



2018

Annual Report



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«The Secret of Getting Ahead Is Getting Started»

Mark Twain, 1835-1910

«Be a voice not an echo»

Anonymous



The present report summarizes, in some representative numbers, the [SCIENTIFIC ACTIVITY OF BCMATERIALS DURING 2018](#). Numbers associated to specific parameters that identify BCMaterials as a centre of excellence. In all our areas of activity, from published papers to outreach, from contributions to the formation of the new generation of researchers to obtaining external funding to support our activity, those numbers reveal [A CENTRE THAT ACCOMPLISH WITH ITS ROLE](#) as a driving force for the generation of knowledge and technology transfer, committed with science and innovation, as a true motor of social and economic development.

But numbers are.... numbers.... easy to set as goals... more or less difficult to achieve... The annual report you are reading represents much more than that. As it was quoted:

*«NUMBERS HAVE LIFE;
THEY'RE NOT JUST SYMBOLS ON PAPER»*

The year 2018 began with [THE IMPORTANT DUTY TO TRANSFORM BCMATERIALS](#) in order to reach higher levels of excellence. Important decision with respect to the present and the future of the centre, its structure and dynamic have been taken and are being implemented to consolidate BCMaterials as global player and a reference centre in the area of multifunctional materials.

Thus, the present report summarizes much more than numbers: [IT REPRESENTS THE ILLUSION AND THE EFFORT, THE SOLIDARITY AND COMPROMISE, THE DETERMINATION AND WILL](#) of the BCMaterials members, nearly half also ascribed to the UPV/EHU, to reach the highest levels of excellence in a great working atmosphere. It represents the compromise from Ikerbasque and UPV/EHU to support us to reach our goals. And it also represents the solidarity and trust from our national and international partners.

[THANKS YOU ALL](#) for believing, inspiring and supporting BCM!

Senentxu Lanceros-Mendez
Ikerbasque Professor
Scientific Director

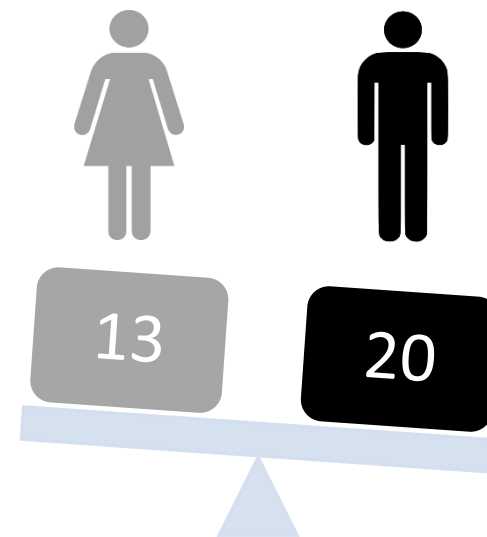
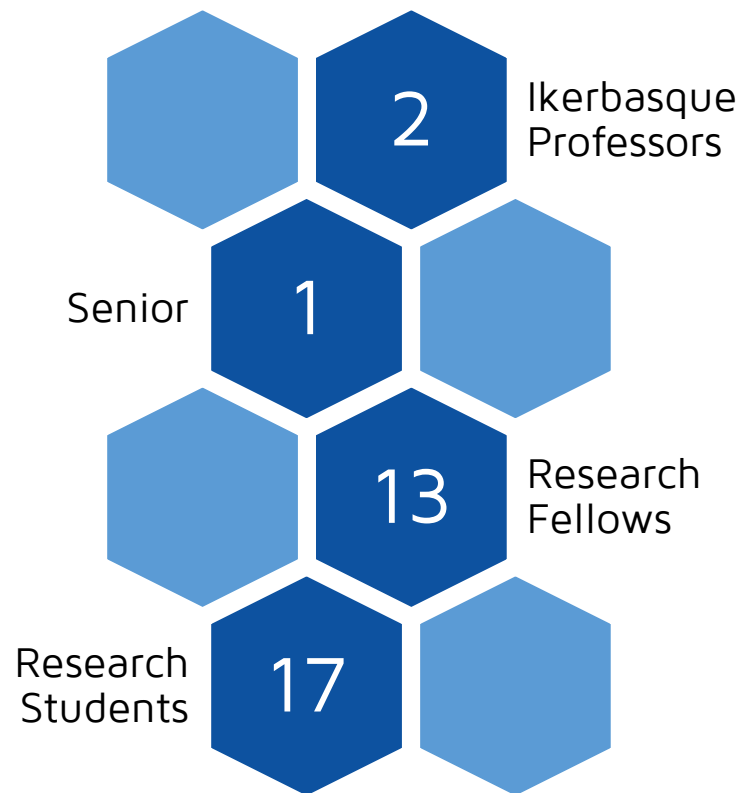
People

Staff

Researchers

The true soul of research are researchers. Their commitment and dedication to excellence science allowed BCMaterials to achieve its goals. They allowed, with the generation of new ideas, strategy and hard work, to become true the generation of knowledge and technology, the development of "materials for a better life".

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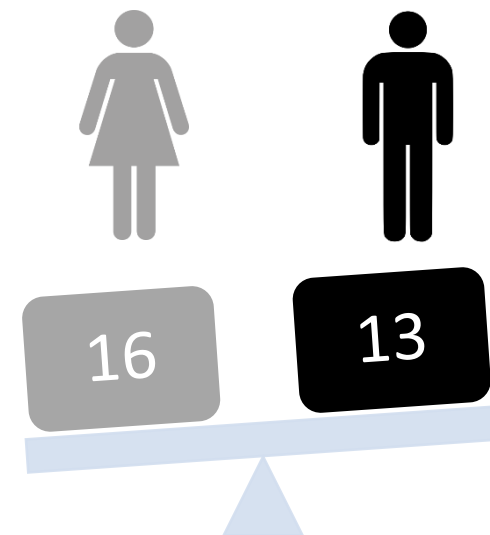
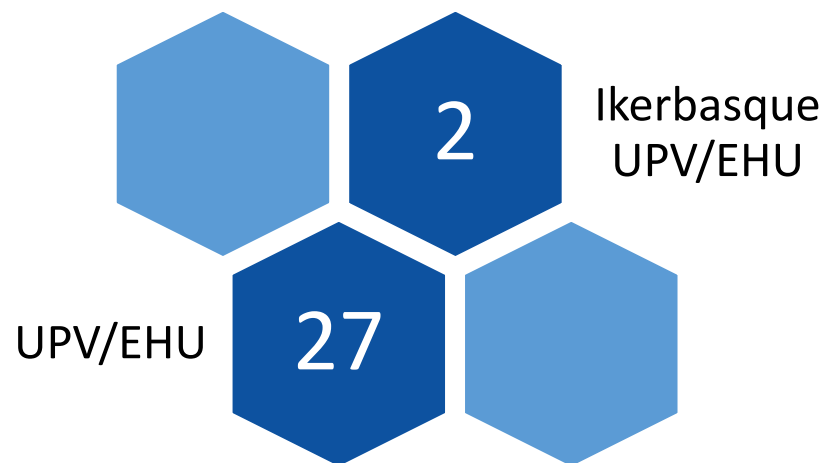


