Chemistry: energy, sustainability and health

- **Prof. Emilio Palomares**

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ICIQ Institut Català d'Investigació Química

ICREA

BIST Barcelona Institute of Science and Technology

ICIQ – Institute of Chemical Research of Catalonia

ICIQ in numbers - Research

18 Research groups

341 ICIQers

80% researchers

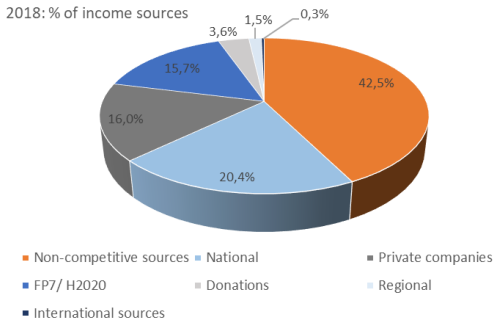
42% international

2,043 publications

100,000 citations

111 national projects

52 H2020 projects

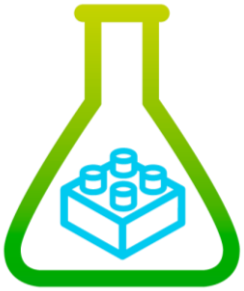


€15,5M anual budget

ICIQ – Research lines

TOOLS AND KNOW-HOW

- CATALYSIS
- COMPUTATIONAL CHEMISTRY
- ADVANCED MATERIALS
- DEVICES



Catalysis

CO_2 Valorization

Artificial Photosynthesis

ICIQ in numbers- Innovation

57 patents
5 licenced patents
3 copyright

Orchestra Sci.
Well-Tempered Tech

1 spin-off

unitat mixta ICIQ ESTEVE

1 mixed unit
7 researchers

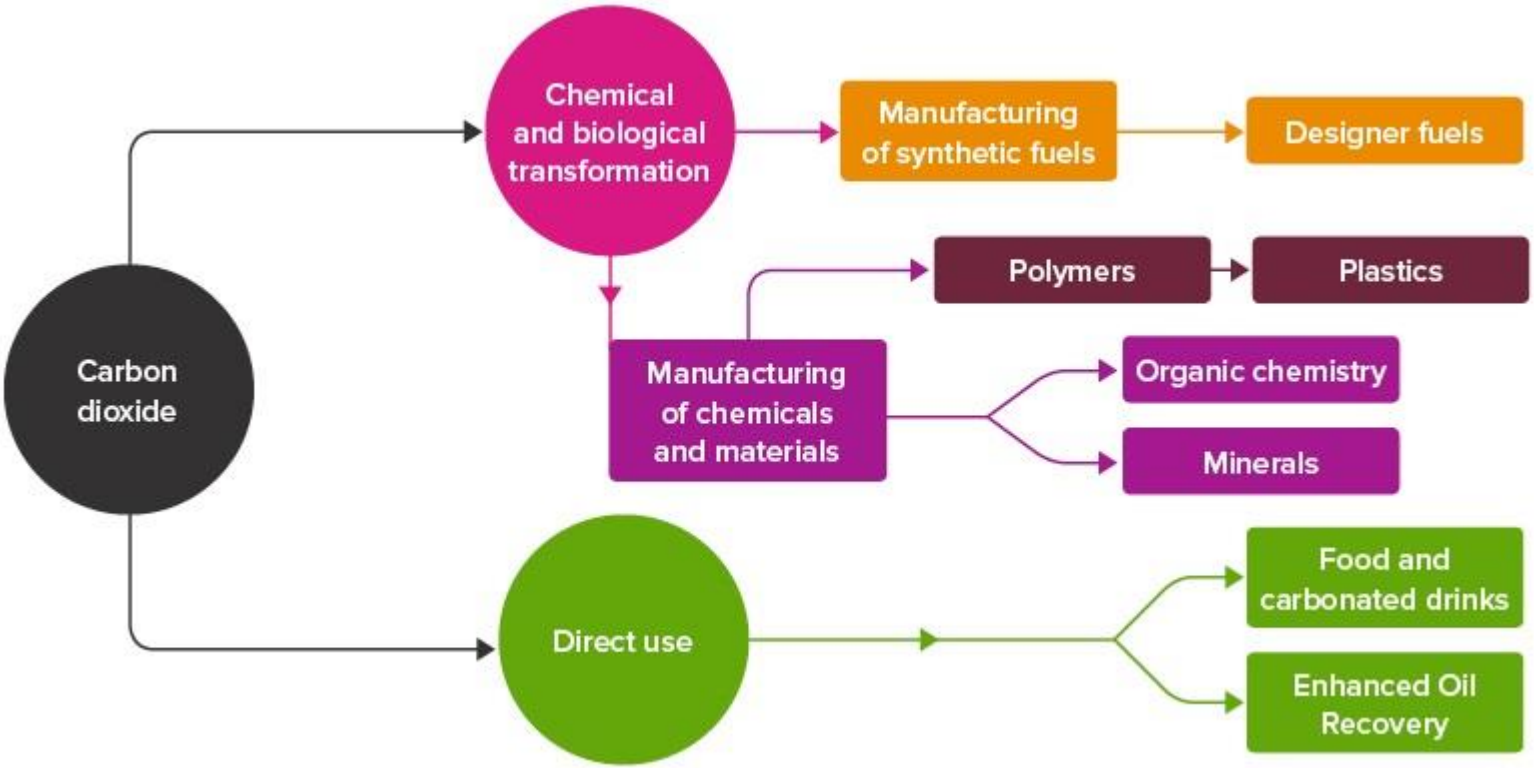
CSOL Catalytic Solutions
CRYSFORMA crystallization solutions
ERTFLOW Efficient Reaction Technologies
HTE High Throughput Experimentation

