

### Addressing the needs of the European Chemical Industry for a carbon-neutral production of energy and high-value chemicals

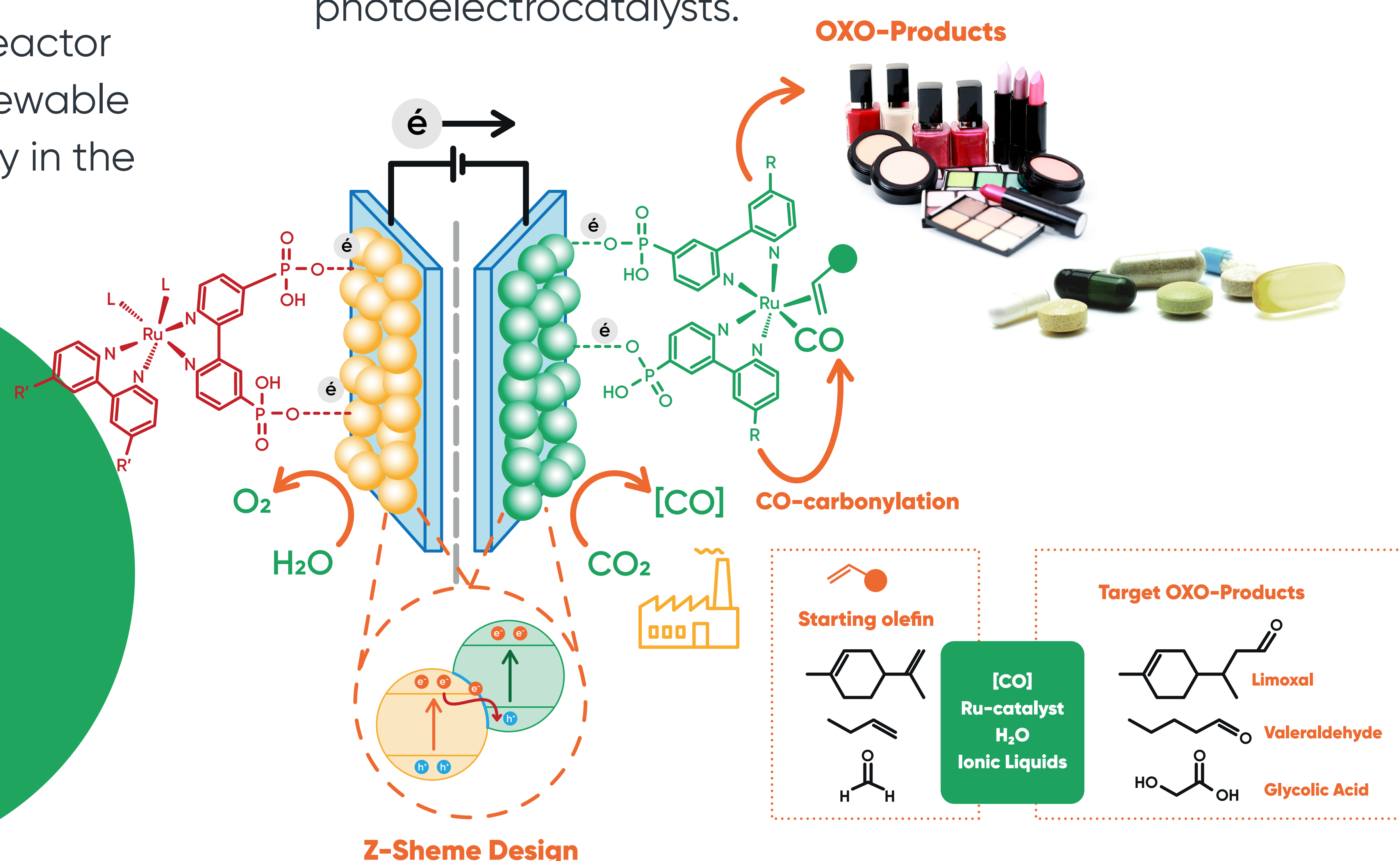
SunCoChem project aims to provide the chemical industry with an alternative to produce oxo-products without using raw materials derived from fossil fuels.

The project is developing a solution based on a competitive tandem photoelectrocatalytic reactor to efficiently produce oxo-products from renewable energies based on CO<sub>2</sub>, H<sub>2</sub>O and solar energy in the presence of ionic liquids.

This will be achieved by process intensification coupling a solar-driven carbon dioxide reduction to CO/ water oxidation to O<sub>2</sub> with C-C bond carbonylation reaction catalysed by novel multifunctional hybrid photoelectrocatalysts.

### PROJECT CONCEPT

SunCoChem project exploits a tandem photoelectrochemical CO<sub>2</sub> 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.



### A competitive and modular self-biased photoelectrocatalytic tandem reactor.

SunCoChem will offer an efficient system for producing high-value chemicals from CO<sub>2</sub>, currently limited due to low CO<sub>2</sub> reactivity. The reactor will be validated in an industrial plant environment for the conversion of CO<sub>2</sub> emissions to produce three oxo-chemicals based on the use of CO<sub>2</sub> as a renewable carbon source: Glycolic Acid, Valeraldehyde and Limoxal™.



**Ionic liquids assisted CO<sub>2</sub> capture from air/exhaust gases from the Chemical Industry**

**Photocatalytic water oxidation (anode reaction),**

**Photo-electrocatalytic CO<sub>2</sub> conversion to CO and H<sub>2</sub> (cathode reaction)**

**C-C bond formation by in situ CO-carbonylation to oxo-products**

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<sub>2</sub> as a raw material in a circular economy approach.

Consortium:

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Dow

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