People

Associated Researchers

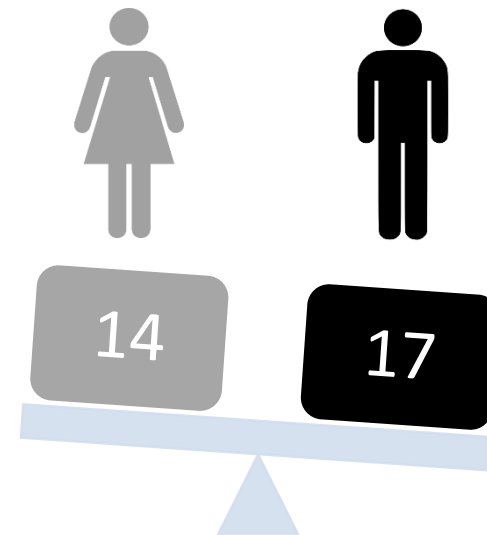
The mission of BCMaterials is to contribute to the Basque System for Science and Technology to generate excellence science in the area of advanced and multifunctional materials. This could not be achieved without our associated partners from the UPV/EHU that kindly share their expertise, infrastructures and continuously support for high level research. Associated researchers and the partnership with the UPV/EHU are at the core and one of the most important driving forces of BCMaterials.

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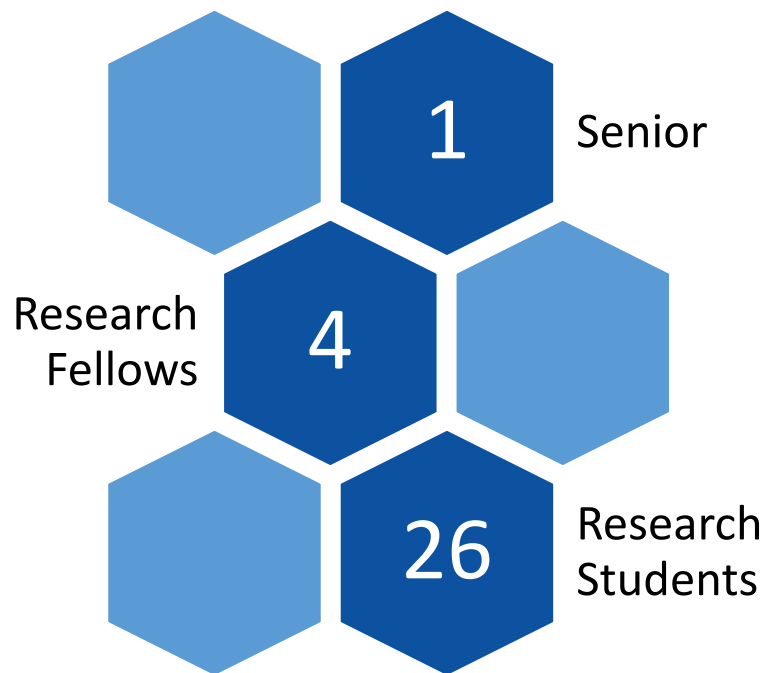


People Visitors

Everybody can feel at home at BCMaterials! Our facilities are open to support our national and international colleagues to achieve their goals... and are also welcome to come and contribute to achieve ours! Colleagues will be always welcome to work with us in our great facilities. BCMaterials has no walls and no boundaries for great science!



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Research Lines & Areas

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The **Research Lines** are focused on the in-depth investigation and development of specific Advanced and Multifunctional Materials.



