MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications (NANOMAT)

José Ángel Pardo

Área de Ciencia de Materiales e Ingeniería Metalúrgica (Universidad de Zaragoza)

Instituto de Nanociencia y Materiales de Aragón (Universidad de Zaragoza - CSIC)

jpardo@unizar.es

https://ciencias.unizar.es/master-en-materiales-nanoestructurados-para-aplicaciones-nanotecnologicas

https://estudios.unizar.es/estudio/ver?id=637&anyo_academico=2025

https://inma.unizar-csic.es/formacion/master-nanomat

Universidad Zaragoza 1474 · CIENCIAS ZARAGOZA · INMA INSTITUTO DE NANOCIENCIA Y MATERIALES DE ARAGÓN · EXCELENCIA SEVERO OCHOA · LMA LABORATORIO DE MICROSCOPIAS AVANZADAS

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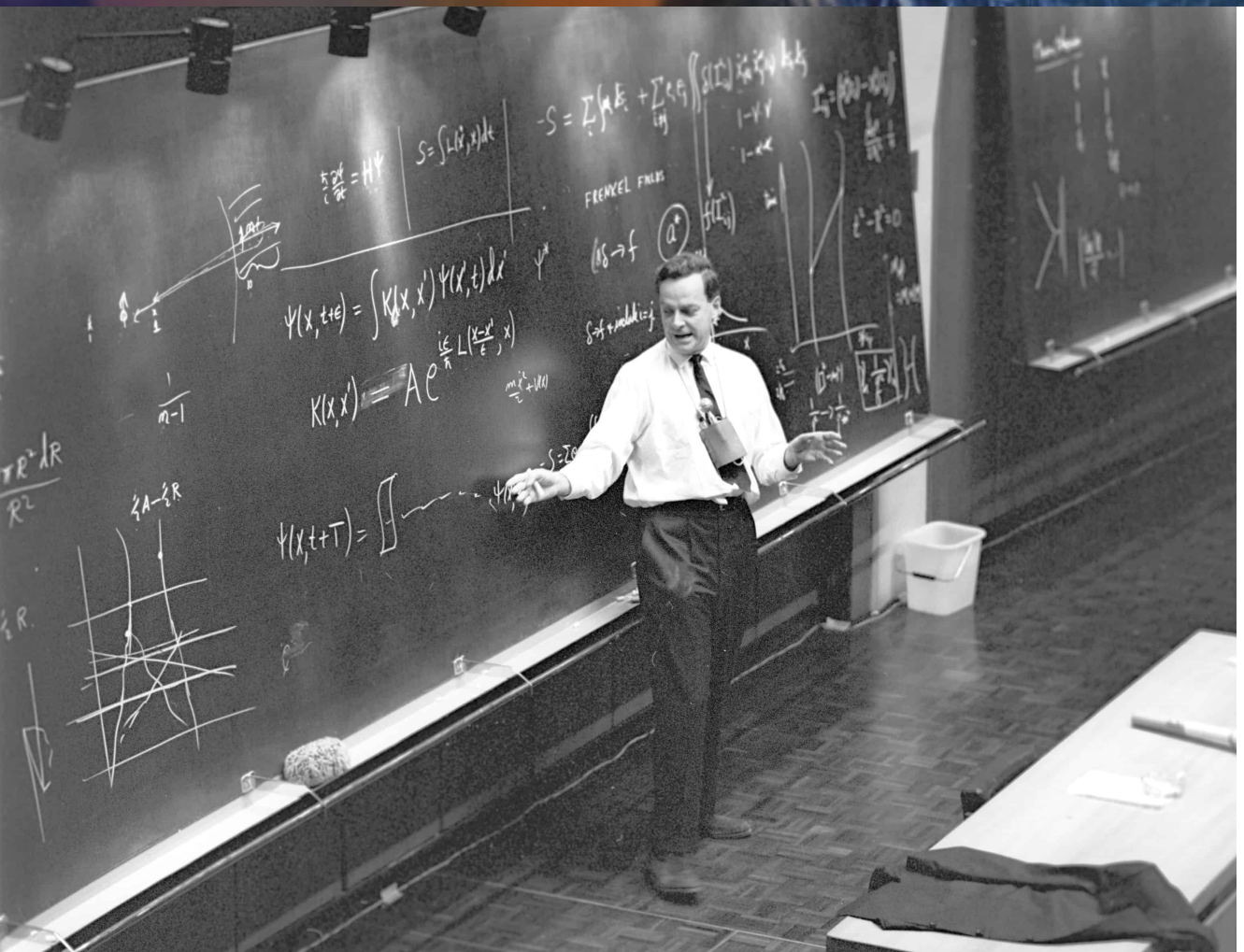

