



Bari, November 7, 2022

Development of new sustainable technologies to produce solar fuels through the direct coprocessing of, possibly atmospheric, CO₂ and water using sunlight as primary energy source

*On November 9 and 10, 2022, the Kick-off Meeting of the European Project DESIRED will take place in the Sala del Consiglio – Palazzo Ateneo, University of Bari. DESIRED has been funded within the programme Horizon Europe Research and Innovation Action-Energy for Future for 3.1 M€. DESIRED, coordinated by **Angela Dibenedetto**, Professor of Inorganic Chemistry and Catalysis at the University of Bari and Director of the Interuniversity Consortium on Chemical Reactivity and Catalysis CIRCC, is devoted to the **development of new sustainable technologies to produce solar fuels through the direct coprocessing of, possibly atmospheric, CO₂ and water using sunlight as a primary energy source.***

DESIRED is one of the nine projects funded by the EU under the Horizon Europe call HORIZON-CL5-2021-D3-03 on 'Next generation of renewable energy technologies'. The project, scored 15/15, involves seven partners from six EU-countries, both academic and industrial partners. DESIRED has a duration of four years (until 2026) and is aimed at producing C₂+ solar fuels (without overlooking C₁ species such as methanol) by direct coprocessing of CO₂ and water using novel and recyclable hybrid photo-electrocatalysts in an innovative photoreactor design.

The research activities fall within the scope of the European strategy for sustainable development, in line with the 2030 Agenda and the European Green Deal and with what is required by the EU, through the activities of Mission Innovation Green Powered Future, aimed at developing sustainable fuels that use sunlight.

DESIRED will involve scientists from CIRCC - University of Bari (Angela Dibenedetto) and Polytechnic University of Marche (Alessandra Norici), Charles University - Prague (Jiří Čejka and Ewelina Szaniawska), University of Warsaw (Renata Solarska), IMDEA Energy Institute - Madrid (Javier Dufour and José Luis Galvez) and industrial partners such as Institute for Sustainable Technologies (AEE INTEC) - Wien (Bettina Muster and Sarah Meitz), eBOS - Technologies LTD - Cyprus (Panayiotis Klitou), IC²R – Bari, Italy (Michele Aresta).

DESIRED will aim at **validating three main research hypotheses:**

- **Novel and recyclable hybrid photo-electrocatalysts** based on *p-n* junctions and supported on a bio-matrix ("frustules" of diatoms) or an inorganic material (new-design zeolites) can render direct solar-driven coprocessing of CO₂ and water both efficient and sustainable.
- **Oscillatory principles**, which have proven effective for processing thick slurries in the biorefining sector, can, for the first time, be applied to increase the yield of catalytic reactions in a photo- or photo-electro-reactor.

- **Appropriate solar collector configurations** can be optimized for the photo-electro-catalytic process by new model development and simulation.

DESIRED, through in-depth and detailed studies on life cycle assessment, will highlight the environmental, social, and economic benefits of such an innovative system for the European industry, for potential application sectors and, for citizens, opening up new opportunities for the new labor market and new technologies to be exported to countries poor in fossil carbon.

With regards to applications, DESIRED will aim at producing products that may be used, by 2040, either *per se*, or as intermediates in the Chemical industry, or else as non-fossil-C-based raw materials of molecules well-suited as **drop-in fuels for sectors where the direct shift to batteries or H₂ is not a technically or cost-efficient option (e.g., aviation)**.

DESIRED will promote an **interdisciplinary, cross-sectorial, and international approach** to research and innovation undertaken by **a consortium of 7 European partners** and complemented by **crosscutting activities**, including modeling, process simulation, Life Cycle Assessment, Techno-Economic Assessment, and standardization activities, as well as impactful dissemination, communication, capacity-building and exploitation activities supporting the exchange of knowledge across and beyond the consortium and project.

Angela Dibenedetto is a Full Professor of Inorganic Chemistry and Catalysis at the University of Bari Aldo Moro, Department of Chemistry. Since 2012 she is Director of the CIRCC Consortium which has given great visibility to the University of Bari at national and international levels. Since 2012 she is Vice-President of the International Scientific Committee of the International Conference on the Utilization of Carbon Dioxide. She is the Bari coordinator of the ERASMUS MUNDUS BIOREF International Degree Course. Since 2021 she is a member of the Scientific Committee of the European Association CO₂ Value Europe. Since 2021 she is the main member of the Working Group on Chemicals of the EU Platform - Just Transition Platform (JTP).



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