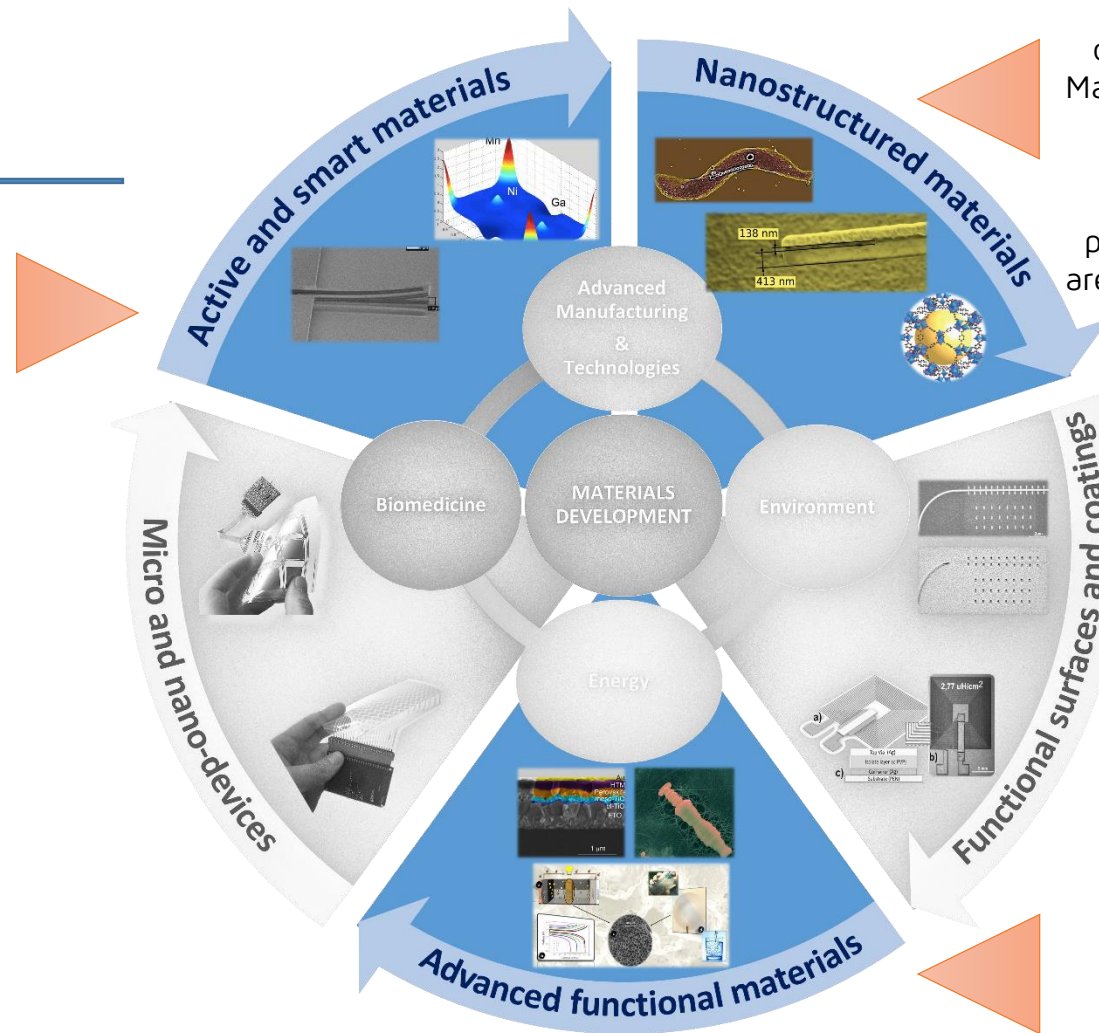
4

Within the **Research Areas**, one or more of these Research Lines work together in order to give answer to specific technological and society challenges.

Research Lines & Areas

Active and smart materials

They are at the core of the on-going rapid technological development. Shape memory, magnetocaloric and elastocaloric materials, piezoelectric, magnetoelectric, and self-healing materials as well as multifunctional hydrogels are being developed. A deep understating on the structural and molecular modifications behind the active responses allows tailoring materials responses.



Nanostructured materials

Nanostructures are being developed in order to take advantage on their specific tailored properties and to make use of them in the development of multiresponsive composites. Magnetic nanoparticles produced by bacteria are being investigated, together with novel magnetic, plasmonic and photocatalytic nanoparticles, among others. Further, novel porous materials, basically MOFS and Zeolites are being investigated based on their tuneability and outstanding intrinsic properties.

Advanced functional materials

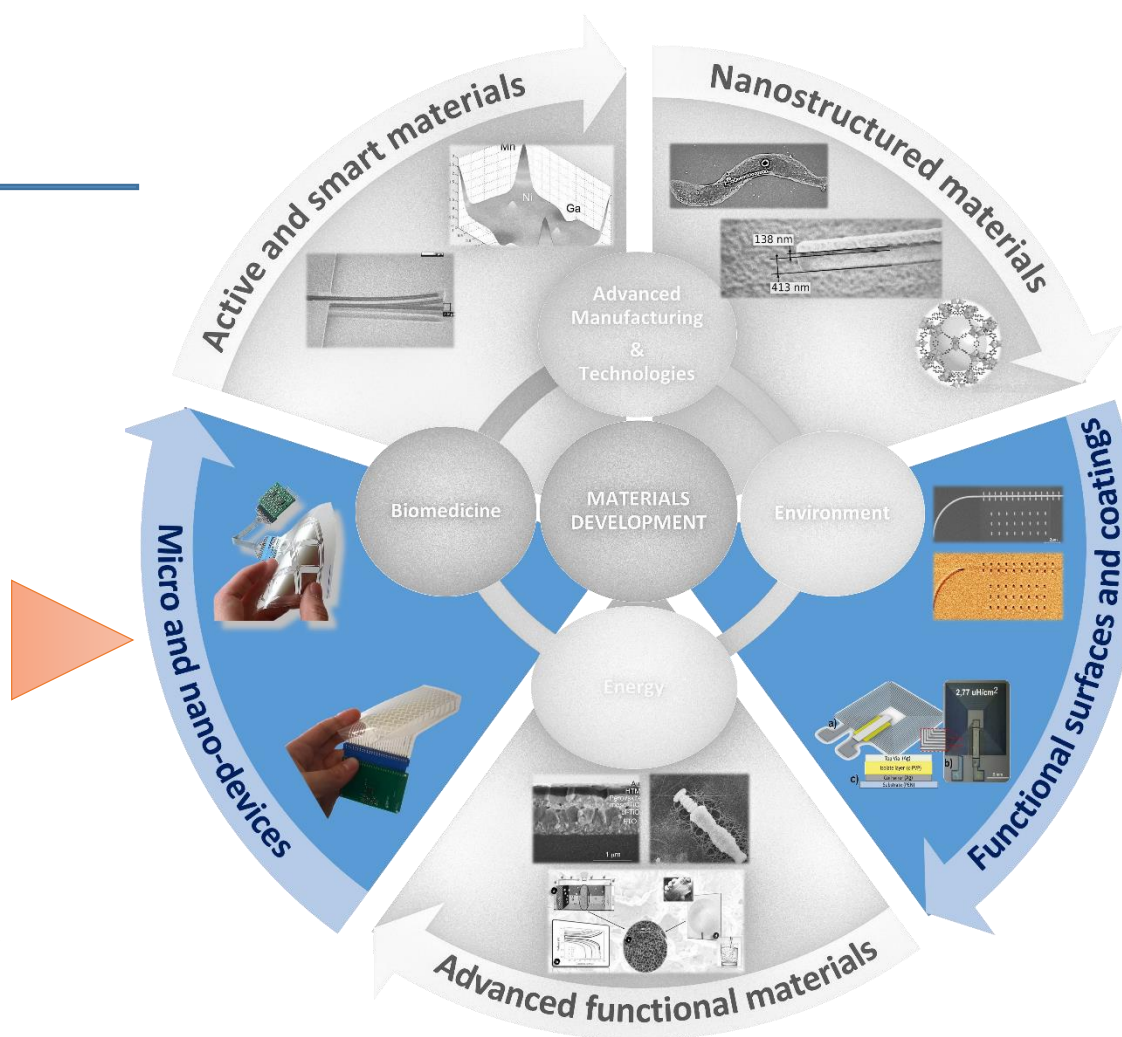
This research line concerns mainly the implementation through deep fundamental understanding of functional materials for advanced technological needs. Functional materials are of critical importance in materials for energy such as electro- and magnetocaloric materials, for energy storage and for solar harvesting functions. In this regard, BCMaterials covers the synthesis, development and scale-up of a wide range of materials for fuel cells and batteries, photovoltaic materials, permanent magnets, sensors and biosensors.

