POSTDOCTORAL RESEARCHER POSITION TO WORK ON NEW GENERATION OF REDOX FLOW BATTERIES

Short Description: IMDEA Energy is opening a Postdoctoral Position for the Electrochemical Processes Unit to work on a next-generation of sustainable Redox Flow Battery (RFB), which relies on the use of solid boosters and organic molecules through redox-mediated processes.

Project Summary: Energy Storage Systems (ESSs) have become key elements for achieving a sustainable energy and transportation system. Among the EESs, different battery technologies hold great promises for enabling the necessary transition from fossil fuels to renewable sources. However state-of-the-art flow (All-Vanadium and Zinc – Br2) and static (Na-ion and Li-ion) battery technologies fail to satisfy all key performance indicators, e.g. sustainability, cycle life, recyclability, energy and power decoupling, cost or energy density.

The selected Postdoctoral candidate will contribute to lay the foundations of a next generation battery technology named Mediated Redox Flow Batteries. This technology which will overcome critical limitations of state-of-the-art battery technologies exhibiting an excellent balance among these key performance indicators. The radically new vision of this novel battery technology relies on a combination of unconventional thermodynamically-driven concepts that will lead to a paradigm shift in energy storage. The proposed new battery technology relies on a flowing configuration system that:

i) possess the intrinsic benefits of flowing systems (energy conversion reactor separated from energy storage reservoir),

ii) boost the energy density by storing energy in solid materials confined in the external reservoirs, and

iii) guarantee the stability of the systems over long periods of time by using immiscible liquids.

The selected postdoctoral candidate will be involved in the MeBattery European Project (https://www.mebattery-project.eu/) and will be beneficiated of the complementary expertise of the highly qualified partners of MeBattery consortium (including 3 ERC awardees). The final prototype aims to demonstrate a long-life, safe and eco-friendly flow battery technology based on noncritical materials.

Tasks Description:

- ✓ Research on Fundamental Electrochemistry and Advanced Redox Flow Batteries (RFB) at lab scale.
- ✓ Investigation of biphasic liquid-liquid systems for application in membrane-free RFB
- ✓ Formulation and Characterization of Redox Electrolytes containing organic redox species (solubility, viscosity, redox potential, kinetics and reversibility of redox reactions).
- ✓ Electrochemistry of battery electrode materials (Prussian blues and redox polymers) and application as solid boosters in RFB.
- ✓ Operation of electrochemical reactors for Mediated RFBs incorporating solid booster.

MeBattery has received funding from the European Innovation Council (EIC) under grant agreement No 101046742. The EIC receives support from the European Union's Horizon Europe research and innovation programme.

- ✓ Participation in national and international research projects in Electrochemical Energy Storage
- ✓ Communicate and disseminate research results through high-quality scientific channels including high impact scientific publications, presentation in international conferences, etc.
- ✓ Writing project proposals to national and international calls related to the topic.
- ✓ Supervision of PhD, Master or undergraduate students.

Compulsory Requirements

- ✓ PhD degree in Chemistry, Material Science, Physics, Electrochemistry, Chemical Engineering, or related areas.
- ✓ Hand-on experience in electrochemistry and/or electrochemical energy storage devices.

Merits to value:

- ✓ Proven experience in assembling and testing of small prototypes of batteries, in particular RFB.
- ✓ Solid background and proven skills in electrochemical characterization techniques (CV, galvanostatic charge-discharge, RDE, etc).
- ✓ Solid background in energy materials and their characterization.
- ✓ International Post-doctoral experience in energy storage.
- ✓ Experience in international research projects and collaborations.
- ✓ Meritorious publishing track-record in related topic.
- ✓ Proficient oral and written communication skills in English

Selection criteria

- ✓ Adequacy of the candidate's training to the requested profile.
- ✓ Work experience related to the profile of the job position.
- ✓ Knowledge of English.
- ✓ Motivation for accomplishing high-quality research.

Remuneration: Between 38.000€ – 41.000€ per year, depending upon qualification and expertise.*The contract includes all the benefits of the Spanish Public Health and Social Security System.

Duration of the contract: up to three years depending on performance.

Applications: https://jobs.energy.imdea.org/en/offer/150

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