



UPV EHU **POLYMAT**



Vacancy

Reg.-Nr. [20.13 EQ3 PRE]

Application deadline: [30/04/2020]

POLYMAT is a Basque Excellence Research Center and Research Institute at the University of the Basque Country, in Donostia-San Sebastian. The aim of POLYMAT is to develop a vibrant use-inspired fundamental research on synthesis, assembly and processing of polymers to contribute to the development of polymers, enabling addressing some of the technological needs of the 21st Century in fields such as energy, electronics, health care and sustainability.

The Institute IMDEA Energy is a Research Centre created by the Regional Government of “Comunidad de Madrid” to develop world-class R&D on clean and renewable energy. The aim of the Institute is to make a significant impact in all energy-related research topics by bringing together high quality researchers, providing them with excellent infrastructures and resources and promoting their close collaboration with the industrial sector. The Institute IMDEA Energy wants to fill at the earliest possible date one position as

Early Stage Researcher Position

in the EU Horizon 2020 Marie Skłodowska-Curie Project **POLYSTORAGE-ETN, Grant Agreement No 860403.**

POLYSTORAGE ETN aims to develop high-quality training opportunities for 16 Early-Stage Researchers (ESRs) (one financed with Australian funds) in the area of “Polymers for Next Generation Electrochemical Energy Storage”. The final objective is the training of materials scientists, who will be the future scientific leaders, to face some of the upcoming European energy and environmental challenges. Well-balanced combination of fundamental and basic material and polymer science with applied research in advanced energy storage devices is a key aspect of this training network. A comprehensive training programme has been designed at two levels including local activities, such as enrolment in PhD programmes, local courses, etc., and network-wide activities, such as sectorial secondments, six workshops, two schools and one final conference. The goal of the project is the exploitation of the high number of potential synergies between innovative polymers and next-generation energy storage technologies, such as post-lithium batteries, redox flow batteries, and all-polymer batteries. POLYSTORAGE assembles 12 beneficiaries (incl. 2 industries) and 13 partners (incl. 11 industries). POLYSTORAGE academic partners are internationally renowned for their research and training activities in polymer science (University of Jena (Germany), University of the Basque Country (Spain), University of Leuven (Belgium), University of Pau (France), Aalto University (Finland)) and energy storage (Karlsruhe Institute of Technology (Germany), Uppsala University (Sweden), Politecnico di Torino (Italy), Imdea Energy (Spain), National Institute of Chemistry (Slovenia) and Deakin University (Australia)). The 13 industries offering complementary expertise are LITHOPS SRL (Italy), E22 Energy Storage Solutions (Spain), Scania CV AB (Sweden), Toyota Motor Europe (Belgium), Evonic Creavis GmbH (Germany), TCI Europe (Belgium), CALIX – Europe SARL (France), Chemspeed Technologies AG (Switzerland), NETZSCH Gerätebau GmbH (Germany), Solvionic S.A. (France), Repsol S.A. (Spain), Tokyo Chemical Industry Co., Ltd. (Japan) and Calix Limited (Australia). The industrial partners will have an active participation in the training activities and exploitation of the project results.

Description of Individual ESR project:

Title: Development of redox-active colloids/suspensions for semi-solid redox flow batteries

Objectives: The main objective of this PhD study is the development of redox-active colloids or suspensions of polymer-based particles. The redox-active particles should act as individual charge carriers incorporating redox functionalities into a well-defined polymer 3D structure for facile charge transport. Translation of the semi-solid redox flow battery concept, already demonstrated for inorganic materials (lithium-ion, sodium-ion chemistry), to the polymer field. The suspensions will contain redox-active moieties derived from quinones, viologens, nitroxides, catechols, etc., which will provide the reversible redox behaviour. This project will include (i) synthesis of redox-active polymer dispersions, (ii) preparation of conductive suspensions using conducting polymers or carbonaceous additives, (iii) electrochemical investigation of redox-active suspensions, (iv) investigation of semi-solid redox flow batteries using redox-active materials with different redox potentials.

Expected results: Boosting the energy density of polymer redox flow batteries by developing a technology in that the energy density does not depend on the solubility of the redox species in the electrolyte but on the solid content of the suspension.

Host institution 1: POLYMAT_ University of the Basque Country (Spain)

(<http://www.polymat.eu/>)

Host institution 2: IMDEA Energy

(Spain) (https://www.energia.imdea.org/research_units/)

PhD enrolment: University of the Basque Country (Spain) (<http://www.polymat.eu/>)

Main supervisor: Prof. David Mecerreyes (david.mecerreyes@ehu.es) from University of the Basque Country and Dr. Rebeca Marcilla (rebeca.marcilla@imdea.org) from IMDEA Energy Institute

Start of employment: As soon as possible

For any additional information, please contact Prof. David Mecerreyes or Dr. Rebeca Marcilla (david.mecerreyes@ehu.es) (rebeca.marcilla@imdea.org)

Your tasks:

- To conduct experiments on the synthesis of redox active polymers following advanced polymerization routes.
- To perform the physicochemical characterization of synthesized polymers.
- To perform the electrochemical characterization of polymer-based electrodes and electrolytes by conventional electrochemical techniques such as cyclic voltammetry, galvanostatic charge-discharge, electrochemical impedance spectroscopy, etc)
- Assembling&Testing of polymer-based batteries.
- To undertake research, e.g., by planning, preparing, setting up, conducting and recording the outcome of experiments, performing data analysis, desktop research etc.
- To participate in maintaining laboratory facilities and assist other members of the group by sharing knowledge and expertise. To collaborate with others to tackle interdisciplinary problems in close cooperation with experts from adjacent disciplines in chemistry, electrochemistry and engineering.

