Institut de Nanociència
i Nanotecnologia
UNIVERSITAT DE BARCELONA

2019 IN^{2}UB ACTIVITY REPORT

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ABOUT IN^{2}UB

Presentation

The Institute of Nanoscience and Nanotechnology of the University of Barcelona (IN^{2}UB) was created in 2006. Its main goal is to coordinate and enhance multidisciplinary research among research groups from the Faculties of Chemistry, Physics, Pharmacy and Food Sciences, Biology, Earth Sciences and Medicine and Health Sciences that work on the different phenomena occurring at the nanoscale. This collaborative spirit aims at integrating both, internally and internationally, interdisciplinary activities which integrate equally, basic and applied research.

The IN^{2}UB wants to contribute to the progress of science, while spurring, at the same time, industrial excellence. In this sense, several spin-off companies are now led by IN^{2}UB researchers. Finally, all members of the IN^{2}UB are strongly involved in teaching endeavours, the most important programs being the Master of Nanoscience and Nanotechnology and the Doctoral Program of Nanoscience. Research and education serve us to convey our strong commitment with society.

IN^{2}UB gathers around 200 researchers (including permanent, postdoctoral researchers and PhD Students). They are organized in 52 research groups distributed among seven major research areas.

Research Areas:

1. Modeling, Simulation and Nanoscopic Methods (NanoMet)
Development of instrumentation and methodology (employing experimental and theoretical tools) to characterize nanostructures and nanosystems of any nature.

2. Nanobioscience, Nanobiomechanics and BioNanotechnology (NanoBio)
Study of the organizational patterns observable in the molecular structures that control and rule the biological systems both at the cellular and at the molecular scales. Developing techniques and devices aimed at prevention and diagnose in nanomedicine.

3. Nanopharmaceutics and Nanomedicine (NanoPharmaMed)
Developing of nanostructured systems for controlled drug release and for the improvement of drug therapeutic efficiency when administered on targets to treat diseases.

4. Nanomagnetism and Spintronics (NanoMagnetics)
Developing new systems for storage and processing of information at the nanoscopic scale for information processing. Study of new nanoscopic phenomena for applications in healthcare, sustainable energy, environment, healthy food and security. Preparation and study of multifunctional molecular nanomagnets for spintronics and quantum computing.

5. Nanoelectronics, Nano-optics and Nanophotonics (NanoPhotoElectro)
Study and exploitation at the nanoscale of the interaction of electric, magnetic and optical properties for the design of functional nanosystems.

6. Nanostructured materials (NanosMat)
Developing new or improved nanostructured materials. Knowledge-frontier research in characterization techniques and manipulation tools at the nanoscale (as electron and probe microscopies, surface analysis, or spectroscopic and magnetic characterization).

7. Nanoenergy: Production and Storage (NanoEnergy)
Application of nanomaterials to energy production and storage to overcome efficiency and lifetime limits.

Organization

Human Resources

GL*	55
SR**	61
Postdocs	35
Predocs	47
Total	198

**GL: Group Leader, leading an independent research group at the unit*
***SR: Senior researcher; Investigator leading one or several projects in a research group, but not being GL*

EXECUTIVE BOARD

Director: Dr. Guillem Aromí Bedmar

Secretary: Dr. Albert Romano Rodríguez

STEERING COMMITTEE

Dr. Xavier Batlle Gelabert	Dr. Blas Garrido Fernández
Dr. Enric Bertran Serra	Dr. Frank Güell Vilà
Dr. Gustavo Egea Guri	Dr. Narcís Homs Martí
Dr. Sònia Estradé Albiol	Dr. Sergi Hernández Márquez
Dr. Giancarlo Franzese	Dr. Jordi Ignés Mullol
Dr. M. José García Celma	Dr. Francesca Peiró Martínez

RESEARCH AREAS COORDINATORS

1. NanoMet: Dr. Francesca Peiró Martínez

2. NanoBio: Dr. Gustavo Egea Guri

3. NanoPharmaMed: Dr. M. José García Celma

4. NanoMagnetics: Dr. Xavier Batlle Gelabert

5. NanoPhotoElectro: Dr. Blas Garrido Fernández

6. NanosMat: Dr. Enric Bertran Serra

7. NanoEnergy: Dr. Narcis Homs Martí

INTERNAL SCIENTIFIC BOARD

Dr. M. Pilar Vinardell Martinez Hidalgo (President)

Dr. Ramon Farré Ventura

Dr. Amílcar Labarta Rodríguez

Dr. Francesc Sagués Mestre

INTERNATIONAL SCIENTIFIC ADVISORY BOARD

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Dr. Kenneth Dawson (UC Dublin)

Dr. Katja Schenke-Layland (Eberhard Karls University Tübingen)

Dr. Maria Jesús Vicent (Centro de Investigación Príncipe Felipe)

OUTREACH COMMISSION: Dr. Sònia Estradé Albiol (Coordinator); Dr. Xavier Batlle Gelabert; Dr. Giancarlo Franzese; Dr. M. Aranzazu Fraile Rodríguez; Dr. Blas Garrido Fernández; Dr. Oscar Iglesias Clotas; Dra. Francesca Peiró Martínez; Dr. Laura Rodríguez Raurell; Dr. M. Antònia Busquets Viñas; Dr. Giancarlo Franzese; Mariona Escoda Torroella, Elena Lopez Aymerich; Dr. Jordi Díaz Marcos i Dra. Sonia Trigueros. Contact: in2ub-divulga@ub.edu

RESEARCH MANAGEMENT

Dr. Ifigènia Saborit Villarroya

Research Outputs, Funding Sources and Transfer Indicators

Scientific Production

IN^{2}UB is a multidisciplinary research unit, mainly harvesting research in the field of Physics, Chemistry, Material Science, Pharmacology and Biology. Specifically, the following major subject areas represent IN^{2}UB scientific production: Chemistry, Physics and Astronomy and Material Science, Biochemistry, Genetics and Molecular Biology, Engineering, Medicine and Chemical Engineering and Pharmacology, Toxicology and Pharmaceutics. The rest of IN^{2}UB publications, are integrated in other related subject areas such as Medicine, Mathematics, Energy Environmental Science or Earth and Planetary Sciences. The analysis of these areas during 2019 period, represented 321 papers published in indexed journals in Scopus, with 79.43% of this production at first quartile.

