



UNIVERSITY: Public University of Navarre (UPNA)

WIT PROGRAMME'S RESEARCH LINE NAME:

Development of advanced materials and technologies for energy production

DOCTORAL PROGRAMME: Doctorate in Science and Industrial Technologies

<https://www.unavarra.es/escuela-doctorado/doctorate-programs/current-plan/science/doctorate-in-science-and-industrial-technologies?languageId=1>

COMPLETE DESCRIPTION OF THE LINE

Permanent magnets are a class of magnetic structures crucial for industrial development as elements able to store and deliver energy. Rare-earth based magnetic materials are the most competitive permanent magnets due to their high magnetic performances. However, since 2011, due to the very high risk of rare-earth elements supply shortage, finding alternatives to such magnets would significantly reduce their importation requirements.

In this aim, the development of novel permanent magnets materials is a demanding task. In order to overcome this problem, we propose the use of colloidal chemistry approaches to develop doped based ferrites. Particularly, CoFe_2O_4 , $\text{SrFe}_{12}\text{O}_{19}$ and $\text{BaFe}_{12}\text{O}_{19}$, well-known hard magnetic material, though an exquisite control of their intrinsic (microstructure) and extrinsic (particle size, morphology and composition) properties in the form of nanoparticles. We envisage that the fine control of these parameters will help us to develop improved ferrite building blocks to realize a novel class of rare-earth free permanent magnets to be employed in all those applications where no large energy products are needed, nor strict volume and weight constraints are operating.



RESEARCH GROUP NAME:

Physical properties and applications of materials

COORDINATOR:

- Last and first name; link to the “Portal of scientific production”:
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https://academicos.unavarra.es/CawDOS//jsf/seleccionActividades/seleccionActividades.jsf?id_pers=812023&idioma=es&elmeucv=N
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MEMBERS OF THE LINE RESEARCH:

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ANOTHER RESEARCH LINES OF THE GROUP: list of them

Other research lines within the WIT Fellowship Programme in progress in the group:

- Magnetic sensors for automotive and mechatronic applications
- Development and manufacturing of multi-source energy harvesting systems
- Additive manufacturing and 3D printing for the automotive industry



- Entities involved in research lines and contact person:

- ✓ Academic entities:

- Dr. Claudio Sangregorio

Istituto di Chimica dei Composti OrganoMetallici (ICCOM-CNR), Sesto Fiorentino, Italy

- Dr. Cesar de Julian Fernandez

Istituto dei Materiali per l'Elettronica e il Magnetismo (IMEM-CNR), Parma, Italy

- Brief group overview

The group “Physical properties and applications of materials” belongs to the Science Department and the research Institute for Advanced Materials and Mathematics (INAMAT²) of the Public University of Navarra, UPNA.

The main research lines are devoted to the development of high-quality basic research on the physical properties of new advanced materials and their application in different technological sectors. This activity is developed by a mixture of experienced seniors and young researchers, sharing a multidisciplinary environment with other research groups of different areas (chemistry, engineering and mathematics).

The main information about the research activities of the group are available at: <http://www.unavarra.es/propiedades-aplicaciones-materiales>

- Link of the group to the “Portal of scientific production”

<https://academicos.unavarra.es/CawDOS/jsf/seleccionPersonalEstamento/seleccionPersonal.jsf>



REQUIREMENTS:

Academic requirements: Chemistry, Physics y Environmental science.

Additional requirements: The PhD candidate, with a background in chemical synthesis, is expected to be willing to engage in experimental development, with a curious spirit and positive interaction with the group. A background in magnetism is a plus.