"There's plenty of room at the bottom"

(Richard Feynman, 1959)

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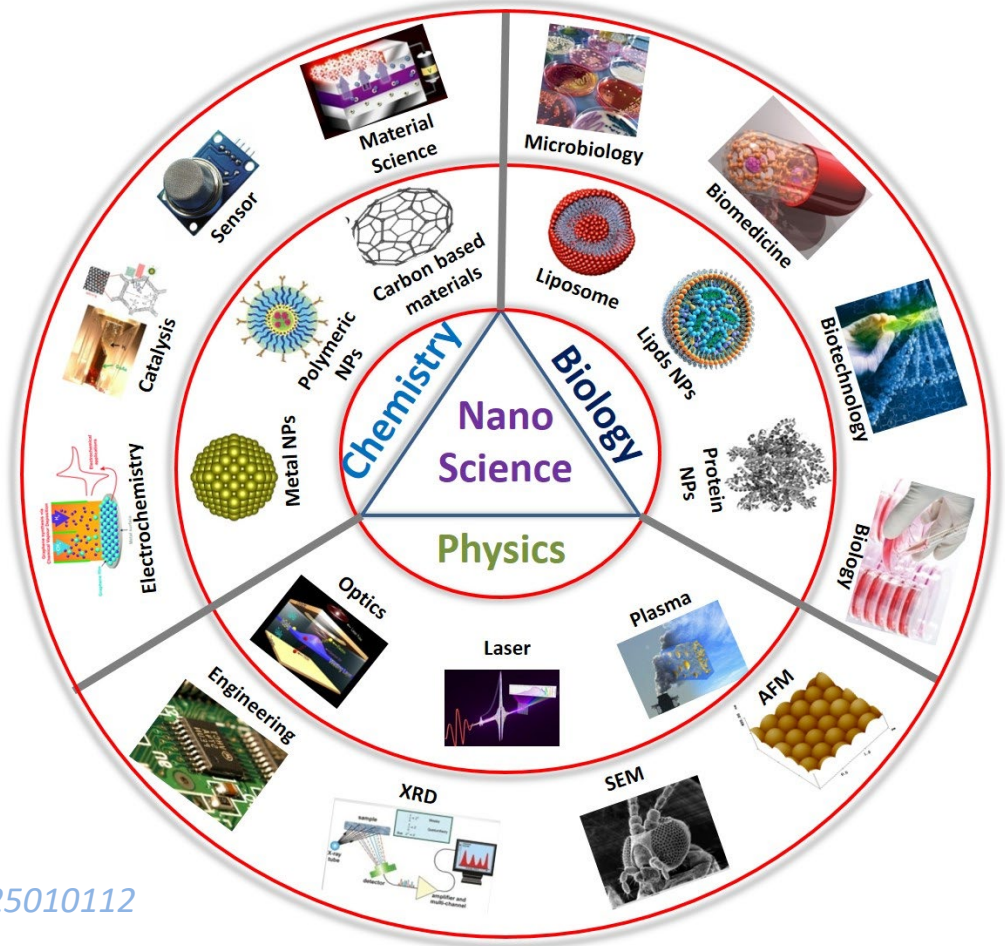
Nowadays, Nanoscience and Nanotechnology are very active scientific and technological fields