4 units for technological development

covestro Henkel ESTEVE BASF
REPSOL TOYOTA syngenta
LEITAT managing technologies
eurecat Centre Tecnològic de Catalunya

60 research contracts

Use of CO_2: Present and Future



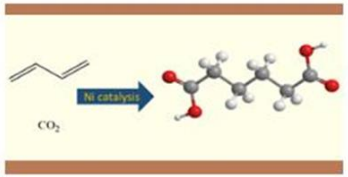
*The potential and limitations of using carbon dioxide – The Royal Society

ICIQ and CO_2 valorization

✓ CO_2 as a feedstock for new molecules

Fatty acids

Monomers and polymers



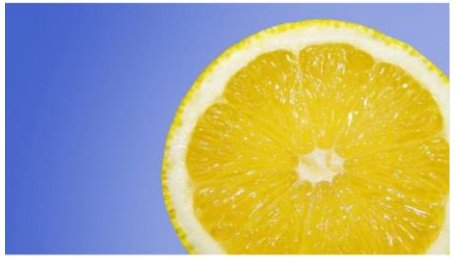
Nickel catalyzed production of adipic acid

Technology area: *catalysis, carbon dioxide, materials*
Keywords: *adipic acid, nickel, nylon*

Fatty acids through nickel-catalyzed olefin carboxylation

Technology area: *catalysis, fatty acids, CO_2 valorization*
Keywords: *CO_2 valorization, fatty acids, nickel, olefins, alkene*

