

SUnlight-driven Next Generation Artificial photosynthesis bio-hybrid TEchnology platform for highly efficient carbon neutral production of solar fuels

Timeline | 10/2023 to 09/2027

Overall Budget | 4 897 007.05 €

ICIQ's Budget | 461 187.50 €

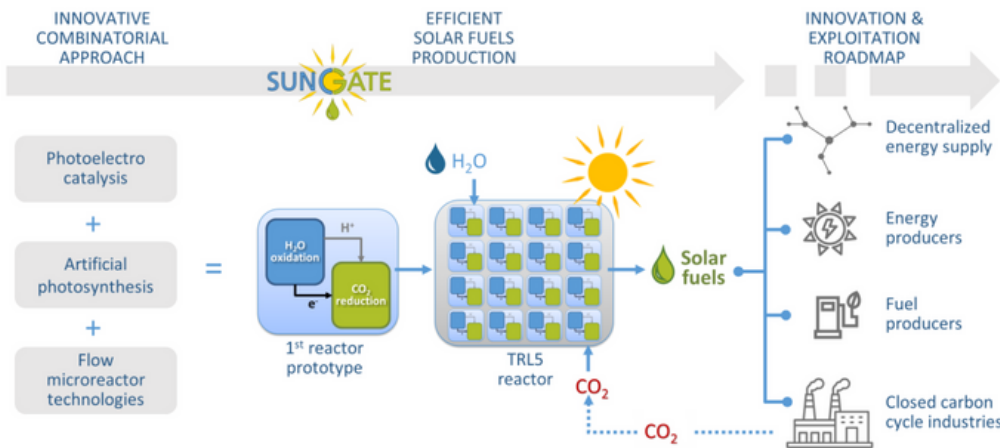
ICIQ People | [Antoni Llobet Research Group](#)

<https://cordis.europa.eu/project/id/101122061>

Call | [HORIZON-CL5-2022-D3-03](#)

SUMMARY

Artificial photosynthesis (AP) is a promising approach for solar fuel production, but current systems are inefficient, expensive and unsuitable for industrial deployment. The interdisciplinary **SUNGATE** consortium of 12 partners from six EU countries and Turkey will overcome these limitations by combining the principles of AP with photoelectrocatalysis and flow microreactor technology, leading to the first modular full-cell continuous flow microreactor technology that requires only sunlight (as an energy source) plus water and CO₂ (as simple, abundant feedstocks) for conversion into solar fuels such as methanol and formate. The technology will operate at room temperature and neutral pH using aqueous solutions. In contrast to state-of-the-art photoelectrochemical (PEC) technologies, **SUNGATE** will not use toxic or critical raw materials, and will combine efficient water oxidation catalysts, with biological components such as photosystem I and enzymes, novel CO₂ reducing catalysts and nanostructured diamond-based cathodes to radically improve the efficiency of conversion. The unique modular and scalable design of **SUNGATE** technology will allow the decarbonised production of solar fuels by increasing the size of the microfluidic PEC device or by numbering up the PEC modules, thus providing the flexibility for diverse applications ranging from decentralised energy infrastructure to closed carbon cycles for industries that emit large amounts of CO₂. **SUNGATE** aims to achieve proof of concept at TRL5, heralding a technology breakthrough that has the potential to secure the future global energy supply at an affordable cost. This meets the central goal of the European Green Deal and the European Climate Law to achieve climate neutrality by 2050. **SUNGATE**'s diverse mix of academic, RTOs and industry partners will allow the full validation of the technology, including life cycle assessment, as well as effective dissemination and knowledge transfer to accelerate industrial take up.



CONSORTIA

Fraunhofer
Project coordinator