Research Lines & Areas

Micro and nano-devices

The multifunctional materials, nanostructures and surfaces being developed, allow the implementation in functional prototypes demonstrating the suitability of the materials for advanced applications. Thus, radiofrequency instrumentation is being implemented for MRI, hyperthermia, and wideband ferromagnetic resonance applications.

Force, deformation, magnetic, magnetostrictive and chemical sensors are being fabricated, among others. In addition, the study and implementation of printed and flexible electronic devices is being used for applications in areas such as wearables, point of care devices, interactive surfaces and structural health monitoring.



Functional surfaces and coatings

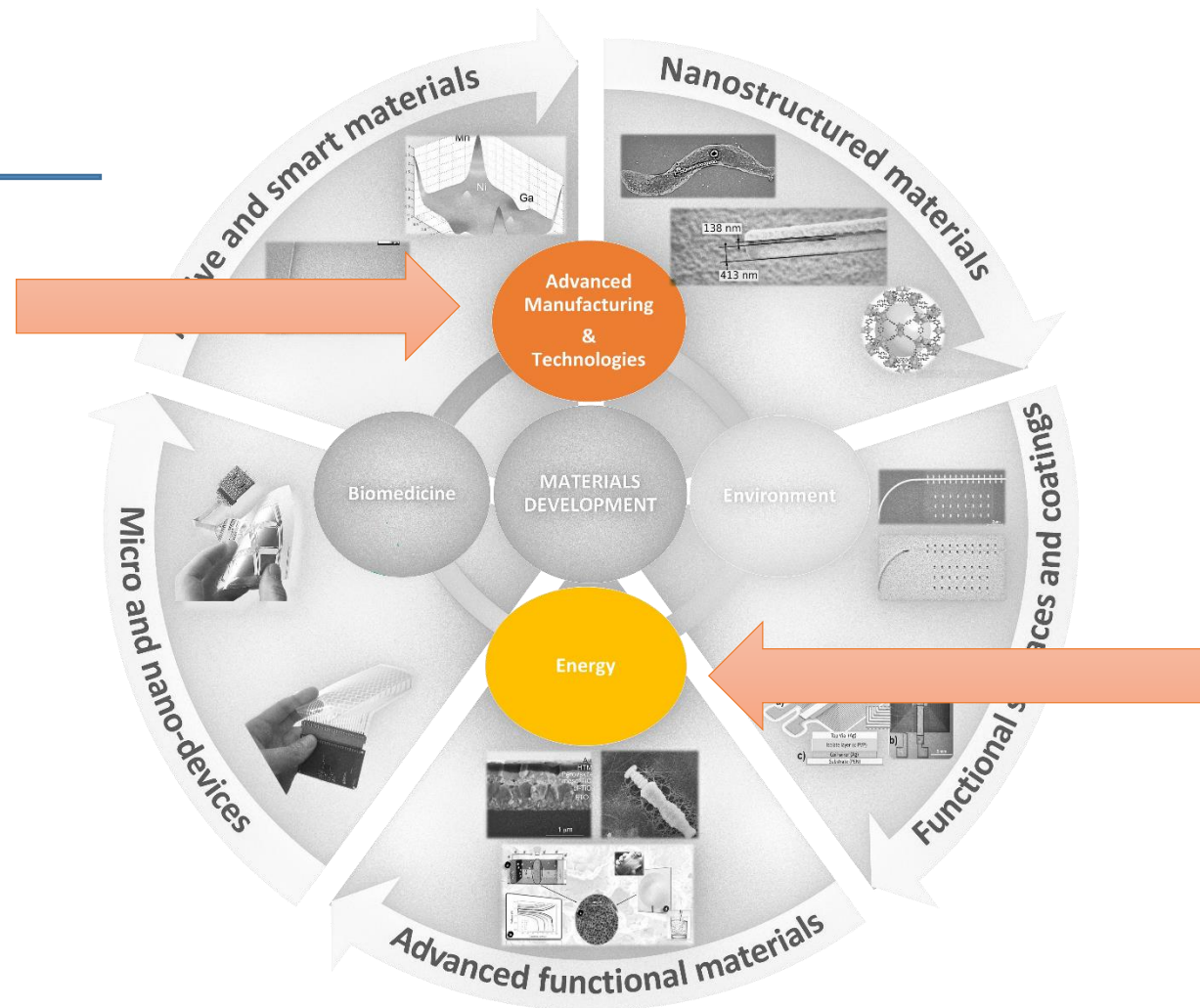
To provide surfaces with additional functionalities beyond the traditional decorative or protective ones is a key issue in science and technology. In particular, surface properties present relevant and specific scientific challenges that must be understood in depth prior to their implementation in devices.

Paving the way towards a systematic functionalization of surfaces of active materials, via patterning and/or chemical modification techniques, will lead to obtaining specific and tailored magnetic, optical and mechanical responses in these materials upon the application of the pertinent stimulus. In this context, BCMaterials is working on the investigation of patterned surfaces and films and well as on the functional surface modification following a wide variety of methods, including chemical and physical deposition and printing techniques, among others.

Research Lines & Areas

Materials for Advanced Manufacturing and Advanced Technologies

Technological advances often rely on both new materials and processing/manufacturing technologies. Additive manufacturing is undergoing strong development allowing customized production. BCMaterials is working on the development of smart and multifunctional materials with improved integration through advanced manufacturing processes. Self-sensing, self-cleaning and self-repairing materials are being developed and integrated into functional prototypes, among others.