TOTAL PUBLICATIONS	**321**
Q1 PUBLICATIONS	**255**
D1 PUBLICATIONS	**149**
% Q1 PUBLICATIONS	**79.43**
% D1 PUBLICATIONS	**46.41**

Data from Scopus (March 2020)

High Index Publications

Large work extraction and the Landauer limit in a continuous Maxwell demon. *Ribezzi-Crivellari M., Ritort F.* **Nature Physics** 15, 660–664 (2019)

Selection mechanism at the onset of active turbulence. *Martínez-Prat B., Ignés-Mullol J., Casademunt J., Sagués F.* **Nature Physics** 15, 362–366 (2019)

Giant barocaloric effect in all- d -metal Heusler shape memory alloys. *Aznar A., Gràcia-Condal A., Planes A., Lloveras P., Barrio M., Tamarit J.-L., Xiong W., Cong D., Popescu C., Mañosa L.* **Physical Review Materials** 3, 044406 (2019)

Tunable self-healing of magnetically propelling colloidal carpets. *Massana-Cid H., Meng F., Matsunaga D., Golestanian R., Tierno P.* **Nature Communications** 10, 2444 (2019)

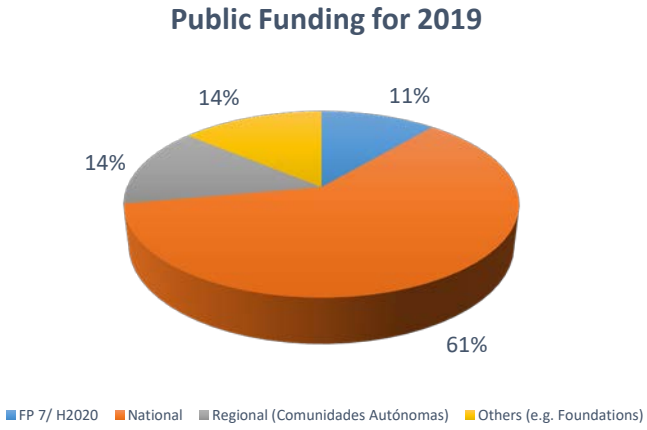
Synchronization of Optomechanical Nanobeams by Mechanical Interaction. *Colombano M.F., Arregui G., Capuj N.E., Pitanti A., Maire J., Griol A., Garrido B., Martinez A., Sotomayor-Torres C.M., Navarro-Urrios D.* **Physical Review Letters** 123, 017402 (2019)

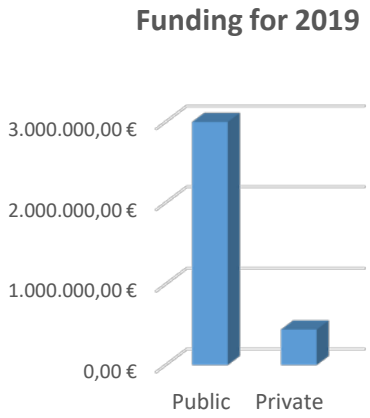
Role of aluminum and HMTA in the hydrothermal synthesis of two-dimensional n-doped ZnO nanosheets. *Murillo G., Leon-Salguero E., Martínez-Alanis P.R., Esteve J., Alvarado-Rivera J., Güell F.* **Nano Energy** 60, 817-826 (2019)

A Three-Dimensional Dynamic Supramolecular "Sticky Fingers" Organic Framework. *Fernandez-Bartolome E., Santos J., Gamonal A., Khodabakhshi S., McCormick L.J., Teat S.J., Sañudo E.C., Costa J.S., Martín N.* **Angewandte Chemie - International Edition.** 58, 2310 –2315 (2019)

Funding Sources

The graphic and pie below, show the amount allocated during 2019 by IN2UB researchers.





Highlighted Projects

During 2019 the researchers from IN^{2}UB have been awarded with more than 6M€ to be distributed in the forthcoming years. Form all these projects, here we highlight the most relevant ones:

ENgineering FrustratiOn in aRtificial Colloidal icEs: degeneracy, exotic lattices and 3D states (ENFORCE). HORIZON 2020 (2014-2020). P1. CALL FOR PROPOSALS FOR ERC CONSOLIDATOR GRANT (ERC-2018-COG). IP: Pietro Tierno

DRop-on demand flexible Optoelectronics & Photovoltaics by means of Lead-Free halide perovskITes (DROP-IT). HORIZON 2020 (2014-2020). P1. FET OPEN – NOVEL IDEAS FOR RADICALLY NEW TECHNOLOGIES (H2020-FETOPEN-2018-2019-2020-01). IP: Blas Garrido Fernández

Disseny d'acceleradors basats en la tecnologia RISC-V per a la propera generació de computadors (DRAC) *(Design of accelerators based on RISC-V technology for the next generation of computers*). Departament d'Empresa i Coneixement. Generalitat de Catalunya (Local Administration). IP: Angel Dieguez Barrientos

Diseño y Nanoestructuración de Moléculas Multifuncionales para el Avance de la Espintrónica *(Design and Nanostructuring of Multifunctional Molecules for the Advancement of Spintronics).* Ministerio de Ciencia, Innovación y Universidades (National Administration). IP: Guillem Aromi Bedmar.

Transfer Indicators

A relevant indicator is the number of spin-off companies emerged from IN^{2}UB. The Institute has 6 spin-offs currently active, which are described below:

• Impetux Optics, S.L., created in 2012 lead by Dr. Mario Montes Usategui. Impetux Optics focuses its activity on Design, Manufacturing and Marketing of optical force measurement systems for Optical Tweezers. The company makes available a patented technology that overcomes existing limitations, providing clear advantages when measuring optical forces. The systems developed, allow force measurements in experiments where trap stiffness calibration is difficult or impossible.

• Advanced Nanotechnologies, S.L., created in 2012 by Dr. Enric Bertran Serra, Dr. Esther Pascual Miralles and Dr. José Luís Andújar Bella. Advanced Nanotechnologies S.L. is devoted to materials and surface applications addressed to general consumers and to the business market. It supports R&D projects by developing specific processes and equipment for each application. The company offers innovative solutions based on nanotechnology adapted to specific developments of the costumers, related to the manufacturing of nanostructured materials. It offers also consultancy services.

• Smalle Technologies, S.L. (by Dr. Christophe Serre and Dr. Alejandro Pérez Rodríguez), created in 2012. Smalle Technologies is a company that develops new methods for maximizing the benefits from renewable and sustainable energy sources in order to address energy supply shortages of off-grid devices. Smalle Technologies develops generators that transform the energy contained in the waves into electricity to supply power to off-shore devices.

• EndoASIC, S.L. (2013) (Dr. Angel Dieguez Barrientos, Dr. Oscar Alonso Casanovas and Dr. Ana Vilà Arbonés, members of the entrepreneurial group). This company develops, using micro and nanotechnologies, autonomous minimally invasive systems for the substitution of gastrointestinal endoscopic systems.

• Enlighting Technologies, created in 2016 by Dr. Blas Garrido Fernández and Dr. Sergi Hernández Márquez. It aims at achieving a more comfortable and adaptable light to each need and situation. They have developed the FLEXILIGHT-UB technology, which is able to reproduce any spectrum of light accurately and imitate any kind of light.

• ColorSensing, S.L, created in 2018 by Dr. Juan Daniel Prades García, devoted to smart packaging for food processing efficiency, quality, and safety.

During this period, IN^{2}UB has applied for 7 patents.

