

## 4-year (FPI) PhD-Fellowship Fundamentals and application of an all-Organic Mediated Redox Flow Battery (OMBAT)

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**Project Summary:** Li-ion batteries (LiB) dominate the market due to its high energy density, high energy efficiency and its level of maturity. However, LiBs still present a number of limitations, which has triggered much interest in other battery technologies. The next-generation batteries must have sustainable and eco-friendly aspects not considered before and prioritize the accessibility to the required raw materials.

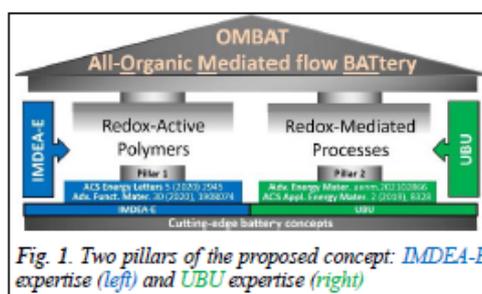
The overall objective of OMBAT project is to lay the foundations of a next-generation of sustainable Redox Flow Battery (RFB), which relies on the use of sustainable redox-active polymers and organic molecules through redox-mediated processes. This new mediated-RFB will overcome the present limitations of state-of-the-art batteries, i.e. energy density, sustainability, safety and cycle-life. To achieve so, the energy density of Aqueous Organic Redox Flow Battery will be boosted through direct electrochemical mediation between redox mediators dissolved in the electrolytes and organic solid boosters (ultrastable redox microporous polymers) located in the external tanks. The redox mediators that are charged in the reactor will react spontaneously with the solid boosters acting as a molecular wire so energy will not only be stored in the redox mediators but principally in the organic solid boosters. In this way, the energy density of the device will not depend anymore on the concentration of the redox species but in the specific capacity of redox booster that is one-two orders of magnitude higher that of dissolved redox molecules.

**Key words:** redox-active polymers, redox mediators, organic batteries, redox flow batteries, electrochemistry

**Eligibility:** Applicants must have a BSc and MSc in Chemistry, Chemical Engineering or similar. Knowledge in synthesis and characterization of organic compounds and/or electrochemistry will be highly valued.

**Applications:** Applications open between **Jan 12-26<sup>th</sup> (14:00h) 2023**. All applications should be submitted online, via the following web page:

<https://www.aei.gob.es/convocatorias/buscador-convocatorias/ayudas-contratos-predoctorales-formacion-doctoresas-2022>



*Fig. 1. Two pillars of the proposed concept: IMDEA-E expertise (left) and UBU expertise (right)*