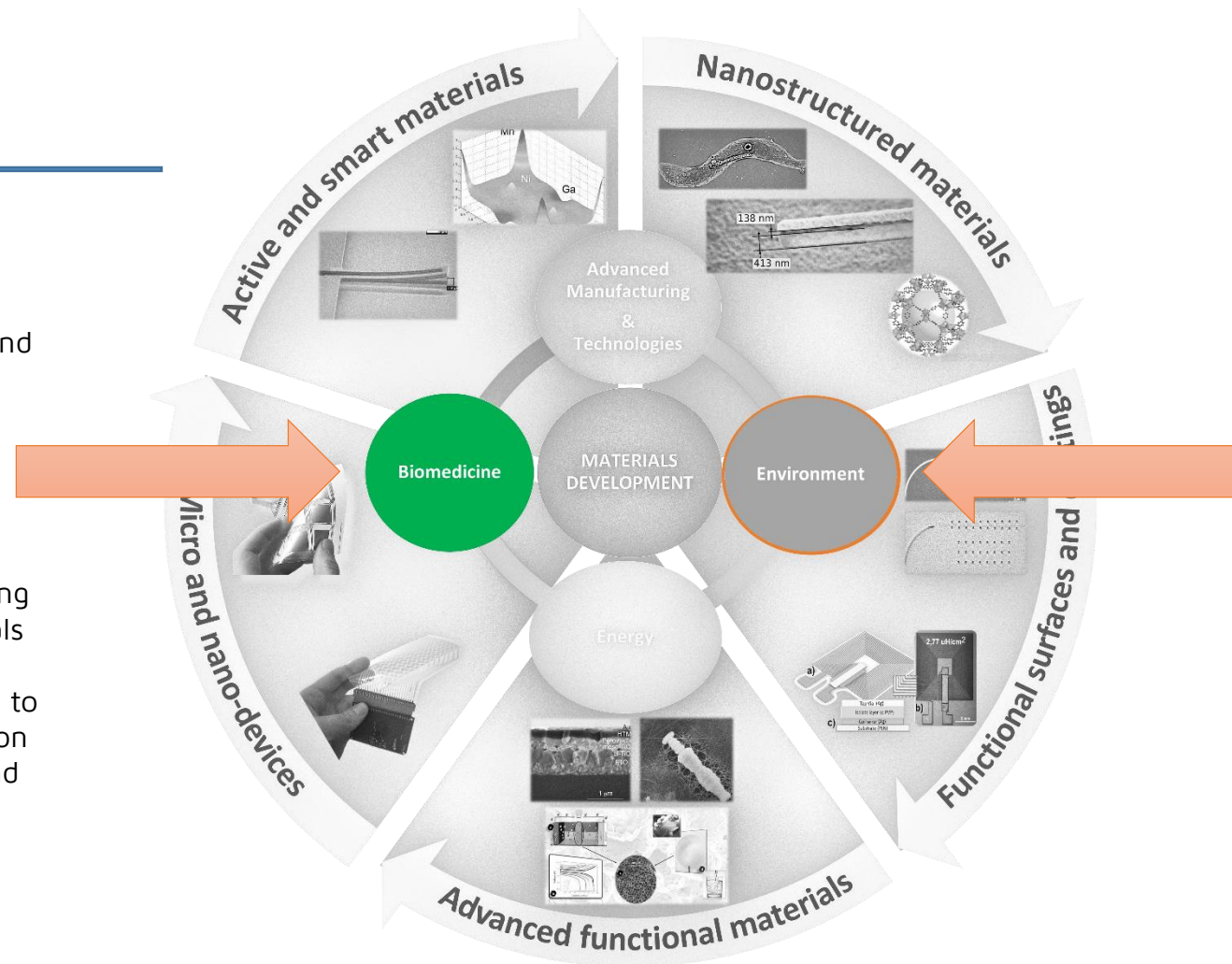
Materials for energy

One of the grand challenges facing humankind is related to energy, its generation and storage being among the key issues of modern society, which is highly dependent on mobility. Therefore, next generation of energy production and storage systems are being developed based on advanced, environmental friendly and multifunctional materials. BCMaterials specifically focus on the conversion between solar energy, and chemical energy in applications such as perovskite and kesterite based solar cells. Other research activities include the development of energy harvesting systems, mainly based on mechanoelectric (piezoelectric and triboelectric) and thermo-electric systems for self-power and wearable sensors. Finally, new active materials are being developed for Li and Na-batteries, as well as new approaches for solid electrolytes and printable batteries.

Research Lines & Areas

Materials for Biomedicine

Related with the aging of population and the strong needs on early detection of illnesses, advanced biomedical approaches are definitely needed. Nanoscience and nanotechnology are providing new tools in order to tackle those important challenges. In this context, BCMaterials is focussing, among others, on the development of materials and new approaches for nanoparticle based biomedicine, from hyperthermia to point of care microdevices, as well as on the incorporation of active scaffolds and microenvironments for tissue engineering.



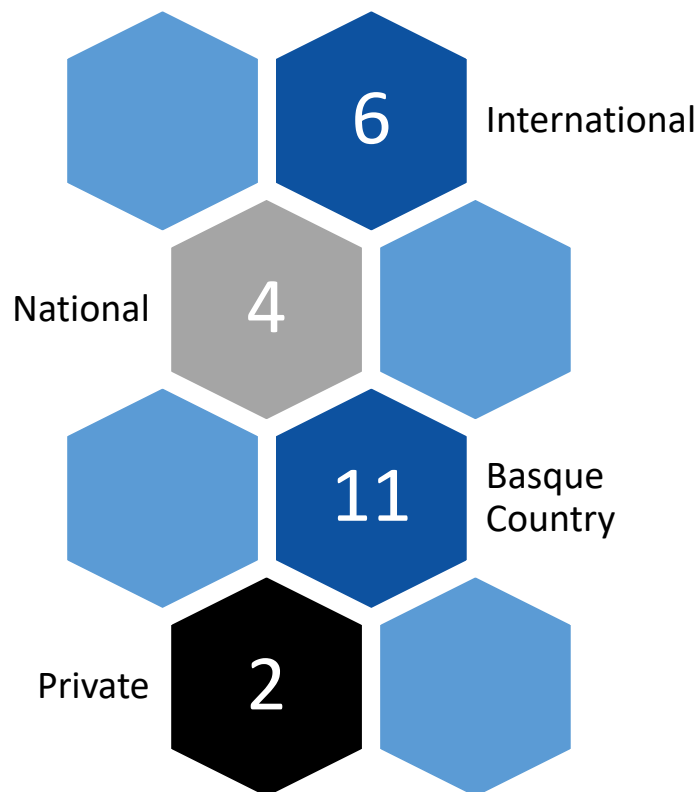
Materials for environment

The strong technological advances of recent years are leaving important footprints in our environment. In this scope, three main issues must be solved in the near future: environmental friendlier technologies, sensors for environmental monitoring and remediation of contaminated scenarios. In these areas, BCMaterials has strongly focussing on the development of sensors and remediation strategies for water and air.