DOI: 10.3390/molecules25010112

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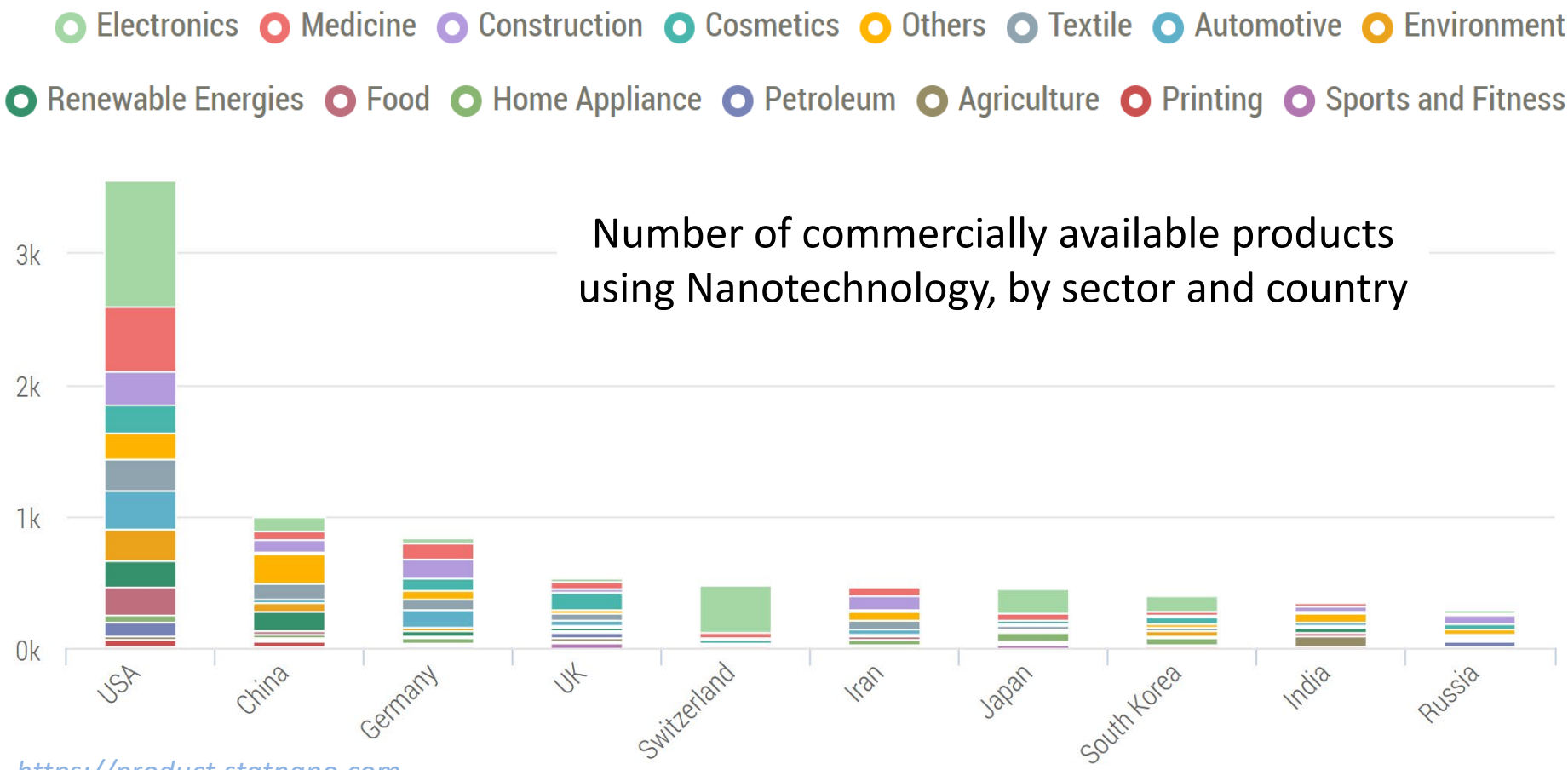