- To actively participate within the research group, communicating and presenting research at meetings, through publications and other recognised avenues as appropriate, ensuring information is communicated to internal and external partners.
- To contribute to research publications and presentations as required.
- To analyse and communicate complex ideas, concepts and data using appropriate methods.
- To resolve issues and support senior colleagues in devising procedures required to ensure accurate and timely reporting.
- To generate research output and contribute to the development of independent and original ideas as appropriate.
- To maintain and update area of specialist knowledge, researching and critically appraising relevant literature within the area.
- To undergo personal and professional development that is appropriate and that will enhance performance.
- Any other duties not included above, but consistent with the role.

Requirements:

- Bachelor Degree on General Chemistry, Organic Chemistry, Polymer Chemistry, Material Science, Chemical Engineering or similar.
- A Master's degree (or equivalent) in General Chemistry, Organic Chemistry, Polymer Chemistry, Material Science, Chemical Engineering or equivalent relevant research experience. The degree must be obtained before the beginning of the contract but you can apply before.
- Expertise in organic synthesis, polymer synthesis and electrochemistry is desired.
- Knowledge of research methods and techniques within specialist field.
- Proven ability to analyse complex information and summaries appropriately.
- Proven communication skills, including presentation to various audiences.
- Excellent organisational and team-working skills.
- Proven ability to demonstrate creativity, innovation and accuracy within work.
- Excellent written and oral communication skills in English

We offer:

- To become part of a highly motivated, international, dynamic young project team.
- 18 month of contract at University of the Basque Country (San Sebastián, Spain) followed by additional 18 moths of contract at IMDEA Energy (Madrid, Spain).
- To join two research institutions; University of the Basque Country (<http://www.polymat.eu/>) and IMDEA Energy Institute (https://www.energia.imdea.org/research_units/) both formed by a talented group of researchers (seniors, postdocs, technicians and predocs) with excellent infrastructures and resources to protote successful scientific results
- To benefit from further continuing education, which includes internships and secondments, a variety of training modules as well as transferable skills courses and active participation in workshops and conferences in addition to the individual scientific PhD project
- **Planned secondments:**
- In addition to the individual scientific project, the fellow will benefit from further continuing education, which includes secondments. In this project, the following secondments are planned: 4 months at Friedrich Schiller University Jena (Germany) (<https://www.uni-jena.de/>) to work on the synthesis of redox-active polymers and 5 months at E22 Energy Storage

Solutions (Spain) (<https://energystoragesolutions.com/>) to perform research on semi-solid redox flow batteries at semi-industrial scale.

Additional Information

ESR eligibility criteria

There are strict eligibility requirements for the ESR PhD positions. Please ensure that you qualify before applying, as ineligible candidates cannot be considered.

Researchers

- **MUST** be in the first 4 years (full-time equivalent) of their research careers and not yet have been awarded a doctorate. This 4-year period is measured from the date of obtaining the degree which would formally entitle to embark on a doctorate.
- **MUST NOT** must not have resided or carried out their main activity (work, studies, etc.) in Spain for more than 12 months in the 3 years immediately prior to their start date of the contract. Compulsory national service, short stays, such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account.

For more information on MSCA-ITN, visit <https://ec.europa.eu/research/mariecurieactions/>

Applicants must confirm and be prepared to provide evidence that they meet the Marie Skłodowska - Curie eligibility criteria as specified above.

English language: It is a requirement that applicants will show that their ability to understand and express themselves in both written and spoken English is sufficient for them to derive the full benefit from the network training, and to embark on a doctorate at a university.

The Marie Skłodowska-Curie programme offers highly competitive and attractive salary and working conditions. The successful candidates will receive a salary in accordance with the Marie Skłodowska - Curie regulations for early stage researchers. Exact salary will be confirmed upon appointment.

The vacant position is limited to 3 years (18 months at University of the Basque Country + 18 months at IMDEA Energy). The position offers the possibility to graduate as a PhD.

Both University of the Basque Country and the IMDEA Energy Institute are committed to ensuring an environment that provides equal opportunities and promotes diversity as well as a good balance between university and family life.

As an equal opportunity employer, we strive to increase the number of women working in the field advertised.

Disabled persons are explicitly encouraged to apply. They will be given preference if appropriately qualified.

Have we piqued your interest? Then please submit your application including the following documents until 30/04/2020 via the application platform at <http://www.polystorage-etn.eu/> as well as to Dr. David Mecerreyes (david.mecerreyes@ehu.es) and Dr. Rebeca Marcilla (rebeca.marcilla@imdea.org)

- Application form [[link](#)]
- Motivation letter
- Curriculum vitae of at most 3 pages. Europass C.V. format preferred (<https://europass.cedefop.europa.eu/documents/curriculum-vitae>)
- Transcripts and certifications from university:
 - Bachelor degree, including class ranking if possible.
 - Master degree (or equivalent), including class ranking if possible.
- Names of at least two references who are willing to write a letter of recommendation on the candidate's behalf (they may be contacted by us).
- Any other relevant documents.