

JOB POSTING

Recruiting organisation:

Centre National de la Recherche Scientifique CNRS (Laboratoire de Chimie Physique et Microbiologie pour l'Environnement), France

Subproject title:

Rheologic behavior of organic and Zn slurry electrolytes in different charge/ discharge and environmental conditions

Starting date:

1st April 2018 (or earlier if preferred)

Background information:

Marie Skłodowska-Curie European Training Networks (ETNs) are joint research and training projects funded by the European Union. Funding is provided for postgraduate researchers from both inside and outside Europe to carry out individual project work in a European country other than their own.

The training network “FlowCamp” is made up of 11 partners, coordinated by Fraunhofer ICT in Germany. The network will recruit a total of 15 postgraduates for project work lasting for 36 months.

Renewable energy sources like wind turbines require large-scale, stationary energy storage systems to balance out fluctuations in energy generation. FlowCamp will advance the development of one of the most promising storage systems: redox-flow batteries (RFBs). The recruited fellows will develop materials (membranes, electrodes, electrolytes, catalysts, sealing materials) and macrohomogeneous models for three next-generation RFBs (hydrogen-bromine, organic and zinc-air systems). They will

then upscale the new systems to prototype level and validate them using the cutting-edge battery testing facilities available for the prestigious German-funded RedoxWind project at Fraunhofer ICT. The new RFB technologies can be combined in energy storage systems tailored to a wide variety of application scenarios, with lower cost, longer service life and higher efficiency than conventional (e.g. Li-ion) storage devices.

Job description:

The advertised subproject will be carried out by one postgraduate (“early-stage researcher”) at CNRS over a period of 36 months.

The objectives of the proposed subproject are the determination of rheological properties and behaviour of organic and Zn-Air based RFBs.

The rheological properties and behavior of the organic RFBs will be determined in correlation with the processing conditions, in particular flow rates and temperature. The evolution of the results with the material formulation i.e. the polymer concentration will also be studied to identify the relevant models and help the simulation and prediction of the behavior of such RFBs.

Regarding the Zn-Air RFBs, different factors influencing the rheology of the slurries will be studied. These include in particular grain charge distribution and shape, volumetric fraction, charge effects, temperature as well as formulation, including the choice and concentration of polymers, additives and dispersants. The understanding of the rheology of slurries is in fact needed in order to produce the ideal material regarding pumping and stability properties. Depending on the evolution of the parameters indicated above, the rheological and flow behavior of different slurries, in terms of formulation and powder's properties, will be characterized using rheometry coupled with various physical methods.

Parameters such as the yield stress, viscosity and settling kinetic will be determined and correlated with the system microstructure (aggregation and percolation mechanisms will be particularly studied) and hence with its stability when used in the RFBs.

The results will also be of great help to determine the relevant model that will be used for the simulation and prediction of the behavior of the RFBs.

This subproject is fully funded by the Marie Skłodowska-Curie European Training Network „FlowCamp“ (H2020-MSCA-ITN-2017). The recruited researcher will have the opportunity to work as part of an international, interdisciplinary team of 15 postgraduates, based at universities and industrial firms throughout Europe. She/he will gain a unique skill-set comprising electrochemistry, material science and cell design/engineering, as well as an overview of different RFB technologies and their implementation at prototype level. She/he is expected to finish the project with a PhD thesis and to disseminate the results through patents (if applicable), publications in peer-reviewed journals and presentations at international conferences.

Requirements:

Qualifications / experience:

- Early-stage researcher: a researcher without a PhD, who is in the first four years (full-time equivalent research experience) of her/his research career, measured from the date when she/he obtained the degree which would formally entitle her/him to embark on a doctorate.
- We seek a MSc level in mechanical or chemical engineering or related disciplines with minimum "distinction" or "upper second class". We are looking for a self-motivated, curious and pro-active candidate with excellent communicative and

organizational skills. A proven affinity or experience in using rheological and light scattering (SLS, DLS) experimental techniques for characterisation of dispersion based colloidal systems speaks strongly in your favour.

Mobility:

The applicant must not have resided or carried out her/his main activity (work, studies etc.) in France for more than 12 months in the past three years.

How to apply:

Please send your CV by e-mail to the following address, quoting the reference „FlowCamp-LRP-ESR1“:

nadia.elkissi@univ-grenoble-alpes.fr

Application deadline: 31.12.2017