Number of commercially available products using Nanotechnology, by sector and country

https://product.statnano.com

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Just a few examples…











https://euon.echa.europa.eu/what-kind-of-products-contain-nanomaterials

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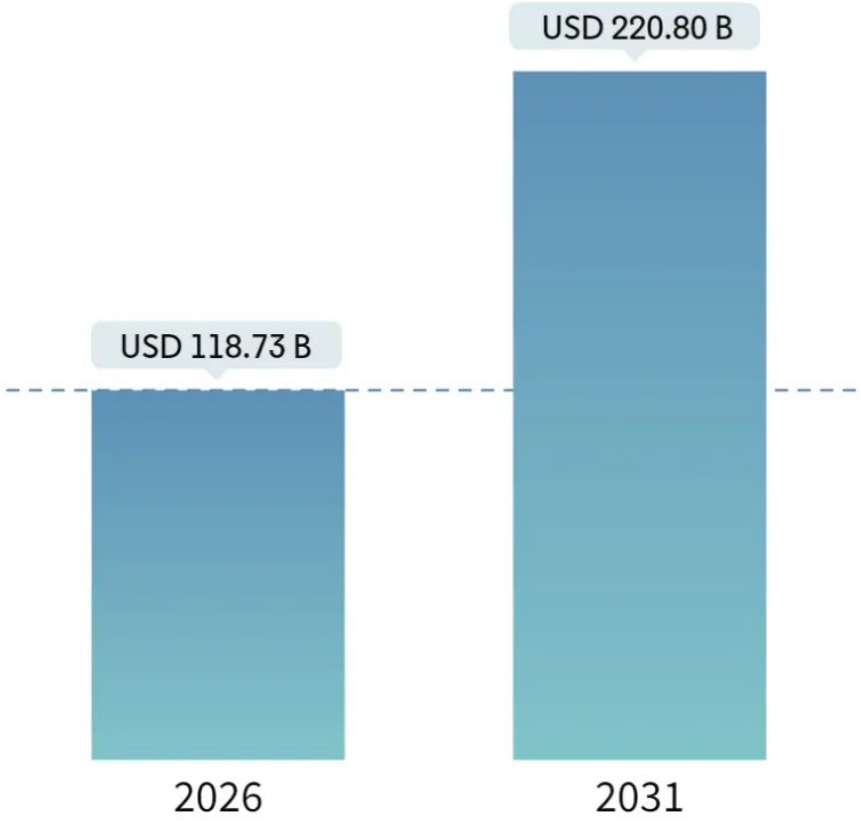
Expected growth of the Nanotechnology Market from 2026 to 2031