Highlighted News

- Advanced Nanotechnologies, spin-off of the University of Barcelona, created by researchers Dr. Enric Bertran Serra, Dr. Esther Pascual Miralles and Dr. José Luís Andújar Bella (Department of Applied Physics, Faculty of Physics) receives the award for the Best Innovation Strategy by the CIAC (automotive industry Catalan cluster)

- Enlighting Technologies, a *spin-off* of the University of Barcelona, created by researchers Dr. Blas Garrido Fernández, Dr. Sergi Hernández Márquez and Mr. Adrià Huguet (Department of Electronics and Biomedical Engineering, Faculty of Physics), increases its capital for its smart lighting System

- ColorSensing, a spin-off which resulted from a research project led by Dr. Juan Daniel Prades García, has received the Entrepreneurship Award (VII Edition) granted by the Fundació Caixa d'Enginyers

- CaixaImpulse, promoted by "la Caixa", funds a project led by Dr. Mario Montes Usategui (Faculty of Physics): "How can microscopes help to develop better medicines?". Dr. Montes' team is working on the prototype of a flexible, programmable laser microscope that enhances High Content Screening, a drug development technique that uses automated microscopy to analyse the effect of large catalogues of pharmaceutical compounds on cell samples. This new medical device overcomes the limitations of the existing microscopes of this type in the market with potential benefits for the development of new drugs.

- Five members of the Institute have been awarded in ICREA Academia 2018. ICREA, Catalan Institution for Research and Advanced Studies, is a foundation supported by the Catalan Government. The ICREA Academia awardees receive funding to do research for five years. The program contributes to strengthen research carried out by the university staff who are in an active and growing phase of their research. Our awarded researchers are: Dr. Guillem Aromí Bedmar (Department of Inorganic and Organic Chemistry and Director of the Institute of Nanoscience and Nanotechnology (IN^{2}UB)), Dr. Juan Daniel Prades García (Department of Electronic and Biomedical Engineering), Dr. Fèlix Ritort Farran (Department of Condensed Matter Physics), Dr. Pere Roca-Cusachs Soulere (Department of Biomedicine) and Dr. Pietro Tierno (Department of Condensed Matter Physics).

- Four researchers from the Institute, through the Bosch i Gimpera Foundation, have received the *Llavor grants*, given by the Agència de Gestió d'Ajuts Universitaris i de Recerca (AGAUR) (*Management Agency of University and Research Grants)* of the Catalan Government for innovative projects with potential to enter the production sector. *Llavor grants* are co-funded by the European Regional Development Fund within the operational program frame Catalonia ERDF 2014-2020.

The projects lead by our researchers that received these *Llavor grants* grants are the following:

"Long-range optical secure communications with optomechanical crystal in a chaotic regime", by Dr. Blas Garrido Fernández, from the Department of Electronic and Biomedical Engineering of the Faculty of Physics. The project aims to improve the security of telecommunication with optomechanical technology.

"Electrónica impresa sobre sustrato innovador para dotar a los robots de tacto en la interacción humano-robot (HRI)", by Dr. Albert Cirera Hernández, from the Department of Electronic and Biomedical Engineering of the Faculty of Physics. This is a project with printed electronics to simulate robots' tact.

"Sensores colorimétricos de bajo coste para la detección de gases orientados a aplicaciones IoT (SensorTape)", by Dr. Cristian Fàbrega Gallego, from the Department of Electronic and Biomedical Engineering of the Faculty of Physics. The project aims to develop a sensor to detect gases with self-adhesive colorimetric tags".

"Priming with rhizosphere polyamine for stress tolerance induction in plants", Dr. Antonio Fernández Tiburcio, from the Department of Biology, Health and Environment of the Faculty of Pharmacy and Food Sciences. The project intends to identify compounds to help crops survive droughts.

RESEARCH LINES AND GROUPS

The Institute is organized around 7 research lines where all groups are distributed according to the research developed. However, due to the transversally of the research performed, some groups can be found in more than one main line.

1. Modeling, Simulation and Nanoscopic Methods (NanoMet)

(Coordination: Dr. Francesca Peiró Martínez)

This research area develops instrumentation and methodology (employing experimental and theoretical tools) to characterize nanostructures and nanosystems of any nature,

A.- NanobioInteractions: Interactions between biological and nanoscopic systems.

B.- Confinement-related phenomena: reactivity, magnetism, optoelectronics and quantum photonics.

C.- Transport and conduction.

D.- Surface effects.

E.- Electronic structure and excitations.

F.- Bose-Einstein condensates and quantum confined gases.

G.- Advanced Electronic Microscopy (EFM, TEM, STM, EELS, EDS)

H.- Instrumentation and Methodology Development in Electron Microscopy.

Group of Magnetic Nanomaterials

(Department of Condensed Matter Physics, Faculty of Physics)

Òscar Iglesias Clotas (Associate Professor)

LENS-MIND

(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Francisca Peiró Martínez (Full Professor)
Sònia Estradé Albiol (Associate Professor)
Josep Manel Rebled Corselles (Adjunct Lecturer)
Luís López Conesa (Adjunct Lecturer)
Catalina Coll Benejam (PhD Student)
Javier Blanco Portals (PhD Student)
Daniel del Pozo Bueno (PhD Sutdent)
Pau Torruella Besa (Collaborator)
Gemma Martin Malpartida (Collaborator)

Materials: Phase transitions
(Department of Condensed Matter Physics, Faculty of Physics)

Antoni Planes Vila (Full Professor)
Lluís Mañosa Carrera (Full Professor)
Teresa Castán Vidal (Full Professor)
Michela Romanini (Postdoctoral Researcher Juan de la Cierva)
Marcel Porta Tena (Adjunct Lecturer)

Nanosystems Statistical Physics
(Department of Condensed Matter Physics, Faculty of Physics)

José Miguel Rubí Capaceti (Full Professor)
Andrés Arango Restrepo (PhD Student)

Nanosystems Statistical Physics-Complex Matter Group
(Department of Condensed Matter Physics, Faculty of Physics)

Giancarlo Franzese (Associate Professor)
Carlos Calero Borrallo (Tenure-Track Lecturer)
Oriol Vilanova Gabarrón (PhD Student)
Sotiris Samatas (PhD Student)
Luis Enrique Coronas Serna (PhD Student)

Theoretical physics of Nanoscopic Systems
(Department of Quantum Physics, Faculty of Physics)

Martí Pi Pericay (Full Professor)
Manuel Barranco Gómez (Full Professor)

2. Nanobioscience, Nanobiomechanics and BioNanotechnology (NanoBio)

(Coordination: Dr. Gustavo Egea Guri)

This research area studies the organizational patterns observable in the molecular structures that control and rule the biological systems both at the cellular and at the molecular scales. Its most relevant application is that of developing techniques and devices aimed at prevention and diagnose in nanomedicine.

A.- Functionalisation of surfaces.

B.- Cellular and molecular biomechanics

C.- Biomimetic structures and systems

D.- Nanofluidics and nanorobotics. Nanomotors.

E.- Diagnosis in nanomedicine: marking and molecular observation

F.- Nanobiosensors; DNA and Protein Chips; lab on chip.

