

Expression of Interest

Contact Person/Scientist in Charge

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- Universidad de Alicante**

Department / Institute / Centre

- **Name of institution:** Department of Inorganic Chemistry. Faculty of Science.
- **Address:** Carretera Alicante - San Vicente
- **Province:** Alicante

Research Area

- Chemistry (CHE)

Brief description of the institution:

The University of Alicante (UA) was created in 1979. Today it educates and trains more than 36.000 students -2.500 of them are international students - and offers more than 80 undergraduate and 96 postgraduate programmes: consequently it is proportionally one of the fastest growing universities in Spain. The UA houses 227 research groups in Social and Legal Sciences, Experimental Sciences, Technological Sciences, Human Sciences, Education and Health Sciences and 15 Research Institutes (Water & Environment, Materials, Electrochemistry, Biodiversity, Chemical Processes and Organic Synthesis, and Modern Languages, among others). Thus, the UA employs over 2.400 researchers/ professors and has a complex management /administration structure of 1.300 people, which involves an annual budget of 175 million Euros.

UA is a young and dynamic university with vast experience in implementing EU funded projects in different programmes and areas, with presence in more than 60 countries worldwide. In the last 10 years, UA has successfully acted as coordinator of many Tempus, Alfa, Edulink projects involving Third Countries and Lifelong Learning and Framework Programme (FP, DG Research) Projects. Moreover, the participation in FP has been increasing in the last years, taking part in 25 5th FP, 26 6th FP, 45 7th FP projects (13 of them coordinated by UA), and 6 in H2020.

It is worth underline the big effort performed by UA in order to meet the commitment with the principles set out in the European Charter for Researchers and in the Code of Conduct for the Recruitment of Researcher

Brief description of the Centre/Research Group:

The researcher will incorporate to The Carbon Materials and Environment research group (MCMA) which carries out its activities at the Department of Inorganic Chemistry and is a member of the Institute for Materials Research (IUMA) of the University of Alicante (<https://web.ua.es/en/mcma/carbon-materials-and-environment-research-group.html>). With a team of 34 people and 210 research projects done or in development (including three PROMETEO projects for excellent research groups from the regional government "Generalitat Valenciana"), it possesses a wide research experience in the fields of porous materials and heterogeneous catalysis, with special dedication concerning the environment. The MCMA group possesses great laboratories with modern facilities equipped with the necessary techniques and experimental systems to perform research duties in the fields of preparation and characterization of porous materials, as for example activated carbons, carbon fibers and zeolites, together with gas-solid reactions, adsorption and gas storage at both atmospheric and high pressures, control and removal of pollutants and heterogeneous catalysis.

Project description:

Carbon dioxide reforming of methane, also called dry reforming of methane (DRM: $\text{CH}_4 + \text{CO}_2 \rightarrow 2\text{H}_2 + 2\text{CO}$), is a chemical process that converts CO_2 and CH_4 (both Greenhouse Gases (GHG)) into syngas (hydrogen and carbon monoxide with a H_2/CO molar ratio of 1, which is convenient for the production of hydrocarbons via Fischer-Tropsch synthesis). Thus, this process not only offers a solution to reduce these two GHG by converting them in valuable products (syngas or H_2); but also it allows the revalorization of different sources of CH_4/CO_2 such as:

- i) the biogas, generated by anaerobic decomposition of waste,
- ii) the pyrolysis gases and
- iii) the high CO_2 content natural gas sources.

In the three cases, the direct use of the gases as fuel implies a costly separate step to remove CO_2 (as CO_2 does not contribute to combustion) whereas; DRM reaction utilizes directly both CO_2 and CH_4 . So, DRM is an effective way for the protection of the environment by providing a sustainable development solution. As DRM is a highly endothermic process, high reaction temperature and the use of catalysts are mandatory, being noble metals and nickel the most actives. Thus, besides noble metals are most active and less prone to deactivation, they are too expensive and, hence, nickel based catalysts are commonly used in reforming reactions, but, deactivation due to sintering and, mainly, due to carbon formation are the main drawback to solve. Therefore, the current main challenge is to design very active and highly active nickel-based catalysts. Consequently, one of the main research interest in our group is the development of nickel perovskite based catalyst. The previous experience in the synthesis and characterization of perovskite based catalysts (13 published papers cited 250 times), as well as in the study of DRM using classical alumina-supported nickel and/or cobalt catalysts (6 papers cited 500 times), allows us to the properly design catalysts for the DRM reaction that is the subject in which the researcher will work in.

Applications

- CV
- Letter of motivation

Deadline 15 July 2019