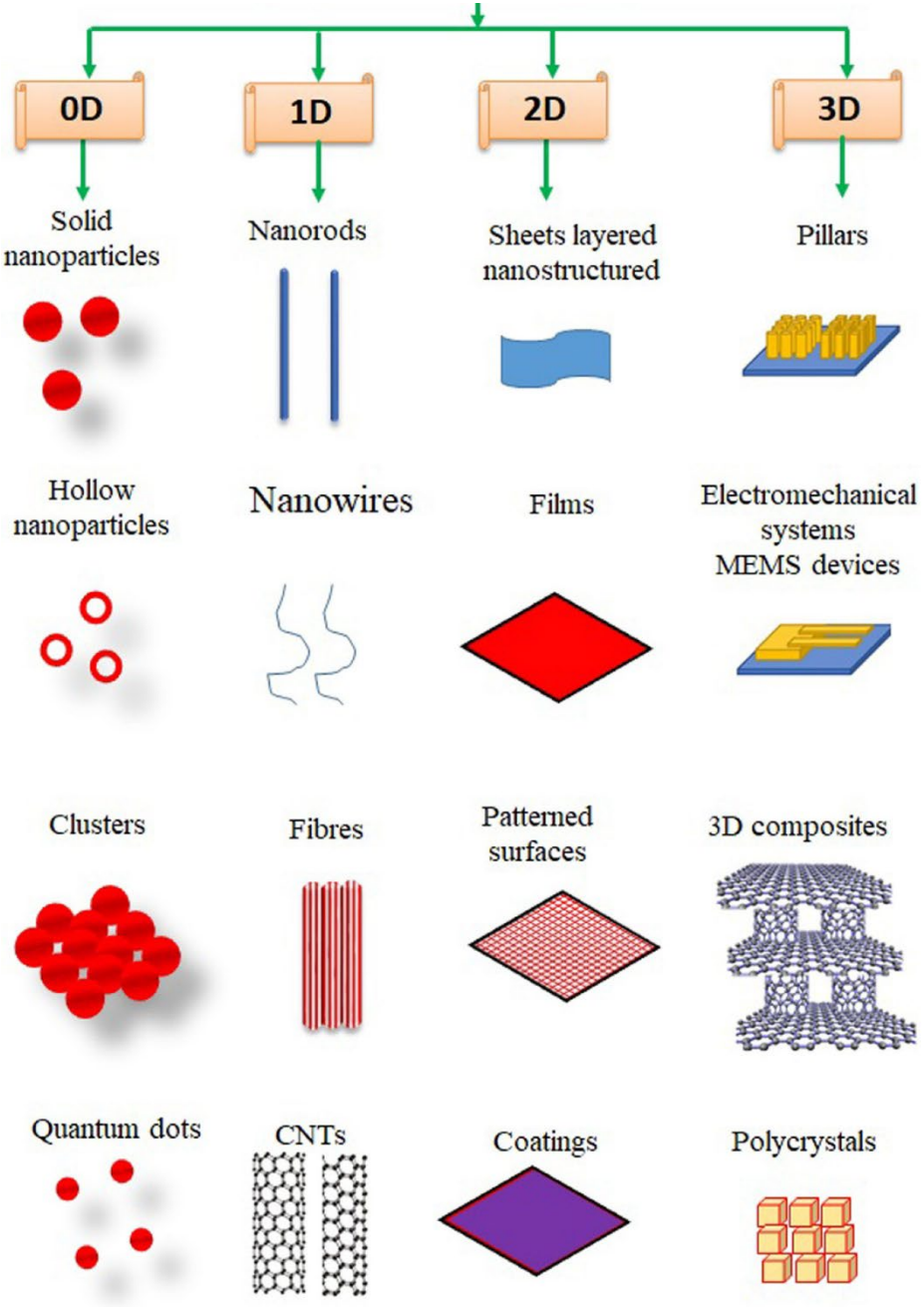


https://www.mordorintelligence.ar/industry-reports/nanotechnology-market

Types of nanomaterials

Nanomaterials are materials with **at least one** dimension measuring **between 1 and 100 nm**, often exhibiting unique physical, chemical, or biological properties distinct from their bulk counterparts (A.I.).

