M-ERA-NET 2024: Topic 1: Sustainable advanced materials for energy

Consortium overview: Project Hydro4E (TRL 2-4)

WP1: Design, synthesis and characterization of hydrogels and hybrid materials (electrodes, supports) for flow cell battery

→ UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH; HTW; UNIVERSITÉ DE LYON; + 5th partner

WP2: Fundamental characterization of flow behaviour and mechanisms of electrochemical reactions and charge transport processes in batteries.

→ UNIVERSITÉ DE LYON; Aalto University; + 5th partner

WP3: Experimental proof-of-concept and validation of the advanced materials in fuel cell bateries with solar irradiation (Lab tests).

→ UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH; Aalto University

WP4: Sustainability and end-life treatment approaches (biodegradation, LCA, upcycling)

→ HTW; UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

WP5: Dissemination of the scientific results to academic and non-academic public.

→ All partners

Partners presentation and roles

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Prof. Dr. Elaine Armelin [elaine.Armelin@upc.edu]
Full Professor
Department of Chemical Engineering
https://imem.upc.edu/en

Role in the project: Coordinator and Partner 1

Preparation of the new hydrogels to be used as semi-solid electrolytes. Chemical and physical characterization (composition, morphology, mechanical integritity, UV absorption, etc.). Evaporation rate efficiencies of solar absorber systems. Biodegradation laboratory.

Team qualification in the field of proposal:

The research team will be formed by experts in hydrogels preparation, modification of them with thermal absorber particles and compounds, and characterization. One part of the team will use computational modelling to approach the interactions of the hydrogels with water and other particles, such as the thermal and photon absorbers.

Partners presentation and roles

Prof. Dr. Kathrin Harre [elaine.Armelin@upc.edu]
Full Professor
Faculty of Agriculture/Environment/Chemistry
https://www.htw-dresden.de/luc/ueber-uns/personen/professoren/harre-prof-dr-rer-nat-kathrin

Role in the project: Partner 2

Preparation of the new hydrogels to be used as semi-solid electrolytes for water and energy supply. Particularly focused in their expertise area working with bio-based hydrogels from polysaccharides and other natural sources. Chemical and physical characterization (composition, rheologic properties, etc.). Combination of such biopolymers with synthetic materials to enhance transport and mechanical properties. Laboratories facilities for composting studies and LCA analysis (sustainability).

Team qualification in the field of proposal:

The research team will be formed by experts in hydrogels preparation and characterization. Experts in LCA and composting studies, among others.

Dr. Thomas Sánchez [thomas.sanchez@univ-lyon1.fr]
Associate Professor
MT2E Dep. (Energy Transition and Efficiency)
LMC² Lab. (Composite Materials for Construction)

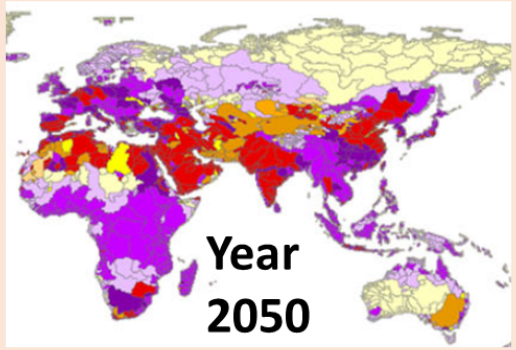
Role in the project: partner 3
Characterization of the new electrodes and support materials based in ceramic compounds, in terms of water flow behaviour.
Team qualification in the field of proposal:
Team to be determined.

Dr. Yaolin Xu [yaolinxu.freedom@gmail.com]
Associate professor
https://www.aalto.fi/en

Role in the project: partner 4
Characterization of the fuel cell batteries, focusing in the Interpretation of mechanisms of electrochemical reactions and charge transport processes, respectively, in terms of electrical transport.
Team qualification in the field of proposal:
Team to be determined.

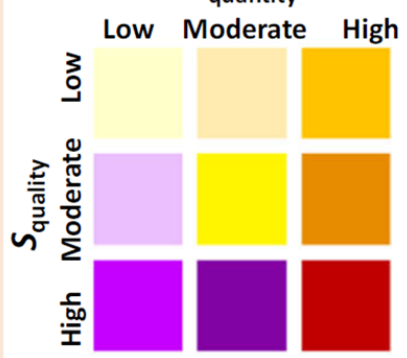
Hydro4E project overview

Rationales



Clean water scarcity: CWS

Number of hotspots:



Implementation & Outcomes

Facing the water stress with solar absorber hydrogels and sunlight irradiation.

Impact

The European Green Deal

✓Water: affordable & reliable

✓Green energy and resources

SDGs United Nations

Hydro4E: addressing freshwater scarcity by using the sea and the sun resources (green water) and adding value to flow cell batteries.