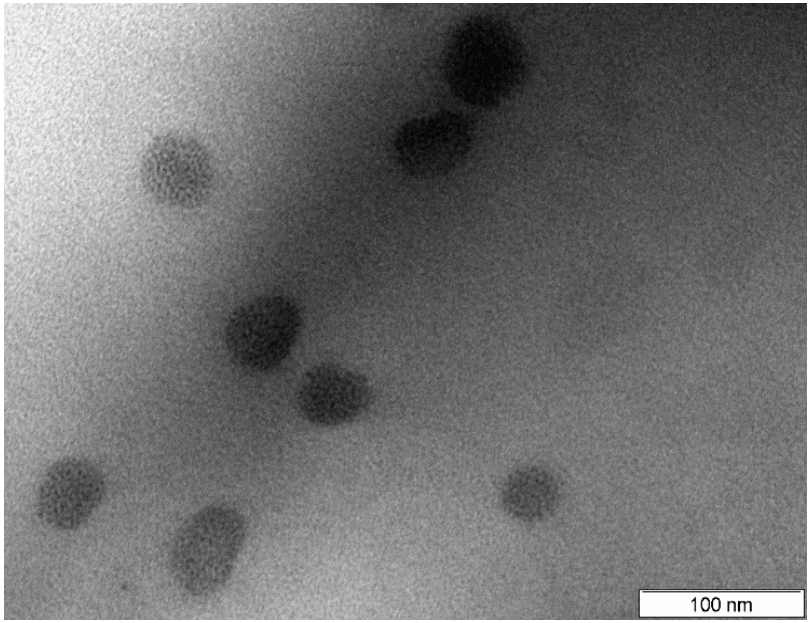
Researchers developing BPA-free polycarbonate from limonene and CO2

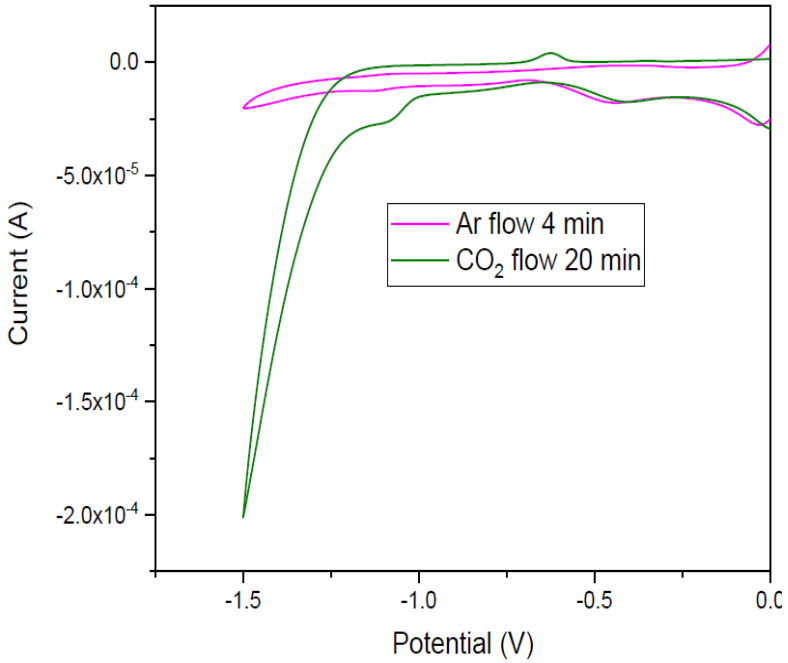


Polycarbonates are everywhere. Several million tons of polycarbonate are produced every year around the world. However, worries about the dangers of this material are increasing because of the toxicity of its precursors, especially bisphenol-A, a potential carcinogen.