DOI: 10.1016/j.eti.2020.101067



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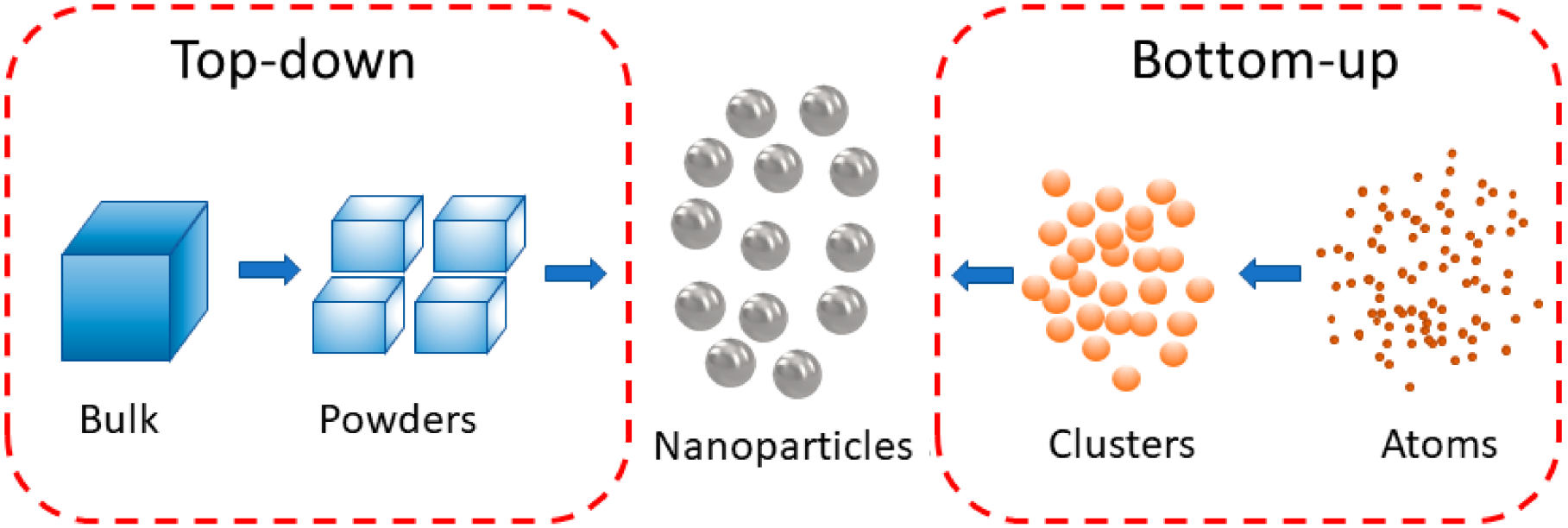
How are nanomaterials produced?



DOI: 10.3390/bios10110165

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Nanostructured Materials
for Nanotechnology Applications (NANOMAT)

OBJECTIVE OF THE MASTER

The objective of the NANOMAT Master is to provide **high-quality University Multidisciplinary Education** in the **synthesis, assembly, fabrication and characterization** of **nanostructured materials** as well as **practical experience and skills** in the **fabrication of micro and nanodevices**.

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for Nanotechnology Applications (NANOMAT)

Academic requirements

- ✓ **Bachelor Degree in Sciences** (Physics, Chemistry, Biotechnology, Biochemistry, Materials Science), **or Engineering** (Chemical Engineering, Materials Engineering, Biomedical Engineering, and related).
- ✓ Particular cases: academic contents revision by Unizar Post-Graduate Office and Master Coordinator.
- ✓ **English level B1 (recommended B2)**.
- ✓ Personal interview.

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MULTIDISCIPLINARY

PRACTICAL

INTERNATIONAL

Admission limit:
25 students

1 year long

60 ECTS
(1 ECTS = 25 hours student workload)

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MULTIDISCIPLINARY

More than 50 lecturers from 11 knowledge areas of UZ

Chemical Engineering

Biochemistry & Molecular Biology

Physical Chemistry

Condensed Matter Physics

Analytical Chemistry

Organic Chemistry

Environmental Technologies

Business Management & Organization

Inorganic Chemistry

Optics

Materiales Science & Engineering

MASTERS DEGREE IN

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MULTIDISCIPLINARY

Students with different backgrounds: Physics, Chemistry, Engineering, Biotechnology, Materials Science, etc.

Invited lecturers from: University of Liverpool, Centro Nacional de Microelectrónica, Universidad Complutense de Madrid, Oficina Española de Patentes y Marcas, Instituto de Ciencia de Materiales de Barcelona, etc.