Bioelectrical Characterization at Nanoscale
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Gabriel Gomila Lluch (Full Professor)
Annalisa Calo (Tenure-Track Lecturer)

Bioelectronics Unit and Nanobioeneering Lab
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Josep Samitier Martí (Full Professor)
Oscar Castaño Linares (Associate Professor)
Romén Rodríguez Trujillo (Tenure-Track Lecturer)
Mònica Mir Llorente (Adjunct Lecturer)

Biomolecule and small-system physics: Small Biosystems Lab
(Department of Condensed Matter Physics, Faculty of Physics)

Fèlix Ritort Farran (Full Professor)
Maria Mañosas Castejon (Postdoctoral Researcher Ramón y Cajal)

Biophysics and Bioengineering Unit
(Department of Biomedicine, Faculty of Medicine and Health Sciences)

Daniel Navajas Navarro (Full Professor)
Ramon Farré Ventura (Full Professor)
Pere Roca-Cusachs Soulere (Associate Professor)

BiOPT: Optical Trapping Lab - Grup de Biofotònica
(Department of Applied Physics, Faculty of Physics)

Mario Montes Usategui (Associate Professor)
Estela Martín Badosa (Associate Professor)
Raul Bola Sampol (PhD Student)
Dorian Treptow (PhD Student)
Antonio Marzoa (PhD Student)
Arnau Farré Flaquer (Collaborator- IMPETUX OPTICS, S.L)
Ferran Marsà Samper (Collaborator- IMPETUX OPTICS, S.L)

Cancer therapy group
(Department of Biochemistry and Physiology, Faculty of Pharmacy and Food Sciences)

Carlos Ciudad Gómez (Full Professor)
Verònica Noé Mata (Full Professor)
Alejandro Jiménez Félix (PhD Student)
Eva Aubets Gil (PhD Student)
Sonia Trigueros (Collaborator-University of Oxford)

Group of Natural Products
(Department of Biology, Healthcare and the Environment and Department of Biochemistry and Physiology, Faculty of Pharmacy and Food Sciences)

Antonio Fernàndez Tiburcio (Full Professor)
Jaume Bastida Armengol (Full Professor)
Francesc Viladomat Meya (Full Professor)
Montserrat Arró Plans (Associate Professor)
Laura Torras Claveria (Adjunct Lecturer)

Laboratory of connective tissue signalling and genetic diseases (CTS-GD)
(Department of Biomedicine, Faculty of Medicine and Health Sciences)

Gustavo Egea Guri (Full Professor)

Magnetic Soft Matter Group
(Department of Condensed Matter Physics, Faculty of Physics)

Pietro Tierno (Associate Professor and ERC Consolidator Grant)
Antonio Ortiz-Ambriz (Postdoctoral Researcher)
José Manuel García Torres (Collaborator-UPC)

Mineral Resources Research Group
(Department of Mineralogy, Petrology and Applied Geology, Faculty of Earth Sciences)

Josep Roqué Rosell (Tenure-Track Lecturer)
Joaquín Antonio Proenza (Associate Professor)
Joan Carles Melgarejo Draper (Associate Professor)
María Abigaíl Jiménez Franco (Visiting Researcher)

Microbian Enzymes for Industrial Applications Group
(Department of Genetics, Microbiology and Statistics, Faculty of Biology)

Francisco I. Javier Pastor Blasco (Full Professor)
Pilar Díaz Lucea (Full Professor)
Josefina Martínez Martínez (Associate Professor)
Susana Valenzuela Mayorga (Adjunct Lecturer)
Carolina Buruaga (PhD Student)
Lourdes Verónica Cabañas (PhD Student)

Nanomalaria Group
(Department of Biochemistry and Molecular Biomedicine. Faculty of Biology)

Santiago Imperial Ródenas (Associate Professor)
Carlota Roca Martínez (PhD Student)
Xavier Fernández Busquets (Collaborator-IBEC)

Nanostructure of Biomembranes Group
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Jordi Borrell Hernández (Full Professor)
María Teresa Montero Barrientos (Associate Professor)
Òscar Domènech Cabrera (Associate Professor)
Martha Leticia Vázquez González (Adjunct Lecturer)
Adrià Botet Carreras (PhD Student)

Peptides and Proteins: Physicochemical Studies
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Victòria Girona Brumós (Full Professor)
Josefina Prat Aixelà (Associate Professor)
Montserrat Pujol Cubells (Associate Professor)
Yolanda Cajal Visa (Associate Professor)
Montserrat Muñoz Juncosa (Associate Professor)

Physics in Nanobiophysics
(Department of Condensed Matter Physics, Faculty of Physics)

Aurora Hernández Machado (Full Professor)

Self-organized complexity and self-assembling materials (SOC&SAM)
(Department of Materials Science and Physical Chemistry, Faculty of Chemistry)

Francesc Sagués Mestre (Full Professor)
Berta Martínez Prat (PhD Student)
Ignasi Vélez Cerón (PhD student)

3. Nanopharmaceutics and Nanomedicine (NanoPharmaMed)

(Coordination: Dr. M. José García Celma)

This area aims at developing nanostructured systems for controlled drug release and to the improvement of drug therapeutic efficiency when administered on targets to treat diseases.

A.- Nanostructured Systems for controlled drug release. Nanocapsules.

B.- Nanostructured systems interaction with biological structures.

C.- Bioavailability, toxicity and therapeutic efficiency of nanostructured systems.

D.- Non-viral vectors. Gene therapy. Pharmacogenomics and nutrigenomics.

E.- Molecular internalization, molecular marking and detoxification.

Cellular responses to xenobiotics
(Department of Biochemistry and Physiology, Faculty of Pharmacy and Food Sciences)

M. Pilar Vinardell Martínez-Hidalgo (Full Professor)
Montserrrat Mitjans Arnal (Associate Professor)
M. del Carmen Moran Bádenas (Associate Professor)
Wawan Kurniawan (PhD Student)
Michele Ferrari (Collaborator-CNR-ICMATE Italy)

Colloids
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Joan Estelrich Latràs (Full Professor)
M. Antonia Busquets Viñas (Associate Professor)

Conformational Diseases Group
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Raimon Sabaté Lagunas (Associate Professor)
Alba Espargaró Colomé (Tenure-Track Lecturer)

Drug Design and Response-evaluation within Pharmaceutical Nanostructured and self-ordered Systems Group
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Elvira Escribano Ferrer (Associate Professor)
Jacinto Lauroba Viladrosa (Associate Professor)
Francesc Xavier García Sala (Adjunct Lecturer)

Group of Magnetic Nanomaterials
(Department of Condensed Matter Physics, Faculty of Physics)

Mariona Escoda Torroella (PhD Student)

Nano BioInorganic Chemistry Research Team (NanoBIC)
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Patrick Gamez Enamorado (ICREA Researcher)
Amparo Caubet Marín (Associate Professor)
Ana Belén Caballero Hernández (Tenure-Track Lecturer)

NanoBioPharma
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

Ana Calpena Campmany (Associate Professor)
Mireia Oliva (Associate Professor)
Lyda Halbaut Bellowa (Associate Professor)
Helen Lissette Alvarado Bonilla (Adjunct Lecturer)
Mireia Mallandrich (Adjunct Lecturer)
Joaquim Suñer Carbó (Adjunct Lecturer)
Guadalupe Del Carmen Abrego Escobar (Collaborator)
Beatriz Clares Maveros (Collaborator)
Marcelle Silva de Abreu (Collaborator)

Nanostructured systems for controlled drug delivery
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