Research Projects

The generation of new ideas focusing on advancing in the generation of knowledge on new materials or in their applicability for the well-being of society is structured in the form of projects that allow, with the necessary partners and funding, the timely implementation of those new ideas.

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Proposals

11 Accepted

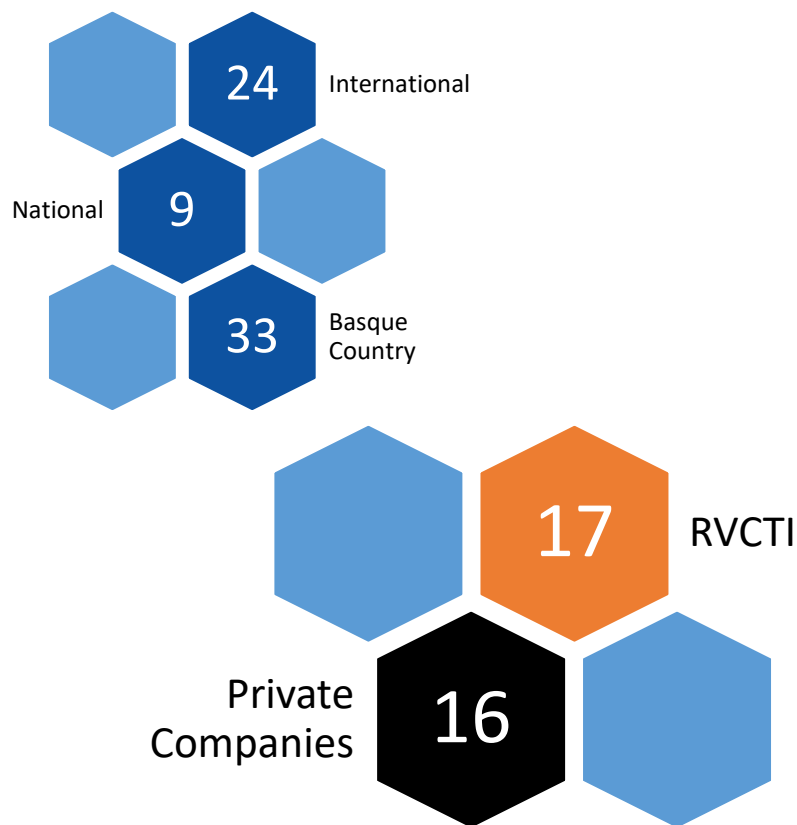
3 Not Funded

2 Pending

Research Partners

“From BCMaterials to the world”. Science has no borders... and no limits within the natural world. Important achievements can only be achieved with our colleagues and partners. This year we are particularly proud for having partnerships and visits from colleagues from the five continents! Internationalization at its best!

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Universidade do Minho



Research Funders

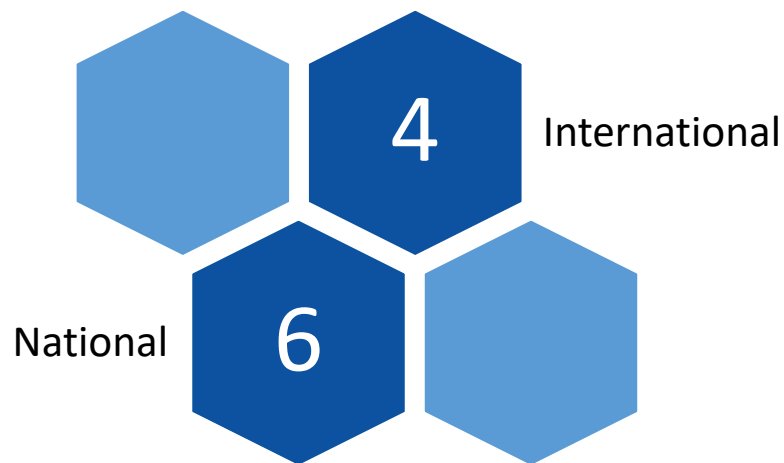
Great ideas can only come true with the proper conditions to pursue their exploration and implementation. A true and sincere thanks to all the funding bodies, public and private, that deposited their confidence in our ideas and supported us and/or demonstrated confidence in our know-how to support their activity and innovation strategies.

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Public

2

Private



Research Publications

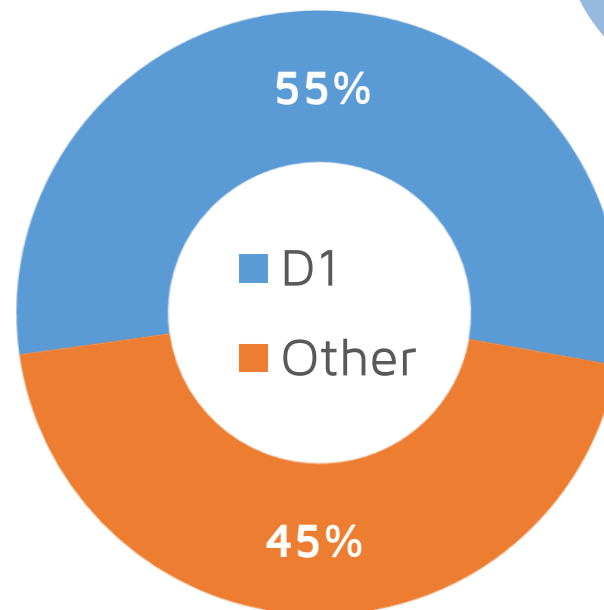
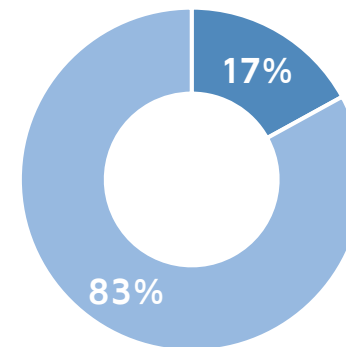
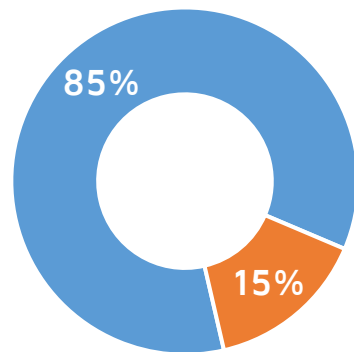
2
Books