ICIQ and CO_2 valorization

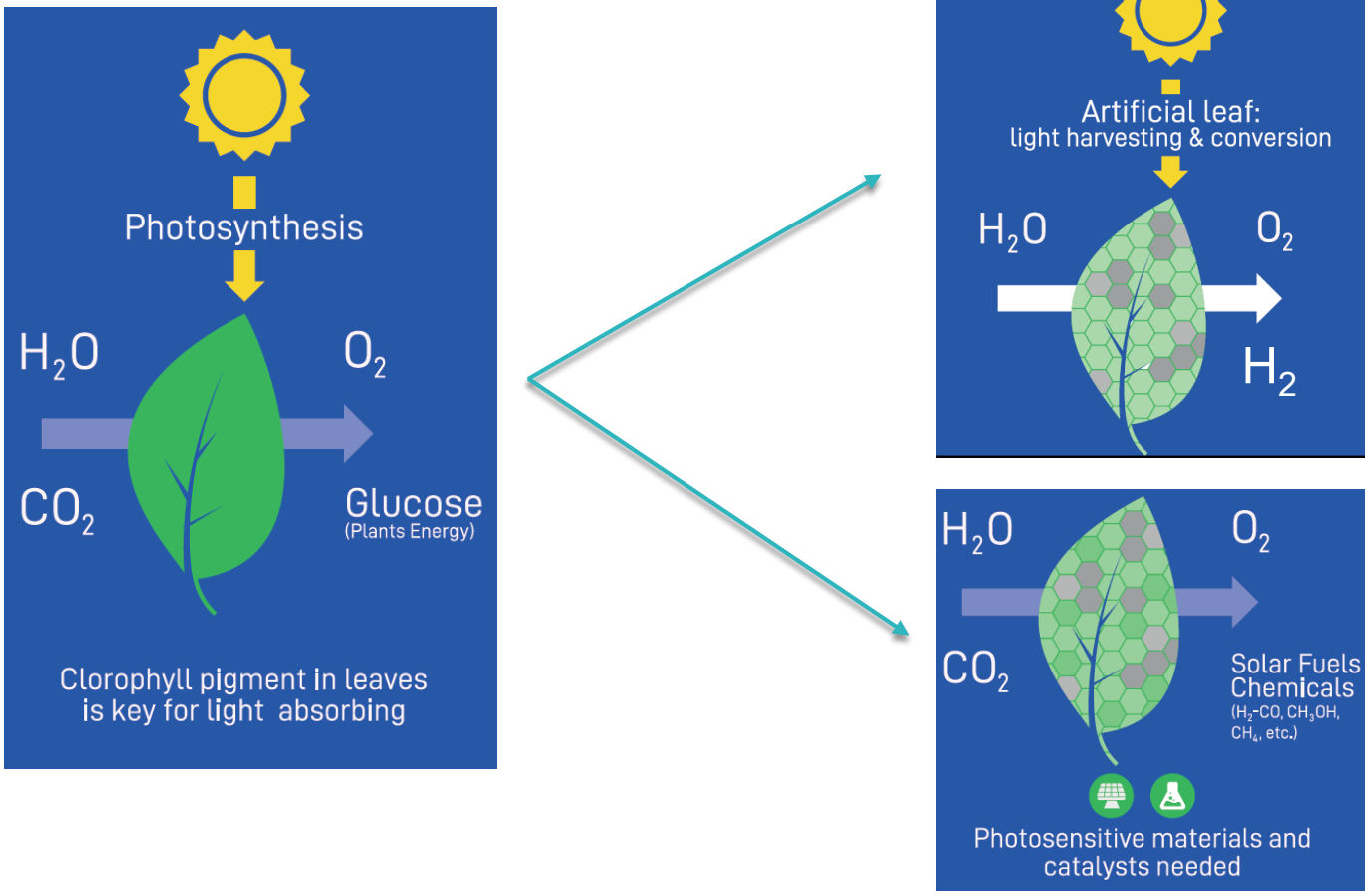
✓ CO_2 as a feedstock for new molecules





ICIQ and Artificial Photosynthesis

✓Generation of Solar Fuels



ICIQ projects examples

AN ARTIFICIAL LEAF:
A photo-electro-catalytic cell from earth-abundant materials for sustainable solar production of CO_2-based chemicals and fuels

a-leaf

www.a-leaf.eu

European Commission

FETPROACT-2016 732840

- ✓ BEYOND PHOTOVOLTAICS
- ✓ A BOTTOM-UP APPROACH
- ✓ VALUE FOR MONEY

ICIQ Institut Català d'Investigació Química · ETH Zürich · Universiteit Leiden · instituto IMDEA nanociencia · EPFL ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE · TU WIEN · UNIVERSITAT JAUME·I · Imperial College London · TECHNISCHE UNIVERSITÄT DARMSTADT · JÜLICH FORSCHUNGSZENTRUM · UNIVERSITÉ DE MONTPELLIER · ALBA · covestro

