

1. Interested institution:

The Spanish National Research Council (CSIC) - C/ Serrano 117, 28006, Madrid (Spain)
www.csic.es

Institute of Materials Science of Barcelona (ICMAB)

[Nanoparticles and Nanocomposites Group \(www.icmab.es/nn\)](http://www.icmab.es/nn)

Campus de la UAB, 08193 Bellaterra, Barcelona, (Spain)

www.icmab.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 centers 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 organization 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.

The ICMAB has as a mission: To generate new knowledge in Materials Science and transfer it to the society, particularly to the industrial sector within the European Research Area. Within this remit, the ICMAB discovers new materials, characterizes them with advanced research tools and modelling, develops new processes of practical interest, and integrates materials into a variety of devices. The ICMAB, with long experience in the participation of European projects, has at present 54 scientific permanent and 110 scientific non-permanent staff. It is organized in four research lines including one on Materials for Health. In addition, there is a Scientific and Technological Services Unit with state-of-the-art equipment available to all scientists comprising a wide range of conventional and advanced materials characterization and testing techniques.

“EXPRESSION OF INTEREST” FOR HOSTING MARIE S. CURIE FELLOWS IN SPANISH INSTITUTIONS (CALL MSCA IF 2015)

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

- | | |
|--|---|
| <input type="checkbox"/> Chemistry (CHE) | <input type="checkbox"/> Environmental Sciences and Geology (ENV) |
| <input type="checkbox"/> Social Sciences and Humanities (SOC) | <input type="checkbox"/> Life Sciences (LIF) |
| <input type="checkbox"/> Economic Sciences (ECO) | <input type="checkbox"/> Mathematics (MAT) |
| <input type="checkbox"/> Information Science and Engineering (ENG) | <input checked="" type="checkbox"/> Physics (PHY) |

4. Research / Project Description

The research will be in the area of solid state physics, combining preparation of oxide thin films and the characterization of its structure and physical properties. We are therefore looking for a highly motivated individual with these transversal competencies.

The research in multiferroic materials is driven by the aspiration of exploiting the coupling of ferroic orders in novel IT devices. The scarcity of ferroelectric magnets above room temperature is one of the hurdles for development of this field. We have pioneered the studies on the physics of the non-centrosymmetric ϵ -Fe₂O₃ and recently reported its ferroelectric and ferrimagnetic nature at room temperature (M. Gich et al. Adv. Mater. 26(2014) 4645).

The project aims at exploring the prospective application of thin films of ϵ -Fe₂O₃ in the field of oxide optoelectronics. Namely, this oxide is expected to show non-reciprocal properties regarding light propagation along the cross product of its magnetization and polarization i.e. with a different absorption coefficient whether it is parallel or antiparallel to the light propagation vector. Since M and P are perpendicular in this material, light transmission could be gated by switching the polarization with a small voltage. This effect has already been demonstrated at low T for an isostructural material (GaFeO₃) which unlike ϵ -Fe₂O₃ becomes paramagnetic around room temperature. Also, for its lack of inversion symmetry, ϵ -Fe₂O₃ is expected to show the photogalvanic effect and when uniformly illuminated generate a flow of photoemitted electrons in a preferred crystallographic direction. More specifically the project will focus on:

- 1) Fundamental studies on non-reciprocal and photogalvanic effects in ϵ -Fe₂O₃
- 2) Enhancement of these effects using strategies based in plasmonics and photonic crystals
- 3) Growth of ϵ -Fe₂O₃ on silicon to exploit these effects in silicon photonics

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

Dr. Martí Gich

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[Nanoparticles and Nanocomposites Group \(www.icmab.es/nn\)](http://www.icmab.es/nn)

Institut Ciència de Materials de Barcelona (www.icmab.es)

Campus UAB, Bellaterra, Barcelona

7. Applications: documents to be submitted and deadlines

- a motivation letter
- An updated CV
- 3 names of reference people (please note at this stage do not ask for recommendation letter)
- pdf files of the most relevant scientific contributions according to the candidate.

Deadline to submit documentation is 1th July 2015

Please note that:

- Deadline of the next call for proposals for Marie Skłodowska – 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](#)