17
Book chapters

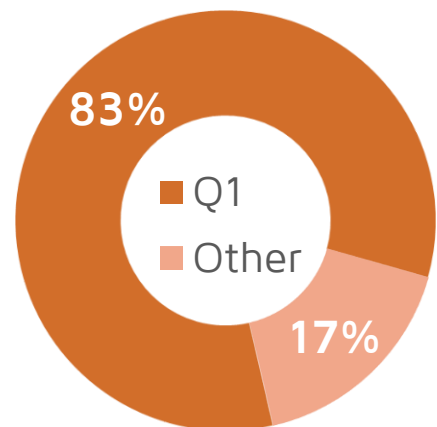
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Articles (Source: SCOPUS)

- Co-authoring RVCTI
- Co-authoring 3rd. Parties only

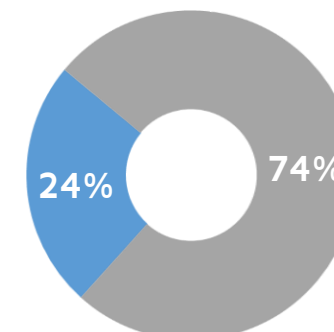


26
h-index



1.395

Citations



■ Open Access ■ Other

Research

Large Facilities Usage

7

Institute Laue-Langevin, ILL (Grenoble, France)



2

High Field Magnetic Lab. (Nijmegen, Holland)



1

VACUMMSHMELZE GmbH & Co. KG (Hanau, Germany)



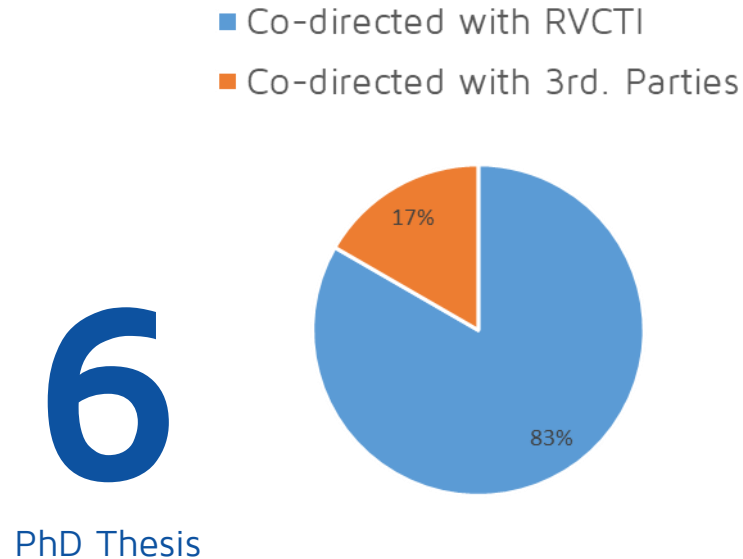
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Australian Centre for Neutron Scattering, ANSTO (Melbourne, Australia)



Research

Collaboration with Academic Degrees

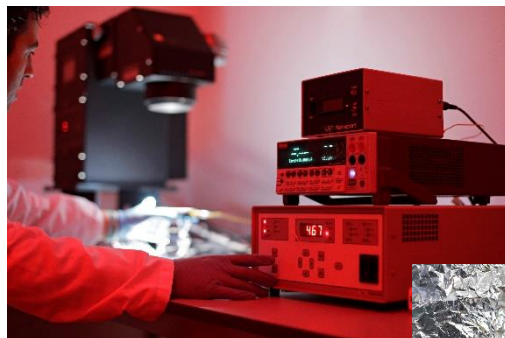


5
MSc
UPV/EHU's Interuniversity Master's Degree
in New Materials



Facilities

2018 was the year for the transfer of BCMaterials to its definitive facilities, in the Martina Casiano Building, located in the UPV / EHU Science Park, in Leioa. Building up a new home takes time... but it represents a rewarding effort setting the new structure for a great present and a better future.



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New instruments



1

New research lab (Optoelectronics)

Outreach

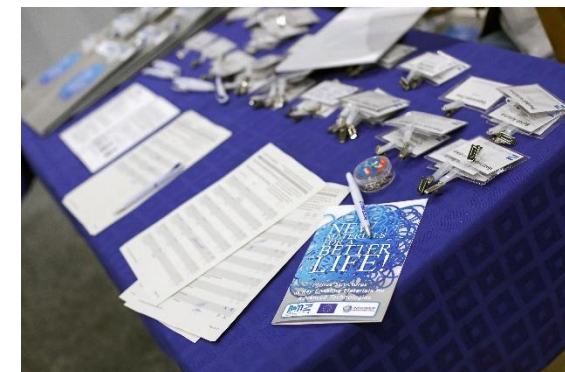
@ BCMaterials

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Invited Talks

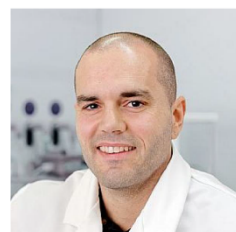


Charla Invitada
Hitzaldia



4

Workshops & Organized Events



Dr. Josep Puigmartí-Luis:
Engineering reaction-diffusion environments for materials synthesis

Institute for Chemical and Bioengineering
Department of Chemistry and Applied Biosciences

ETH Zürich

11/09/2018
10:30

Auditorio Plataforma Tecnológica – “Martina Casiano”, UPV/EHU, Leioa.
Plataforma Teknologikoaren Auditorioan – “Martina Casiano”, UPV/EHU, Leioan.