Invited speakers from companies (Cátedra SAMCA de Nanotecnología)

MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications (NANOMAT)

Thursday's NanoSpin-off TALKS

November 27th, 17.00h

ONLINE by ZOOM and PRESENTIAL
(Conference Room. I+D Building)

Enlace a Teams

TALK

"PRECISION, SPEED, AND SCALE: DALP® IN ADVANCED MATERIALS COMBINATORICS"

SPEAKER

Mikel Mangold

Partnerships Manager at ATLANT 3D, chemist by training, now helping scientific innovation to lands into the scientist's hands

ATLANT 3D is a deep-tech company based in Copenhagen, Denmark, founded in 2018 as a spin-off from the Technical University of Denmark (DTU). Their mission is to revolutionize atomic-scale manufacturing with their proprietary Direct Atomic Layer Processing (DALP®) technology.

ATLANT 3D's Direct Atomic Layer Processing (DALP®) platform provides programmable, localized atomic-layer controlover deposition and etching, enabling precise tuning of material composition, structure, and thickness across many substrates and morphologies. By generating high-throughput combinatorial material libraries (10^3–10^6 variants per wafer, e.g. 50 TiO_2 data points in 6 hours instead of 1–2 weeks), DALP® dramatically speeds up materials optimization while cutting waste and process complexity. These capabilities translate into faster lab-to-fab pipelines for real devices—such as sensors, capacitors, catalysis and MEMS/optics—because materials discovered and optimized on DALP® can be transferred to industry-standard fabrication flows at scale.

Cátedra SAMCA de Nanotecnología Universidad Zaragoza

INMA INSTITUTO DE NANOCIENCIA Y MATERIALES DE ARAGÓN

EXCELENCIA SEVERO OCHOA 04/2024 - 03/2030

CSIC Consejo Superior de Investigaciones Científicas

Universidad Zaragoza

MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications (NANOMAT)

Thursday's NanoSpin-off TALKS

January 22th, 17.00h

ONLINE by ZOOM and PRESENTIAL
(Aula. I+D+i Building)

TALK

"DESIGNER 3D MATERIALS BY ADDITIVE MICROFABRICATION"

SPEAKER

Alexander Legant

Sales Manager for most parts of Europe, physicist with studies in Darmstadt and Heidelberg, since 2010 at Nanoscribe.

PRESENTER

Dra. Pilar Cea Mingueza

Catedrática de Química Física en la Facultad de Ciencias de la Universidad de Zaragoza e investigadora del Instituto de Nanociencia y Materiales de Aragón (INMA, CSIC–Universidad de Zaragoza)

Nanoscribe is the pioneer and market leader in high-precision additive manufacturing. The company develops and produces 3D micro-printing and grayscale lithography systems, along with specialized materials and application-specific solutions for nano-, micro- and mesoscale fabrication. Founded in 2007 as a spin-off of KIT, Nanoscribe has been part of the LAB14 Group since December 2024.

SUMMARY TOPIC TALK:

The achievements of the two-photon polymerization based world's most flexible 3D micro-printer will be presented. The device offers a defined control on the feature sizes and resolutions ranging from nanometer to micrometer scale and accessible print area of ~ cm2. This versatility has opened new frontiers in the field of material research, MEMS, microfluidics, photonics, biomedical engineering, plasmonics, micro-optics, mechanical metamaterials, biomimetics, life sciences, and micro-robotics. All this is made possible by the advancements in the software and hardware design of the printer that enables the realization of ideas only with few clicks. The decade of trusted use of this technology has found its way in labs like Imperial College London, Harvard University, University College London, ETH Zurich, University of Oxford and to several industrial applications as well. This presentation will therefore cover the latest advances utilizing this art of 3D microprinting that has made small things matter across the globe.