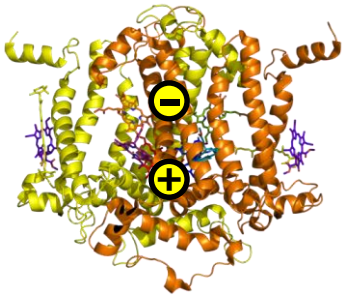
ICIQ projects examples

BioInspired_SolarH2: Engineering Bio-Inspired Systems for the Conversion of Solar Energy to Hydrogen

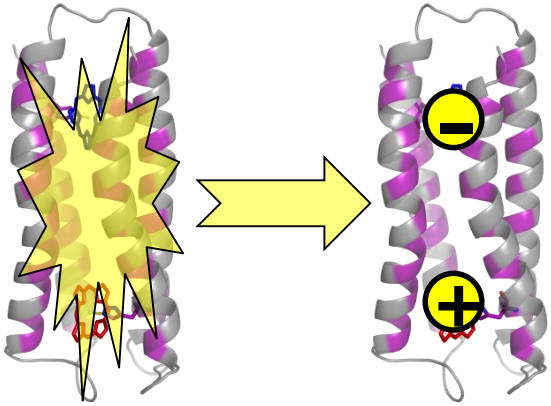
Learning

Design and costruction

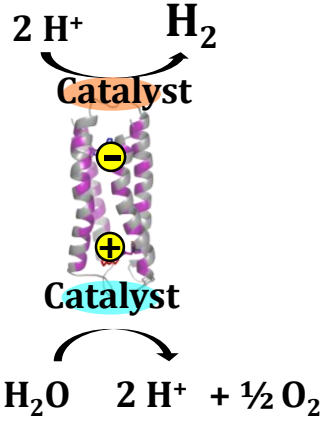
Implementation



photosynthesis



Light absorption *Charge separation*



Device Concept

ICIQ as Platform for Future Researchers

H2020 Innovative Training Networks

ELCOREL: Electrochemical Conversion of Renewable Electricity into Fuels and Chemicals

PhotoTrain: Entrepreneuring Dynamic Self-Organized Interfaces in Photocatalysis: A Multidisciplinary Training Network Converting Light into Products

eSCALE: A bio-inspired research program for the development of a device capable of transforming solar energy into its chemical form, to store it in the molecular scale.

SOLAR2CHEM: European network for the training of the next generation of scientists in solar chemicals for a sustainable Europe by hybrid molecule/semiconductor devices

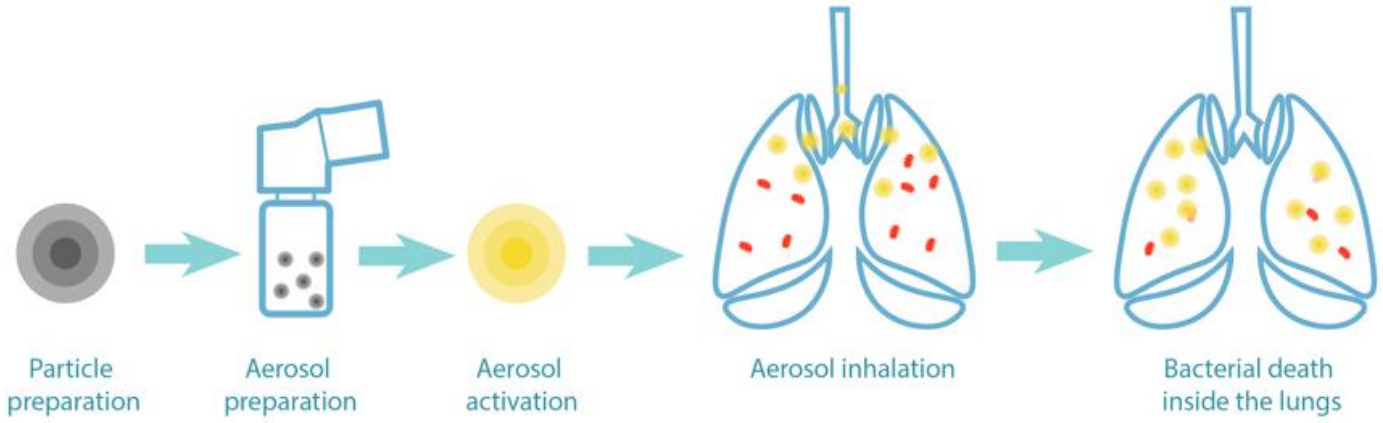
CO2PERATE: Cooperation towards a sustainable chemical industry