M. Luisa García López (Full Professor)
Espina García Marta (Associate Professor)
Fidencia Gamisans Linares (Adjunct Lecturer)
Elena Sanchez Lopez (Adjunct Lecturer)
Amanda Cano Fernández (Adjunct Lecturer)

Pharmaceutical Nanotechnology
(Department of Pharmacy and Pharmaceutical Technology and Physical Chemistry, Faculty of Pharmacy and Food Sciences)

M. José García Celma (Full Professor)
Immaculada Dinarès Milà (Associate Professor)
M. Àngels Salvadó Lladós (Associate Professor)
Marta Monge Azemar (Adjunct Lecturer)
Esteban Figueroa Becerra (PhD Student)

Supramolecular Systems in Nanobiomedicine
(Department of Pharmacology, Toxicology and Therapeutic Chemistry, Faculty of Pharmacy and Food Sciences)

M. Lluïsa Pérez Garcia (Full Professor)
David Limon Magaña (Adjunct Lecturer)
Sandra Giraldo Clemente (PhD Student)

4. Nanomagnetism and Spintronics (NanoMagnetics)

(Coordination: Dr. Xavier Batlle Gelabert)

The area aims at developing new systems for storage and processing of information at the nanoscopic scale for information processing. It is also devoted to the study of new phenomena appearing at the nanometric size for the implementation of innovative devices of application in healthcare, sustainable energy, environment, healthy food and security.

It is also involved with the preparation and study of multifunctional molecular nanomagnets for spintronics and quantum computing.

A.- Magnetic nanoparticles and single molecule magnets.

B.- Dynamic processes in nanomagnetism and interaction with microwaves.

C.- Magnetic electronics.

D.- Spin-based molecular quantum bits and quantum gates for quantum computing.

Group of Magnetic Nanomaterials
(Department of Condensed Matter Physics, Faculty of Physics)

Amílcar Labarta Rodríguez (Full Professor)
Xavier Batlle Gelabert (Full Professor)
M. Aranzazu Fraile Rodríguez (Associate Professor)
Carlos Moya Alvarez (Collaborator)
Ana Conde Rubio (Collaborator)

Laboratory of Nanostructured and Nanocomposite Materials (LM2N)
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Marta Estrader Bofarull (Postdoctoral Researcher Ramón y Cajal)

Magnetic Interactions and Molecular Magnetism
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Ramón Vicente Castillo (Full Professor)
Albert Escuer Fité (Full Professor)
Mohamed Salah El Fallah (Full Professor)
Montserrat Corbella Cordomí (Associate Professor)
Carmen Díaz Gasa (Associate Professor)
Júlia Mayans Ayats (Postdoctoral Researcher)

Magnetism
(Department of Condensed Matter Physics, Faculty of Physics)

Javier Tejada Palacios (Emeritus)
Antoni García Santiago (Associate Professor)
Joan Manel Hernández Ferràs (Associate Professor)
Ferran Macià Bros (Postdoctoral Researcher Ramón y Cajal)

Magnetism and Functional Molecules Group (GMMF)
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Guillem Aromí Bedmar (Full Professor)
Eva Carolina Sañudo Zotes (Associate Professor)
Verónica Velasco Amigó (Adjunct Lecturer)
David Aguilà Avilés (Postdoctoral Researcher Juan de la Cierva)
Leoni A. Barrios Moreno (Postdoctoral Researcher)
Rosa Diego Creixenti (PhD Student)

Thin Layer Structures for Spintronics
(Department of Applied Physics, Faculty of Physics)

Manuel Varela Fernández (Full Professor)
César Ferrater Martorell (Associate Professor)
M. Carmen Polo Trasancos (Associate Professor)

5. Nanoelectronics, Nano-optics and Nanophotonics (NanoPhotoElectro)

(Coordination: Dr. Blas Garrido Fernández)

Study and exploitation at the nanoscale of the interaction of electric, magnetic and optical properties for the design of functional nanosystems.

A.- NEMS (Nanoelectromechanical Systems).

B.- Nanodevices, nanosensors and electronic nanosystems, optoelectronics and photonics. Photonic crystals.

Group of Magnetic Nanomaterials
(Department of Condensed Matter Physics, Faculty of Physics)

Montserrat García del Muro Solans (Associate Professor)

Instrumentation Systems and Communications (SIC)
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Anna Vilà Arbonés (Associate Professor)
Mauricio Moreno Sereno (Associate Professor)
Angel Dieguez Barrientos (Associate Professor)

LASER-MIND
(Department of Applied Physics, Faculty of Physics)

José Luís Morenza Gil (Emeritus)
Pere Serra Coromina (Full Professor)
Juan Marcos Fernández Pradas (Associate Professor)
Martí Duocastella Solà (Tenure-Track Lecturer)
Pol Sopeña Martinez (PhD Student)

Micro-nanotechnologies and nanoscopies for electronics and photonic devices (MIND)
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Albert Cornet Calveras (Full Professor)
Blas Garrido Fernández (Full Professor)
Albert Cirera Hernández (Full Professor)
Juan Daniel Prades Garcia (Full Professor and ERC Starting Grant)
Albert Romano Rodríguez (Full Professor)
Sergio Hernández Márquez (Associate Professor)
Paolo Pellegrino (Associate Professor)
Cristian Fàbrega Gallego (Tenure-Track Lecturer)
Daniel Navarro Urrios (Postdoctoral Researcher Ramón y Cajal)
Francisco de P. Hernandez Ramirez (Adjunct Lecturer)
Aïda Varea Espelt (Adjunct Lecturer)
Olga Casals Guillén (Postdoctoral Researcher)
Julià López Vidrier (Postdoctoral Researcher Juan de la Cierva)
Josep Oriol Blazquez Gomez (PhD Student)
Adrià Huguet Ferran (PhD Student)
Alexander Cabal Tato (PhD Student)
Ismael Gabaldon Saucedo (PhD Student)
Juan Luis Frieiro Castro (PhD Student)
Guillem Domènech Gil (PhD Student)
Elena López Aymerich (PhD Student)

6. Nanostructured materials (NanosMat)

(Coordination: Dr. Enric Bertran Serra)

This research area aims at developing new nanostructured materials or improving the properties of existing materials. This line also includes knowledge-frontier research in characterization techniques and manipulation tools at the nanoscale (as electron and probe microscopies, surface analysis, or spectroscopic and magnetic characterization).

A.- Synthesis, nanomanufacturing and nanomanipulation.

B.- Thin layers, nanostructured multilayers and coatings.

C.- Nanoparticles, gels, nanofibers, nanorods, nanothreads and nanotubes.

D.- Nanostructured metallic oxides.

E.- Mesoporous Materials and Nanopatterns.

