Electra-4-Fuel

Fabrication of Highly Efficient Electrodes for the Production of CO under Industrial Relevant Conditions in Electrolyzers

Timeline | 12/2022 to 11/2024

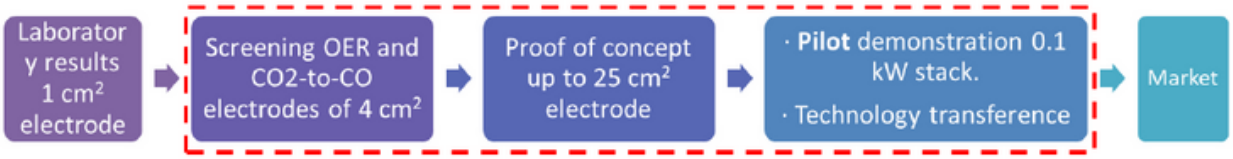
ICIQ People | J. Lloret Research Group

Budget | 115.000,00€

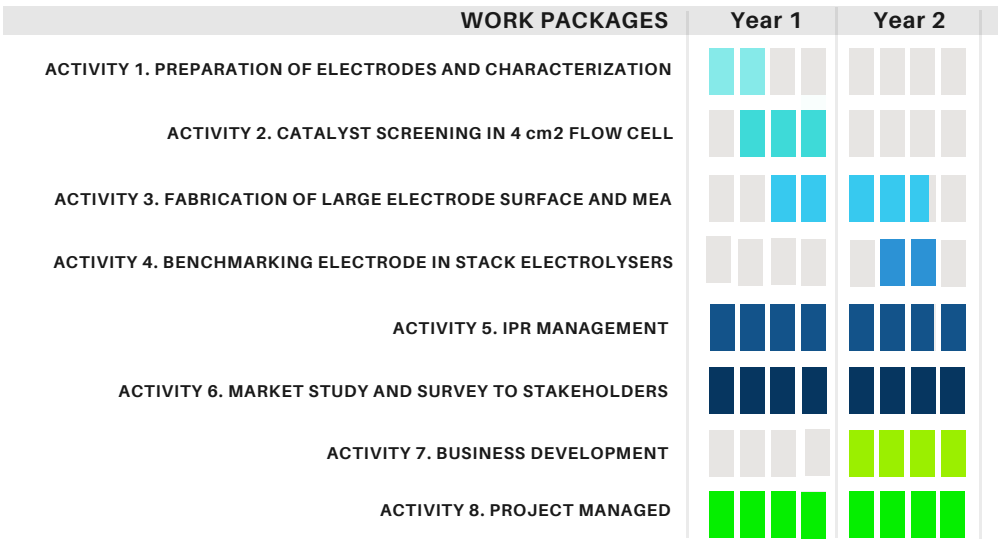
Call | Pruebas de Concepto 2022

SUMMARY

ELECTRA-4-Fuel comprises the validation of new technology for the fabrication of catalytic electrodes, the solution-combustion method, in CO2 electroreduction to carbon monoxide (CO). CO obtained from CO2 electrolysis, when using renewable energy, is an excellent product to advance in the decarbonization of our society, providing access to platform chemicals. Nevertheless, CO2 to CO electrolysis technologies still suffer from low current densities and high overpotential. It can not yet beat economically the CO obtained from producer gas, a mixture mainly containing carbon monoxide and nitrogen, formed by the combustion of carbon in the air at high temperatures. Moreover, this process is associated with undesired CO2 emissions. Our patented solution-combustion method allows the growth of catalytically active materials on top of metal such as carbon-based gas diffusion layers, metal foams, and felts, forming stable and active catalysts that can operate at pH 10-13. Our method is fast and straightforward, versatile, more catalytic efficient and cost-effective. We have proved that our method can be directly growth outperforming CO2-to-CO and OER catalytic materials (and a broad scope of metal nanoparticles, highly entropic nanostructures of metal oxides, sulfides and phosphides) on top of current collectors (carbon-GDLs) in less than 100 seconds, form simple precursors, at low-temperature ignition. **ELECTRA-4-Fuel** will advance the technology to the market by validating the solution-combustion method to generate electrodes operative under industrially relevant conditions. The project plans to scale the preparation of the state-of-the-art CO2-to-CO catalysts and electrodes from a small flow cell electrolyzers (4 cm2) to a membrane electrode assembly of 25 cm2. IP protection and market studies are already showing the relevance of the technology. More importantly, the solution-combustion method is universal to produce a wide variety ofcatalytic materials and, therefore, applicable to many different electrochemical processes with a potential transversal impact.



WORK PLAN



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