1. *Interested institution:*

The Spanish National Research Council (CSIC)

C/ Serrano 117, 28006, Madrid (Spain)

www.csic.es

2. *Brief Description of the Institution*

The Spanish National Research Council (CSIC) is the largest public institution dedicated to research in Spain and the third largest in Europe. Belonging to the Spanish Ministry of Economy and Competitiveness through the Secretary of State for Research, Development and Innovation, its main objective is to develop and promote research that will help bring about scientific and technological progress, and it is prepared to collaborate with Spanish and foreign entities in order to achieve this aim. It has a staff of more than 13,000 employees, among these about 3,300 are permanent researchers and about 4,300 are pre- and post-doctoral researchers. The CSIC has 70 fully own institutes or centres distributed throughout Spain. In addition, it has 53 Joint Research Units with universities or other research institutions. There is also a delegation in Brussels and Rome.

CSIC has considerable experience in both participating and managing R&D projects and training of research personnel. Under the 7th Framework Programme CSIC has signed approximately 700 actions (including 97 coordinated by CSIC and 47 ERC projects). Funding wise, CSIC is listed the 1st organisation in Spain and the 5th in Europe in the 7th Framework Programme, with a total FP7 contribution of over 260 million euros. During the first calls of H2020, CSIC has had an intense participation in all programmes. It has been remarkable the participation in certain calls, such as ERC and Marie Curie, as well as in ICT, NMBP and Societal Challenges. In March 2015 CSIC has obtained 90 projects with a total financial contribution of 40 million euros.

3. *Please tick the areas of research (as established in Marie Sklodowska Curie Actions)*

☒ Chemistry (CHE)	☐ Environmental Sciences and Geology (ENV)
☐ Social Sciences and Humanities (SOC)	☐ Life Sciences (LIF)
☐ Economic Sciences (ECO)	☐ Mathematics (MAT)
☐ Information Science and Engineering (ENG)	☐ Physics (PHY)

4. *Research / Project Description*

Title: Development of new hydrosilylation catalyst for sustainable processes of industrial relevance.

Project Description

The availability and innocuous nature of silicon reagents, the mild conditions required for hydrosilylation reactions and the ease for functionalization of their reaction products have converted this catalytic reaction into a key tool in modern organic synthesis. Vinylsilanes in particular are essential building blocks in organic synthesis; however, the lack of direct methods for the selective preparation of these compounds has somewhat hindered their utilization. Transition metal-catalyzed hydrosilylation of terminal alkynes is an efficient and atom economic route to vinylsilanes. The most common products obtained from the hydrosilylation of terminal alkynes are β-(*E*)- and β-(*Z*)-vinylsilanes, the latter being less thermodynamically stable and a more elusive target. In contrast, examples of α-hydrosilylation of terminal alkynes are very unusual. We have recently published a series of articles that describe the selective hydrosilylation of terminal alkynes to give β-(*Z*)-and α-vinylsilanes (*Adv. Synth. Catal.* **2015***, 357,* 350; *Chem. Eur. J.* **2013**, *19*, 17559; *Chem. Commun.*, **2012**, *48*, 9480; *ChemCatChem* **2014**, 6, 2486). The selectivity of the reaction was modulated by fine tuning of the ligand system in $[M(L)_2\{\kappa\text{-}C,C',O,O'\text{-}(bis\text{-}NHC)\}]BF_4$ (M = Rh or Ir) complexes. Remarkably, mechanistic studies substantiated by DFT calculations suggest that the reaction operates by an unprecedented outer-sphere mechanism, where the oxophilicity of the silicon atom and the nucleophilic nature of the metal hydride formed by the heterolytic splitting of the Si–H bond play a crucial role.

In view of achieving a more sustainable use of transition metals we intend to anchor these complexes to heterogeneous supports, which would permit a recyclable use of the catalysts. Noteworthy, our research team has extensive experience in the heterogenization of organometallic catalysts and the characterization of the resulting hybrid materials (*ChemCatChem* **2013**, *5*, 1133; *Catal Sci Technol* **2014**, *4*, 62; *Catal Sci Technol* **2015**, *5*, 1878; *ChemSusChem* **2015**, *8*, 495). The fact that the homogeneous catalyst is immobilized on a solid support minimizes the possibility of interaction between the intermediate species of the catalytic cycle (usually naked species), which react to give inactive aggregates. This would result in an increased stability of the catalytic active species and consequently an increased lifetime of the catalysts. Moreover, the project aims at exploring potential synergistic interactions between the organometallic catalyst and the solid supports that improve the selectivity and activity of the catalyst (enzyme mimics). All these possible synergies will be systematically studied and enhanced by looking for the most adequate material-complex combination, and by further functionalizing the material if this is required.

The catalysts developed in the frame of this project will be applied to the synthesis of high added-value chemicals such as polymers or biomolecules of interest for the pharmaceutical and cosmetic industry.

Group Description

The applicant will be incorporated into the research group Homogeneous Catalysis by Organometallic Compounds of the Instituto de Síntesis Química y Catálisis Homogénea (ISQCH). The research group is led by Prof. Luis A. Oro, (Highly Cited Researcher, http://sorores.unizar.es/personales/LAO/oro.html) and is formed by 10 permanent scientists of the University of Zaragoza and of the CSIC, as well as a number of pre-doctoral and post-doc researchers of different nationalities. The group possesses a large experience

in Organometallic Chemistry and in Homogeneous Catalysis having published more than one hundred research papers in international journals of recognized international prestige in the last five years. The general aim of the research activity of the group is the development of new transition metal organometallic compounds and its applications as homogeneous catalysts including the immobilization on different solid supports. The group is currently financed by competitive research projects from public institutions as well as of contracts with chemical companies. The group undertakes an important work on academic and research formation at all the University levels.
For more information, see:
http://www.isqch.unizar-csic.es/ISQCHportal/grupos.do?id=29
http://sorores.unizar.es/personales/LAO/oro.html

5. *Who can apply?*

At the deadline for the submission of proposals (10/09/2015), researchers (*):

- shall be in possession of a doctoral degree or have at least four years of full-time equivalent research experience.
- must not have resided or carried out their main activities in the country of Spain for more than 12 months in the 3 years immediately prior to the abovementioned deadline.

6. *Contact person*

Prof. Dr. h.c. Luis A. Oro
e-mail: oro@unizar.es

7. *Applications: documents to be submitted and deadlines*

- Curriculum vitae
- Letter of motivation

Please note that:

- Deadline of the next call for proposals for Marie Sklodowska – Curie Individual Fellowships is **September, 10th 2015.**
- Oficina Europea is only responsible for the display of the expressions of interests received by the institutions; further contact and information requests will take place directly between the host institutions and the interested researchers.

(*) Further details on the Call and additional eligibility criteria can be found at the Participants´Portal