Engineering of colloidal systems
(Department of Chemical Engineering and Analytical Chemistry, Faculty of Chemistry)

José María Gutiérrez González (Associate Professor)
Alicia Maestro Garriga (Associate Professor)

Homogeneous Catalysis
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Arnald Grabulosa Rodríguez (Associate Professor)
Anton Vidal Ferran (ICREA Researcher)
Dana Josa Hidalgo (PhD Student)

Laboratory of Nanostructured and Nanocomposite Materials (LM2N)
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Albert Figuerola Silvestre (Associate Professor)
Mengxi Lin (PhD Student)

Materials for Energy, Photonics and Catalysis, ENPHOCAMAT
(Department of Applied Physics, Faculty of Physics)

Enric Bertran Serra (Full Professor)
Esther Pascual Miralles (Full Professor)
Adolf Canillas Biosca (Full Professor)
José Luis Andújar Bella (Associate Professor)
Franc Güell Vilà (Associate Professor)
Roger Amade Rovira (Tenure-Track Lecturer)
Oriol Arteaga Barriel (Postdoctoral Researcher Ramón y Cajal)
Arevik Musheghyan Avetisyan (PhD Student)
Luis Fernando Pantoja Suárez (PhD Student)
Islam Alshaikh (PhD Student)
Joan Martí González (PhD Student)

Mechanisms of Reactions in Inorganic Chemistry
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Manuel Martínez López (Full Professor)
Montserrat Sofia Ferrer García (Associate Professor)

Organic Materials Unit
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Dolors Velasco Castrillo (Full Professor)
Jaume García Amorós (Associate Professor)
Alba Cuadrado Santolaria (PhD Student)
Roger Bujaldón Carbó (PhD Student)

Surface Engineering. Thin-layer Lab
(Department of Applied Physics, Faculty of Physics)

Joan Esteve Pujol (Emeritus)
Arturo Lousa Rodríguez (Associate Professor)

Self-organized complexity and self-assembling materials (SOC&SAM)
(Department of Materials Science and Physical Chemistry, Faculty of Chemistry)

Jordi Ignés Mullol (Associate Professor)
Joan Antoni Farrera Piñol (Associate Professor)
Josep Maria Pagès Casas (PhD Student)
Mohammad Tahghighi (PhD Student)

Supra and Nanostructured Systems Group
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Laura Rodríguez Raurell (Full Professor)
Inmaculada Angurell Purroy (Associate Professor)
Francisco Javier Caparrós Rodríguez (Adjunct Lecturer)
Andrea Pinto Martínez (PhD Student)
Ariadna Lázaro (PhD Student)

Thin-film and Nanostructure electrodeposition group
(Department of Materials Science and Physical Chemistry, Faculty of Chemistry)

Elvira Gómez Valentín (Full Professor)
Elisa Vallés Giménez (Collaborator)

7. Nanoenergy: Production and Storage (NanoEnergy)

(Coordination: Dr. Narcis Homs Martí)

The aim of this research line is the application of nanomaterials to energy production and storage to overcome efficiency and lifetime limits.

A.- Catalytic nanostructures for energy production. Fuel cells.

B.- Nanomaterials for solar cells and photocatalytic processes.

C.- Nanostructured systems for energy storage.

Catalysis and Advanced Inorganic Materials (MATCAT)
(Department of Inorganic and Organic Chemistry, Faculty of Chemistry)

Narcis Homs Martí (Full Professor)
Pilar Ramírez de la Piscina (Full Professor)
Arturo Pajares Rojas (PhD Student)
Yan Wang (PhD Student)
Paulina Raquel Martinez Alanis (Adjunct Lecturer)

Design and improvement of Processes and Materials (DIOPMA)
(Department of Materials Science and Physical Chemistry, Faculty of Chemistry)

Mercè Segarra Rubí (Full Professor)
Joan Formosa Mitjans (Associate Professor)
Elena Xuriguera Martín (Tenure-Track Lecturer)
Jordi Díaz Marcos (Adjunct Lecturer)
Jaume Calvo de la Rosa (PhD Student)

Instrumentation Systems and Communications (SIC)
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Christophe Serre (Associate Professor)

Nanoenergy and Electronic Materials (M2E) Group
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Joan Ramon Morante Lleonart (Full Professor)

Solar Energy Materials and Systems (SEMS) Group
(Department of Electronics and Biomedical Engineering, Faculty of Physics)

Alejandro Pérez Rodríguez (Full Professor)
Lorenzo Calvo Barrio (Adjunct Lecturer)
Edgardo Saucedo Silva (Collaborator- IREC)
Victor Izquierdo Roca (Collaborator- IREC)
Marcel Placidi (Collaborator- IREC)

Solar and Photovoltaic Energy Group
(Department of Applied Physics, Faculty of Physics)

Joan Bertomeu Balagueró (Full Professor)
Jordi Andreu Batallé (Associate Professor)
José Miguel Asensi López (Associate Professor)
Thomas Tom (PhD Student)

INTERNAL CALLS

Grants for Multidisciplinary Research (Ajuts a la Recerca Transversal-ART)

Internal call of collaborative research projects (*Ajuts a la Recerca Transversal* – ART). The aim of these calls is to promote transversal an innovative research among the research areas of the Institute between PhD researchers at the beginning of their career. On 2019, 2 ART grants have been awarded to the following proposals:

Laser Activation of Smart Nanosystems for Photothermal Therapies of Cancer Cells. Research areas (Faculties) involved: NanoPhotoElectro (Faculty of Physics) and NanoPharmaMed (Faculty of Pharmacy and Food Sciences).

Multicaloric Effects in Ferroelectric Plastic Crystals. Research areas (Faculties) involved: NanoMet (Faculty of Physics) and NanoMagnetics (Faculty of Chemistry).

Master Fellowships

In order to stimulate scientific careers in master's students, in the frame *of Beques de Col·laboració UB* (*UB Collaborating Fellowhips*), the Institute offers Master Fellowships to collaborate with IN^{2}UB research groups and supports the students in the process of carrying out research and working on their master theses. During 2019, 5 students have been awarded.

Funding the Organization of Congresses

the IN^{2}UB has cofounded and given support to the following congresses organized by IN^{2}UB members:

- ✓ **XXVI Sitges Conference on Statistical Mechanics. "New Trends in Statistical Physics". 50 years of the Sitges Conference** (Dr. José Miguel Rubí Capaceti, Organizing Committee)

  With the participation of prominent researchers in the areas of physics, chemistry and biology working on current topics of interest for the community of Statistical Physics. This Conference provides a unique opportunity to exchange points of view, to promote contacts and new collaborations among researchers working on different interdisciplinary areas, and to create a forum for debate about the new trends in Statistical Physics.

  Sitges, Barcelona (May 2019)

- ✓ **5th Conference on Frontiers in Water Biophysics (FWB) (**Dr. Giancarlo Franzese, Course Co-Director)

The conference offers opportunities for presentation and discussion of the most up-to-date research in the field of ***water structure and dynamics at the nanoscale and mesoscale***, properties which make water a unique molecule in all aspects of human life. Main topics will cover the active role of water in food, pharmaceutical and life sciences, and on their related technological aspects.

Erice, Sicily (Italy) (July 2019)

- ✓ **VII Symposium on Hydrogen, Fuel Cells and Advanced Batteries, HYCELTEC 2019** (Dr. Narcís Homs Martí, Organizing Committee)

An interdisciplinary forum for discussion of topics related to fuel cells, hydrogen and batteries, bringing together researchers from academia, technological centers and industry.