SUNRISE: EU project – Science Policy

ICIQ – Institute of Chemical Research of Catalonia

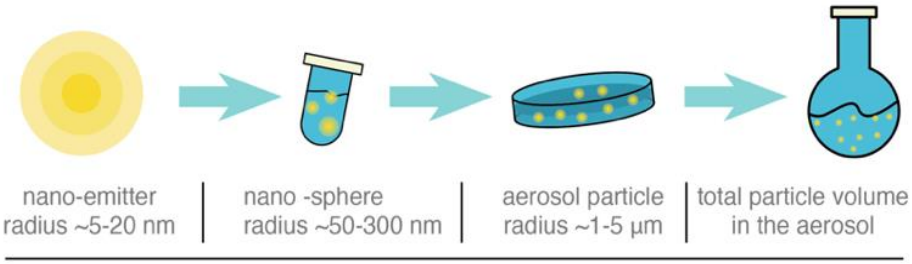
- **LC-SC3-RES-2-2020**: International cooperation with Japan for Research and Innovation on **Advanced biofuels and alternative renewable fuels**. RIA. TRL's 3 5MEuros

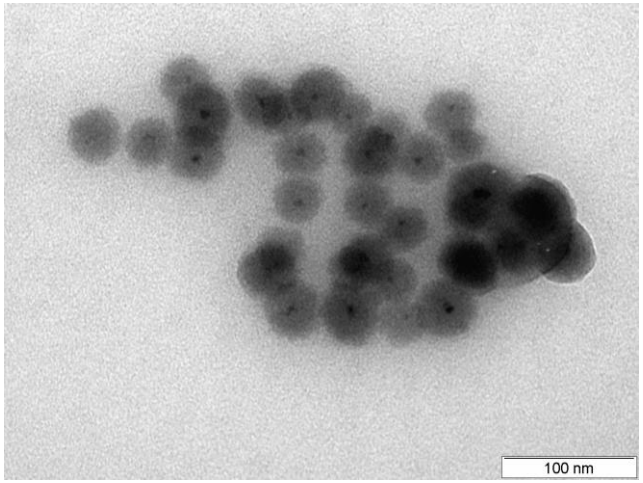
Light4Lungs



Nanoscience for health: The Concept.

Light4Lungs





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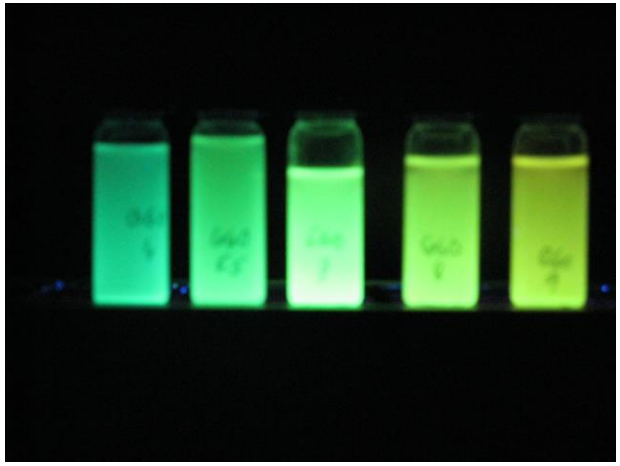

Nanoscience for health: The Concept.

Thank you!.

Generalitat de Catalunya

ICREA

BIST Barcelona Institute of Science and Technology

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European Research Council erc

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