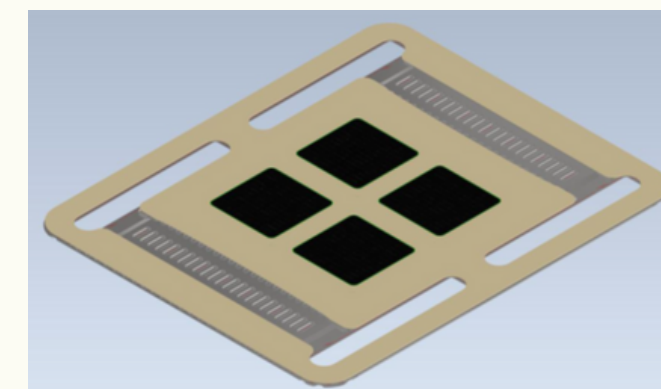
- reproducible, durable and effective electrolytes of co-ionic (H⁺/O²⁻) conductivity at temperatures of industrial interest, to boost **chemical-industry electrification**

BZCY/GDC co-ionic electrolyte 16 μm

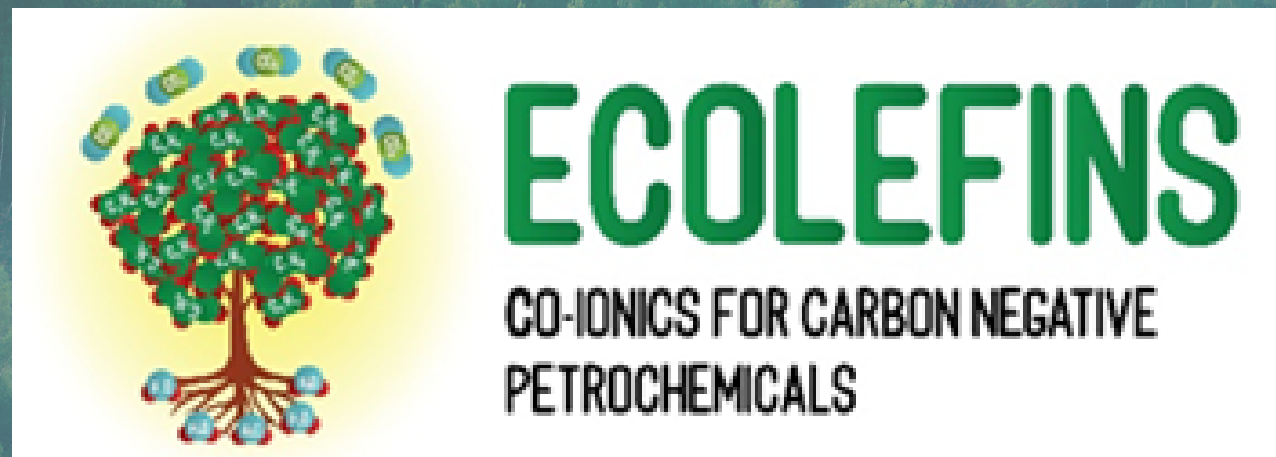
NiO/SZCY electrode/support 300 μm



CO-IONIC ELECTROCHEMICAL REACTORS



- co-ionic (H⁺/O²⁻) short stacks, to prove ceramic-membranes and co-ionic electrochemical reactors scalability