Asistencia libre

Sarrera dohain



19

Seminars

Outreach

BCMaterials @ Scientific Meetings

20

Invited Talks



58

Oral Presentations

WORLD
ECONOMIC
FORUM

Joule
Published by
Cell Press

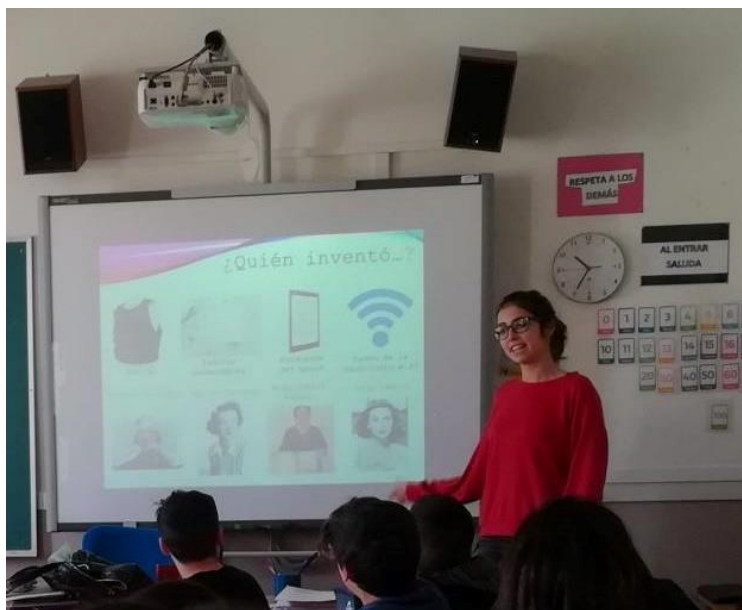
The 25th International Workshop on Rare-Earth and Future Permanent Magnets and Their Applications (REPM 2018)

Beijing, 26-30 August 2018



Outreach

General Outreach Events



3

General
Outreach Events



Outreach

Presence in social media

BCMaterials
December 3, 2018 · 🌐

We have attended to the multidisciplinary Basque Industry 4.0 Conference. Basque Industry 4.0 is a move towards the incorporation of intelligent systems into production plants, the integration of advanced materials into higher added-value solutions and improved processes, and the efficiency and sustainability of resources and integration of high added-value services.
Grupo SPRI Taldea Eusko Jauriaritza - Gobierno Vasco UPV/EHU
#revolution

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- res2valhum**
Science, Technology & Engineering
- D'Art Side**
Artist
- Rubén Miranda G**

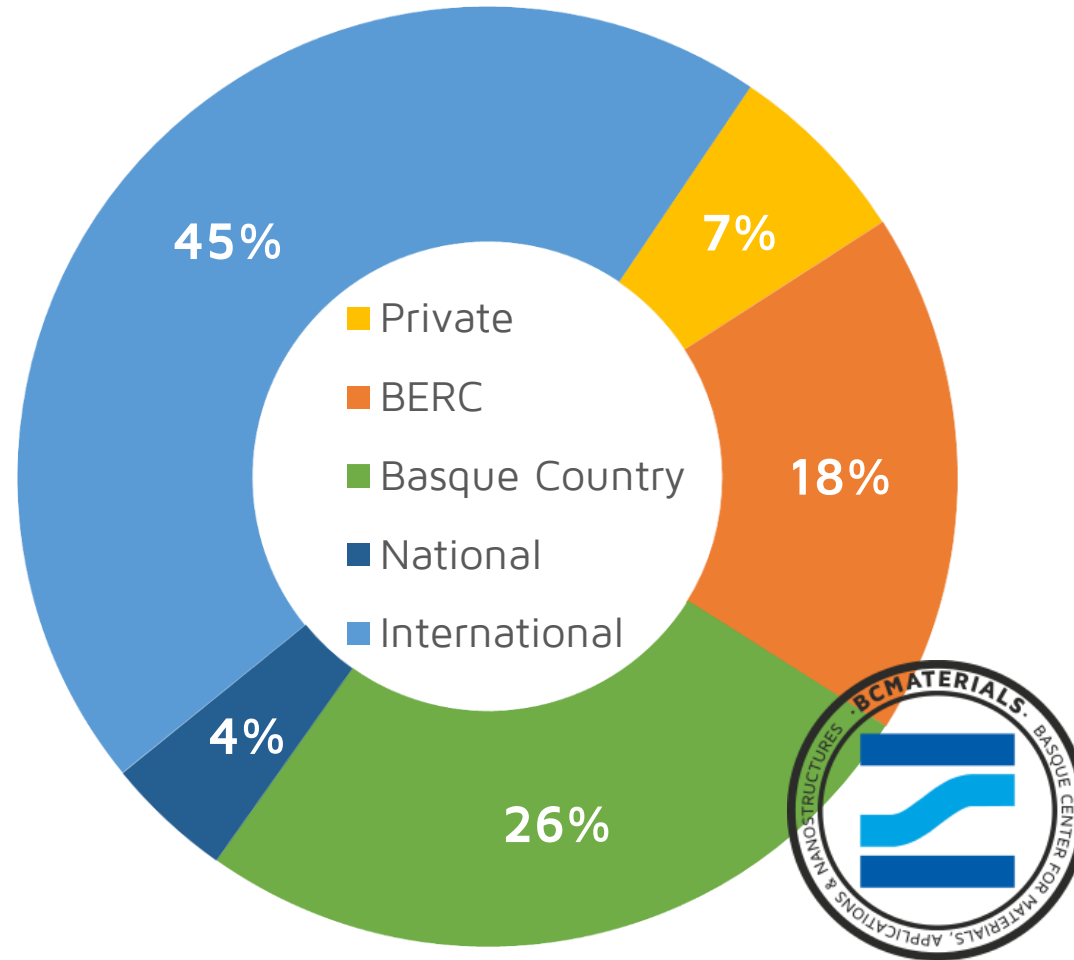
BCMaterials
@BCMaterials

Tweets **467** Following **368** Followers **498** Likes **72** Lists **2**

BCMaterials @BCMaterials · 19 Sep 2018
So proud! Irati Rodrigo, one of our researchers has won the IEEE Summer School prize, organized by @IEEEEMagSoc, to develop a project based on magnetic hyperthermia and magneto mechanical destruction against cancer. The results will be presented at Joint MMM-Intermag. Congrats!

BCMaterials @BCMaterials · 19 Sep 2018
Txema Porro one of our excellent Marie Curie granted researchers has given an amazing talk full of motivation to the students of @IrlandesasLeioa about why to be a Physicist is a good choice for their future. #Motivation #welovePhysics

Funding



Fundación BCMaterials

Basque Center on Materials, Applications and Nanostructures

📞 +34 946128811

✉ info@bcmaterials.net

Bld. Martina Casiano, 3rd. Floor
UPV/EHU Science Park
Barrio Sarriena s/n
48940 Leioa, Spain

ikerbasque
Basque Foundation for Science