Faculty of Chemistry of the University of Barcelona, Barcelona (July 2019)

EVENTS

International Research Seminar (IRS)

In frame of the cycle of International Research Seminars (IRS), once a month an international researcher is invited to impart a high-level research seminar, covering one of the subject areas from the Institute:

"Nanoplasmonic Biosensing Through Colloid Chemistry". By Dr. Luis M. Liz-Marzán, Ikerbasque Research Professor, Scientific Director CIC biomaGUNE, Donostia-San Sebastian, Spain (February 2019)

"Marker-free monitoring of cells and tissues". By Dr. Katja Schenke-Layland, University of Tübingen, Germany (March 2019)

"Revealing the dynamics of nanomaterials in their formation and application media with liquid-cell TEM". By Dr. Damien Alloyeau, Paris Diderot University, France (March 2019)

"Energy Loss Spectroscopy at High Resolution: Probing the local electronic structure and the plasmonic response of materials". By Prof. Dr. Gianluigi Botton, McMaster University, Hamilton, Canada (April 2019)

"Printed Electronics: Equipment, Processing and Applications". By Dr. Meyya Meyyappan, NASA Ames Research Center, Moffett Field, CA 94035, United States of America (May 2019)

"Quantum Molecular Spintronics Based on Single-Molecule Magnets: Kondo Effect, Single-Molecule Memory, and MOF-Spintronics". By Prof. Masahiro Yamashita, Tohoku University, Japan (July 2019)

"Nanostructured Materials and Interfaces: Patterning and Templating". By Prof. Rigoberto Advincula, Case Western Reserve University, Department of Macromolecular Science and Engineering, Cleveland, OH 44106, United States of America (October 2019)

"Mesoporous silica nanoparticles as pharmacological nanocarriers". By Prof. María Vallet, Universidad Complutense de Madrid, Spain (November 2019)

Annual Workshop

Each year, IN^{2}UB celebrates a meeting aimed at stimulating collaborations between our researchers. The 2019 Annual Meeting took place on June at Enric Casassas Lecture Hall from Physics and Chemistry Faculties. There were two invited researchers who gave plenary sessions:

Chemistry of 2D-Pnictogen Nanomaterials. By Dr. Gonzalo Abellán. Institute of Molecular Science (ICMol), University of Valencia, Paterna (Spain), Joint Institute of Advanced Materials and Processes (ZMP), University Erlangen-Nuremberg, Fürth (Germany)

Nanoscience: the future arrived. By Dr. África González Fernández, Universidad de Vigo (Spain), Director of the Biomedical Research Center (CINBIO), President of the Spanish society for Immunology

There were also oral presentations from 2019 ART grantees and from selected abstracts from members of the Institute. The poster session hosted 50 presentations.

Book of Abstracts of the 2019 meeting: LINK

Transversal Workshop on Biomedicine

Since 2017, IN^{2}UB organizes transversal workshops with the aim of meeting together and sharing the research and know-how in some specific fields, in order to start collaborative projects or solve questions of mutual interest. In 2019, the focus of this workshop was to bring together the groups at the Department of Biomedical Sciences (Faculty of Medicine and Health Sciences) with researchers from the IN^{2}UB working in biomedical research topics. The meeting took place on the 9th of July at the Aula Magna of the Faculty of Medicine of the UB and it featured 22 short presentations from both units and an open discussion.

Program and presentations of the Workshop on Biomedicine at: LINK

Organization of Seminars

During this period, the Institute has also participated in the organization of seminars and talks of general interest to the IN^{2}UB community:

"Nanosafety research addressing public health concerns about metal oxide nanoparticles". By Prof. Paul Wright, Head of RMIT Nanosafety Research Group at RMIT University (Australia) (March 2019)

"Acoustic light focusing for fast 3D microscopy". By Dr. Martí Duocastella, Istituto Italiano di Tecnologia, Genoa (Italy) (June 2019)

"Computer simulations of skyrmionic textures in magnetic materials with Dzyaloshinskii-Moriya interactions". By Prof. David Cortés Ortuño, Computational Modeling group, University of Southampton (United Kingdom) (June 2019)

"The Power of Powder Diffraction and other Scattering Methods". By Prof. Tomče Runčevski, Department of Chemistry, Southern Methodist University (SMU), Dallas (USA) (July 2019)

"Using Laser-induced Forward Transfer (LIFT) for Additive Manufacturing". By Dr. Alberto Piqué, Materials Science and Technology Division, Code 6360, Naval Research Laboratory, Washington (USA) (July 2019)

"Magneto-optically active plasmonic structures". By Dr. Antonio García-Martín, Instituto de Micro y Nanotecnología IMN-CNM, CSIC, CEI UAM+CSIC, Isaac Newton 8, E-28760 Tres Cantos, Madrid (Spain) (October 2019).

"Insights into magnetotactic bacteria Magnetospirillum gryphiswaldense: a magnetic and structural study". By Dr. Lourdes Marcano, Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin, Germany & Dpto. Electricidad y Electrónica, Universidad del País Vasco, Leioa (Spain) (October 2019).

"Recent Advances in Spintronics" By Prof. Fèlix Casanova, CIC nanoGUNE, Donostia (Spain) (November 2019).

OUTREACH

IN^{2}UB is committed to transfer knowledge to society. In the year 2019, a **Permanent Commission of Outreach** was created and put to work in order reinforce this facet of the Institute. The outreach activities have, since then stepped up in amount relevance and diffusion.

Outreach education events:

"Outreach strategies and scientific communication" By Dr. Pedro Serena (CSIC, Madrid) and Dr. Jordi Diaz Marcos (CCiTUB and NanodivulgaUB) (January 2019).

*"(Nano)divulgation workshop at IN^{2}UB: How to nano(divulgate)?"***.** By Daniel Jiménez (Scientific Divulgator, Creaciencia), Dr. Jordi Diaz Marocs (CCiTUB and NanodivulgaUB) and Margarita Becerra (UBDivulga) (June 2019).

"*Divulgation with Gender Perspective Workshop*". By Dr. Beatriz Cantero (Faculty of Education, UB), Dr. Anna May (ICMAB-CSIC, outreach officer), Dr. Ana González (UAB, AMIT (WOMEN'S ASSOCIATION RESEARCHERS & TECHNOLOGY -CAT president) and Dr. Leni Bascones (ICMM-CSIC, 11F promotor) (November 2019).

Our researchers participate in very popular science fairs and outreach activities, addressed to the general public. These include the following activities:

European Research Night (September 2019)

- *Electron Microscopy, Diffraction and atoms* (LENS-IN^{2}UB-Faculty of Physics) .

- "*Yes, you are right, there is a lot of space in the background, Mr. Feynman"* by Prof. Xavier Batlle Gelabert (IN^{2}UB-Faculty of Physics).

- *Scientific Coffee- The periodic table in renewable energy. The elements of the periodic table are key in the implementation of renewable energy* with the participation of Prof. Joan Esteve Pujol (Faculty of Physics).

Festival 10alamenos9 (*10-9 Festival*)

The Festival aims to bring the nanometric scale, its effects and how this knowledge is going to change our lives through countless applications and products, to all audiences. Our researchers participate to this event giving general talks about their research and the Director opens the festival with a speech.

