OPEN PHD POSITION FOR MARIE SKŁODOWSKA-CURIE INNOVATIVE TRAINING NETWORKS (MSCA-ITN) AT CSIC

MSCA-ITN
H2O20-MSCA-ITN-2018

PROJECT
Bimetallic catalyst knowledge-based development for energy applications (BIKE)

PhD SUPERVISOR(S)
Maria Jesús Lázaro Elorri and Maria Victoria Martínez Huerta

SCIENTIFIC AREA
Chemistry

HOST INSTITUTION
CSIC

DURATION
36 months

FIXED START DATE:
Application deadline: 30th June 2019
Start date: 1st October 2019

PLANNED SECONDMENT(S):
Host, supervisor, timing, length and purpose. **UDUR**, P. Dyer 12th month, 2 months, to learn about molecular organometallic precursor preparation of bimetallic nanoparticles.
**CNR**, A. Fortunelli, 18th month, 2 months, to learn about predictive modelling. **BAS**, T. Tsoncheva, 24th month, 2 months, to learn about mesoporous oxides preparation.
**HyDEP**, M. Dragoni, 36th month, 1 month, to test electrocatalysts in alkaline electrolyzers.

EMAIL OF THE PhD SUPERVISOR(S)
mlazaro@icb.csic.es and mmartinez@icp.csic.es

WEBSITE OF THE RESEARCH GROUP OR CENTRE/INSTITUTE
https://www.icb.csic.es/grupo/grupo-conversion-de-combustibles-fosiles/
IDEAL CANDIDATES

The ideal candidate should have an academic success. It should prove a compromise with the marked aims, high initiative and dedication and a big capacity for team work. It would be of great interest if it can also manage different languages and has the capacity to be integrated into different foreign research groups.

DESIRABLE CANDIDATE REQUIREMENTS

With a background in chemistry or material science.

BENEFITS

The future career prospects of the Early Stage Researchers, ESRs, as mature scientists would be clearly enhanced and the fellows would:

a) Work on an innovative scientific approach bringing together different disciplines and knowledge;

b) Experience a new country, a new language and new research environments. Through interactions at the host institutes and the research community, they will build new relationships, gain visibility, and greatly strengthen their ability to approach problems from a new direction. They will work in multicultural teams and with multinational companies and universities. This will further progress the working in the field. This goal is achieved by devising a cross sector, application-oriented, multi-disciplinary and synergic intense training plan at 12 European research centres leaders in the Fuel Cells and Hydrogen (FCH) field, in academia and public research institutions (9) and industry (3), integrated with soft skills components, exchange meetings, workshops, schools, courses as appropriate to pursue the BIKE's goal. Industrial members will strongly contribute to cross sector training and validation in industrial environment of BIKE bimetallic catalysts. problem solving, adaptability, teamwork, and communication skills necessary for their personal and professional advancement.

c) Work side by side with renewed scientists with strong international recognition. These collaborations will put the applicant in a great position to develop an international reputation, which will prove essential as they will plan their own.

PhD PROJECT
Development of high performance and stable electrocatalysts for oxygen evolution reaction (OER)

The aim of this project is to study bimetallic electrocatalysts for oxygen evolution reaction in an anion exchange membrane water electrolysis (AEMWE) technology.

AEMWE, employing a hydroxide conducting polymer membrane electrolyte, with electrodes deposited directly onto the membrane surfaces, shows several advantages such as the use of non-noble metals as catalysts, low ohmic resistance, and good gas separation characteristics of membrane electrolyte. The oxygen evolution reaction (OER) and hydrogen evolution reaction are the two important processes that are involved in electrochemical water splitting process that, in case of large-scale, is greatly hindered by the sluggish anodic OER. Even with state-of-the-art precious catalysts (i.e. RuO$_2$ and IrO$_2$) a substantial over-potential is required to drive the OER.

The development of efficient, abundant and inexpensive OER catalysts is a task worth pursuing. The main objectives of the PhD project will be:

(i) preparation of non-precious bimetallic electrocatalysts with a good control of the crystal phases, degree of alloying, composition, chemical state and particle size;
(ii) acquire knowledge of structure and electrochemical characterization of the electrocatalysts;
(iii) increase knowledge in the study of the electrochemical reactions OER in alkaline media, including stability tests of the catalysts.