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

<table>
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<th>MSCA-ITN</th>
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<td>MSCA-ITN-EJD PIONEER Plasma catalysis for CO₂ recycling and green chemistry. Grant number: 813393</td>
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**PROJECT**

Nanostructured catalysts for plasma CO₂ methanation

**PhD SUPERVISOR(S)**

M Victoria Navarro/Elena Galvez

**SCIENTIFIC AREA**

Physics, Applied Physics, Physical Chemistry, Chemistry, Catalysis

**HOST INSTITUTION**

Instituto de Carboquímica (ICB)/ Sorbonne Université

**DURATION**

36 months

**FIXED START DATE:**

Application deadline: 30/03/2019  
Start date: 01/06/2019

**PLANNED SECONDMENT(S):**

17 months in Sorbonne Université and 2 months CNRS-LPP with Olivier Guaitella

**EMAIL OF THE PhD SUPERVISOR(S)**

navarro@icb.csic.es  
elena.galvez_parruca@upmc.fr

**WEBSITE OF THE ITN-MSCA**

https://www.icb.csic.es/grupo/grupo-de-investigaciones-medioambientales/  
http://www.dalembert.upmc.fr/frt/
IDEAL CANDIDATES

Degree and master on Physics, Applied Physics, Physical Chemistry, Chemistry, Catalysis, Chemical Engineering
Special attention will be paid to match the education of the candidate with the chosen topics, the number of previous publications or communications in conferences, mobility experience and public awareness. Because of the need for multidisciplinary approach in all the PhD topics of PIONEER, the adaptability of the candidate to different fields of science will be especially valued

DESIRABLE CANDIDATE REQUIREMENTS

- **ESR eligibility criteria:** Early-stage researchers (ESR) shall at the call deadline be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree. Full-time equivalent research experience is measured from the date when a researcher obtained the degree which would formally entitle him or her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited or seconded, irrespective of whether or not a doctorate is or was ever envisaged.
- **Mobility rule:** Candidates may not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary for more than 12 months in the 3 years immediately before the call deadline;
  Fluent English (C1 or equivalent)
  At least 300 ECTS in official titles, 80 ECTS (or equivalent for non European candidates) in a master
Candidates will have to send:
CV
Official certificates for academic, English records and complementary training
Description of previous research work including publications
Motivation letter
4 topics within PIONEER ranked

BENEFITS

Extensive and dedicated training programme including secondments, workshops, schools and non-research oriented skills.
Average gross salary 33600 €/year (depends on the country)
Including living + mobility allowances. PhD tuition fees covered + research, training and network costs
PhD PROJECT

The main objective of this ITN project is the formation of a new generation of experts in the CO2 valorisation using plasma-catalytic coupled processes. Intensification of CO2 valorisation processes can contribute to the stabilization of CO2 concentration in our atmosphere through the production of synthetic fuels that will play an important role in our transition to a 100% renewable future. Chemical and thermochemical processes are often accelerated by specific catalysts that used in combination with plasma could turn sluggish CO2 valorisation processes feasible. The Project will be directed towards the understanding of CO2 plasmas, their interaction with solid catalysts and fundamentals of reaction mechanisms involved with complementary formation of PhD students on soft skills, specific formation on managing, marketing and business.

Nanostructured catalysts for plasma assisted CO2 methanation

The aim of the PhD is to comprehend key parameters controlling the catalytic-plasma methanation process with Ni/CeO2 catalyst and DBD plasma. Optimize the synthesis variables of catalysts to produce the determined solid properties that maximize the yield and stability of plasma assisted methanation at optimal reaction conditions. To reach this aim the ERS will be trained in the catalyst synthesis methods relating synthesis conditions with catalyst properties development at CSIC-ICB. The ERS will be trained as well in the use of plasma equipment and gas products analysis (GC) at SU. In addition, different tools will be provided to the ESR to analyse characterization results of catalysts.

14 more titles in the ITN

1.- Electric fields on catalyst covered dielectric surfaces under plasma exposure
2.- CO2 dissociation for value-added products at atmospheric pressure using tailored radio-frequency and nanosecond pulsed power input
3.- Improving the energy efficiency of CO2 conversion and activation in a microwave plasma by a combination of experiments and modelling
4.- Energy input and relaxation in atmospheric pressure CO2 plasmas
5.- Valorization and optimization of plasma assisted CO2 catalytic reduction of CO2 methanation
6.- Efficient catalysts preparation for plasma-assisted CO2 methanation
7.- Novel catalysts for plasma-assisted tri-reforming of methane
8.- Tayloring selectivity with different plasma sources
9.- Plasma-catalytic CO2 hydrogenation for the production of molecules for green chemistry
10.- Time-resolved detection of transient species in nanosecond repetitively pulsed discharges for CO2 conversion
11.- Bending and stretching to promote catalysis
12.- Investigating methods to vibrationally excite CO2 with plasma
13.- Plasma-assisted production of organic acids by reacting CO2 with water
14.- Role of vibrationally excited molecules on catalytic surfaces