Festa de la Ciència (*the Party of Science*)

The aim of the festival, which takes place on May at the Central building of the University of Barcelona, is to make the research carried out at the University of Barcelona accessible to all audiences (mainly schools), and at the same time to claim the relevant role of science in all areas

of the life. Researchers from the IN^{2}UB collaborate to this initiative by organizing educative workshops in fields such as microscopy or the periodic table.

Exhibitions

"*Fritz Haber: both sides of a Nobel Prize*" exhibition the Physics and Chemistry Library, being the commissioners of the exhibition the members of IN2UB Dr. Arnald Grabulosa Rodríguez, Prof. Narcís Homs Martí and Prof. Pilar Ramírez de la Piscina (Faculty of Chemistry).

In frame of this initiative and thanks to Prof. Narcís Homs expertise in catalysis, he has invited to participate in the divulgate program *quequicom* (what-who-how) on TV to talk about the Haber-Bosch Process.

PhD THESIS DEFENDED

Most IN^{2}UB researchers are involved in the doctorate training. This is the list of doctoral theses defended in 2019, supervised by IN^{2}UB researchers:

Title: Diseño, desarrollo y caracterización de formas de dosificación tópicas frente a la amenaza NRBQ: Agentes radiológicos. Author: José Luis Soriano Ruiz. Directors: Ana C. Calpena Campmany, Beatriz Clares Naveros.

Title: Desarrollo y optimización de sistemas nanoestructurados lipídicos conteniendo pranoprofeno para administración dérmica. Author: María Rincón Díaz. Directors: M. Luisa García López, Guadalupe Abrego Escobar.

Title: P-Stereogenic ligands with the tert-butylmethylphosphine fragment. Coordination chemistry and catalysis of their organometallic complexes. Author: Albert Gallen Ortiz. Directors: Antoni Riera, Arnald Grabulosa Rodríguez.

Title: Magnetismo en nanoestructuras cilíndricas magnéticas y efectos topológicos de borde: Estudio teórico y simulaciones multiescala. Author: Hernán David Salinas. Directors: Johans Restrepo, Òscar Iglesias Clotas.

Title: Study of solid particle materials as high temperature Thermal Energy Storage and Heat Transfer Fluid for Concentrating Solar Power. Author: Alejandro Calderón Díaz. Directors: Mercè Segarra Rubí, A.I. Fernández.

Title: Mechanical and functional properties in magnetic materials. Author: Jaume Calvo de la Rosa. Directors: Mercè Segarra Rubí, Javier Tejada Palacios.

Title: Asociación de sistemas nanostructurados con Fluorometolona para el tratamiento de enfermedades inflamatorias. Author: Robert Carlos González Pizarro. Directors: M. Luisa García López, Marta Espina García.

Title: Oligopeptides as highly versatile agents against copper-mediated oxidative stress and amyloid-β aggregation. Author: Guillem Vázquez-Bigas. Directors: Patrick Gamez Enamorado, Ana Belén Caballero Hernández.

Title: Z-scan methods for ultrashort laser microprocessing of transparent materials. Author: Francesc Caballero Lucas. Directors: Juan Marcos Fernández Pradas, Pere Serra Coromina.

Title: Synthesis and Characterization of Multilayer Graphene Nanostructures. Author: Arevik Musheghyan Avetisyan. Director: Enric Bertran Serra.

Title: Carbon Nanotubes grown on stainless steel for supercapacitor applications. Author: Luis

Fernando Pantoja Suarez. Director: Enric Bertran Serra, Roger Amade Rovira.

Title: Síntesi Assistida per Microones de Molècules Imant i Nanoestructuració en Sistemes Híbrids amb Nanopartícules d'Òxid de Ferro. Author: Lidia Rosado Piquer. Director: Eva Carolina Sañudo Zotes.

Title: Development and optimization of inkjet printing based technologies for hybrid printed circuit boards. Author: Javier Arrese Carrasquer. Director: Albert Cirera Hernández.

Title: Mathematical work on the foundations of Jones-Mueller formalism and its application to nano optics. Author: Ertan Kuntman. Directosr: Adolf Canillas Biosca, Oriol Arteaga Barriel.

Title: Development of novel EELS methods to unveil nanoparticle properties. Author: Pau Torruella Besa. Directors: Francesca Peiró Martínez, Sònia Estradé Albiol

Title: Optimization of the use of diamond indicator minerals in diamond exploration in kimberlites. Author: Jingyao Xu. Director: Joan Carles Melgarejo Draper

Title: Out-of-equilibrium dynamics in driven and active magnetic colloids. Author: Helena Massana-Cid. Director: Pietro Tierno.

Title: Advances in semiconducting nanowires for gas sensing: synthesis, device testing, integration and electronic nose fabrication. Author: Guillem Domènech Gil. Director: Albert Romano Rodríguez.

Title: Free energy and information-content measurements in thermodynamic and molecular ensembles. Author: Alvaro Martinez Monge. Directors: Félix Ritort Farran, Maria Mañosas Castejon.

Title: Advanced methodologies for improving the characterization and treatment of sleep apnea. Author: Jair Asir Villanueva Padilla. Directors: Ramon Farré Ventura, Josep M. Montserrat

Title: Semiconductores Orgánicos derivados del carbazol y su aplicación en dispositivos eletrónicos. Author: Alba Cuadrado Santolaria. Director: M. Dolores Velasco Castrillo

Title: Control of integrin-mediated mechanoresponse by binding partners and force loading rates. Author: Víctor González-Tarragó. Director: Pere Roca-Cusachs Soulere.

Title: Desarrollo de formulaciones innovadoras para la liberación de principios activos en la piel. Author: Eva M. Arias Chousa. Director: María José García Celma

Title: Development and Optimization of a Low Temperature Co-fired Ceramic Suspension for Mask-Image-Projection-based Stereolithography. Author: Joana Gonçalves Fernandes. Director: Elena Xuriguera Martín.

Title: Stable and efficient photoelectrodes for solar fuels production. Author: Carlos Ros. Director: Juan Ramon Morante Lleonart.

Title: Enhancing electrochemical performances of supercapacitors. Author: Avireddy Hemesh. Director: Juan Ramon Morante Lleonart.

Title: Redox Flow Batteries: from vanadium to earth abundant organic molecules (quinones). Author: Francisco Javier Vazquez Galvan. Director: Juan Ramon Morante Lleonart.

Title: Design of Novel Compositionally Controlled Hybrid and Ternary Nanostructures. Author: Mariona Dalmases Solé. Director: Albert Figuerola Silvestre.

Title: Transport and assembly of colloids in liquid crystals. Author: J.M. Pagès Casas. Directors: Jordi Ignés Mullol, Francesc Sagués Mestre.

Title: Multiscale Nonlinear Mechanics of Soft Biological Tissues. Author: Ignasi Jorba. Director: Daniel Navajas Navarro.

Institut de Nanociència i Nanotecnologia

UNIVERSITAT DE BARCELONA

Institut de Nanociència i Nanotecnologia

Universitat de Barcelona, IN^{2}UB

Faculty of Chemistry

Diagonal 645, 08028, Barcelona (Spain)

Telephone: + 34 93 402 12 66

in2ub@ub.edu / www.ub.edu/in2ub/