START

01 October 2023

END

30 September 2026

BUDGET

€2.998.991

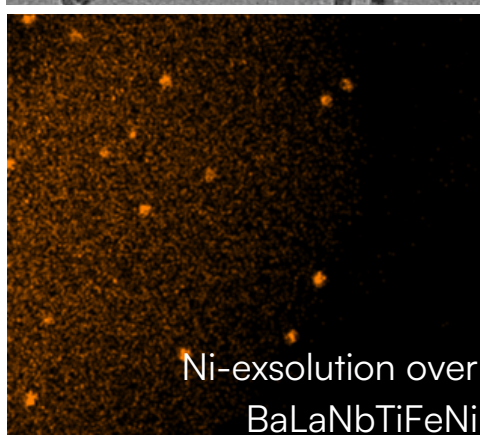
PROJECT WEBSITE

<https://ecolefinsproject.eu/>

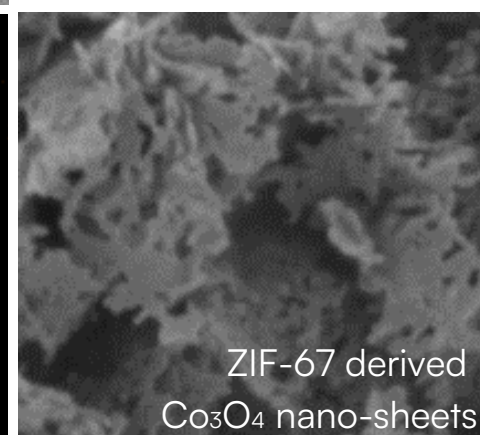
CORDIS LINK

<https://cordis.europa.eu/project/id/101099717>

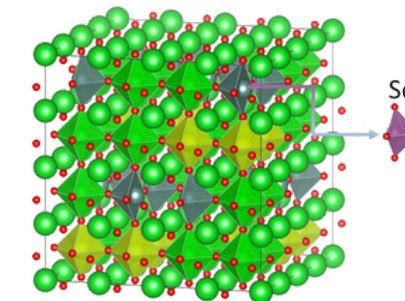
NANO-ENGINEERED ELECTRO-CATALYSTS



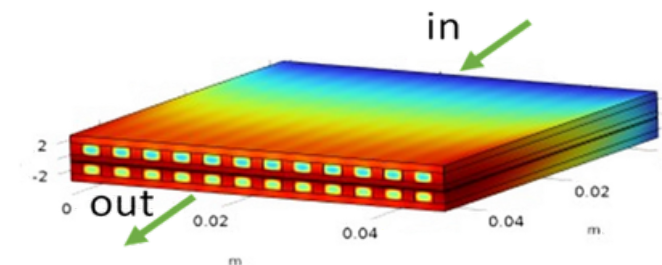
- effective, conductive and selective nano-formulations
- MOFs/COFs derived nano-sheets
- perovskite exsolutions



ATOMIC SCALE & CFD MODELLING

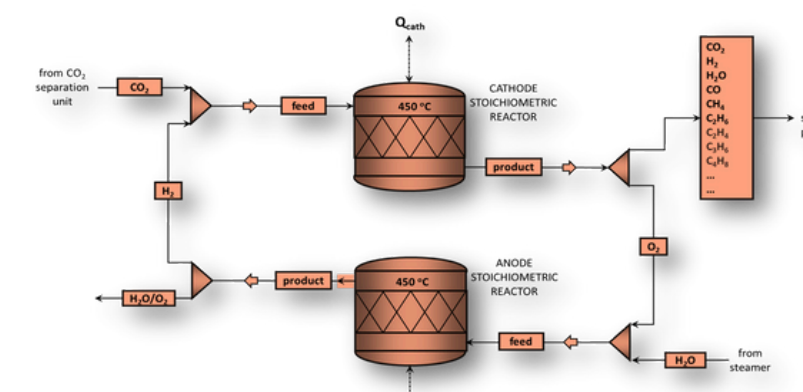


CAD of BZCSc single-phase co-ionic conductor



co-flow, co-ionic reactor/cell

CONCEPT ASSESSMENT



co-ionic electrochemical membrane reactor simulation

- integrated process modelling tool
- economic performance calculator-tool
- LCSA
- social acceptability study
- marketing planning

CONTACTS

Participating organization

Centre for Research & Technology Hellas (CERTH)

University of St Andrews (USTAN)

Forschungszentrum Jülich (FZJ)

Politecnico di Torino (POLITO)

Technical University of Crete (TUC)

University of Groningen (RUG)

Elcogen Oy (ELCO)

Helleniq Energy (HELPE)

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PROJECT PARTNERS

