ADDRESSING THE NEED OF THE EU CHEMICAL INDUSTRY TO REDUCE THEIR DEPENDENCE ON CARBON FEEDSTOCK

SunCoChem project aims to provide the chemical industry with an alternative to produce oxo-chemicals without using raw materials derived from fossil fuels.

The project is developing a solution based on a competitive tandem photoelectrocatalytic reactor to efficiently produce oxo-products from renewable energies based on CO_2, H_2O and solar energy.

This will be achieved by process intensification coupling a solar-driven carbon dioxide reduction to CO/water oxidation to O_2 with CC bond carbonylation reaction catalysed by novel multifunctional hybrid photoelectrocatalysts.

Our goal is to provide a sustainable alternative for the production of traditionally fossil-based chemicals by using sunlight as an energy source and reusing CO_2 as a raw material in a circular economy approach

SunCO2Chem

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SunCO2Chem

PHOTOELECTROCATALYTIC DEVICE FOR SUN-DRIVEN CO_2 CONVERSION INTO GREEN CHEMICALS

Carbon-neutral production of energy and high-value chemicals

PHOTOELECTROCATALYTIC TANDEM REACTOR

A competitive and modular self-biased photoelectrocatalytic tandem reactor

SunCoChem will offer an efficient system for producing high-value chemicals from CO_2, currently limited due to low CO_2 reactivity.

The photoelectrocatalytic tandem reactor will be validated in an industrial plant environment for the conversion of CO_2 emissions to produce different added-value chemicals.

THE PROCESS

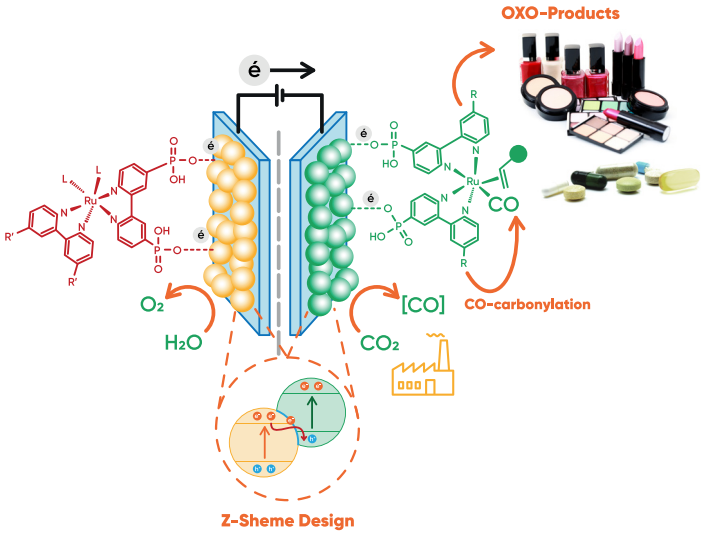
- CO_2 capture from air/exhaust gases from the Chemical Industry and its selective concentration in Ionic Liquids
- Photocatalytic water oxidation (anode reaction)
- Photo-electrocatalytic CO_2 conversion to CO and H_2 (cathode reaction)
- C-C bond formation by in situ CO-carbonylation to oxo-products

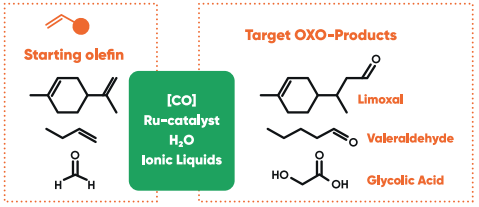
PROJECT CONCEPT

The SunCoChem concept is based on Solar-driven chemistry.

SunCoChem project aims at exploiting a tandem photoelectrochemical CO_2 conversion route to produce CO as a key intermediate for the in-situ CO-carbonylation of chemicals to produce three important oxo-products of the chemical industry:

- **Limoxal™, by carbonylation of limonene**
- **Valeraldehyde, by carbonylation of Butene**
- **Glycolic Acid, by carbonylation of formaledehyde**





SOLAR-DRIVEN CHEMISTRY

Solar-driven Chemistry refers to a future scenario for chemicals production based on the substitution of fossil feed-stocks as energy source and raw materials.

In a broader perspective, Solar-driven Chemistry is crucial for an already started transition to a new economic cycle in chemistry/energy production.

THE EUROPEAN CHEMICAL INDUSTRY

The European Chemical Industry strongly depends on carbon feedstock imports for energy and chemical manufacturing processes.

The introduction of sustainable chemistry using renewable resources to exploit CO_2 for the production of chemical products is an opportunity to an efficient use of resources and preservation of the environment.

30
giatons of CO_2 emitted yearly

95%
Chemicals based on fossil fuels