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EXCELENCIA SEVERO OCHOA 04/2024 - 03/2030

Ayuda CEX2023-001286-S financiada por

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Universidad Zaragoza 1542

MASTERS DEGREE IN

Nanostructured Materials for Nanotechnology Applications (NANOMAT)

Thursday's NanoSpin-off TALKS

February 26th, 17.00h

ONLINE by ZOOM and PRESENTIAL
(Aula 04. Fac. Ciencias. Físicas)

TALK

"HARNESSING SUNLIGHT TO ELIMINATE FOG: SOLAR DEFOG TECHNOLOGY AS FIRST DURABLE SOLUTION TO FIGHT FOG IN EYEWEAR"

SPEAKER

Iwan Hächler

CEO & Co-Founder of Solabs Nanotechnology. Mechanical Engineer (PhD, ETH Zurich) specializing in functional nanomaterials.

PRESENTER

Dra. Cristina Momblona

Ramón y Cajal Researcher at the Institute of Nanoscience and Materials of Aragon (INMA), CSIC–University of Zaragoza, and the Department of Chemical Engineering and Environmental Technologies (IQTMA)

SUMMARY TOPIC TALK:

Fogging on transparent surfaces such as eyewear, vehicle glazing, and optical devices remains a persistent challenge, impairing visibility, safety, and user comfort. Existing solutions—primarily temporary sprays or hydrophilic coatings—lack durability, require repeated application, or compromise optical performance, leaving a clear gap for a long-lasting, maintenance-free alternative.

Solabs addresses this challenge with a sunlight-activated, infrared-absorbing nanocoating that passively prevents and removes fog through selective photothermal heating while maintaining high visible transparency. The technology is based on nanoscale light–matter interaction engineering and is designed for seamless integration into existing manufacturing processes through a licensing model.

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EXCELENCIA SEVERO OCHOA 04/2024 - 03/2030

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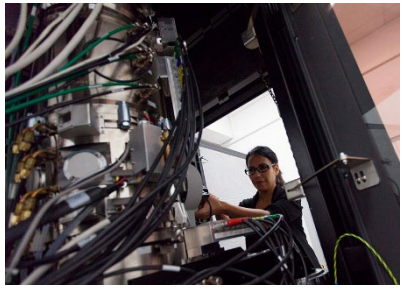
PRACTICAL



More than 50 % of the credits are practical

Training in advanced tools for Nanotechnology

Communication and management skills

Internships - UNIVERSA

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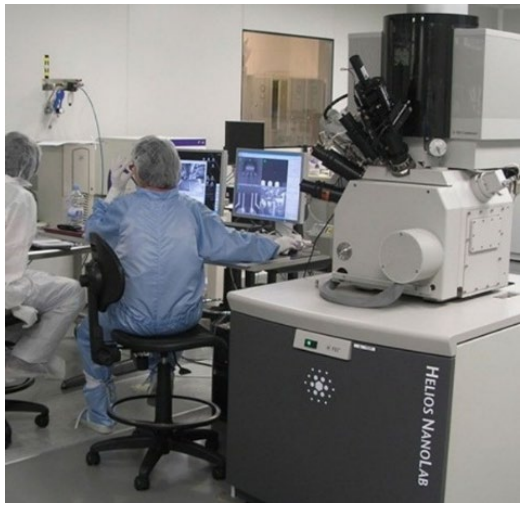
LMA
LABORATORIO DE MICROSCOPIAS AVANZADAS

1474

Servicio de Orientación y Empleo

Universidad Zaragoza



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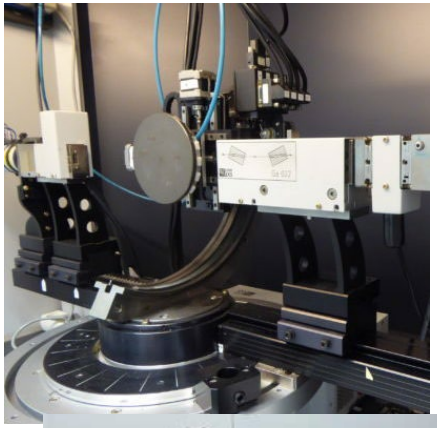
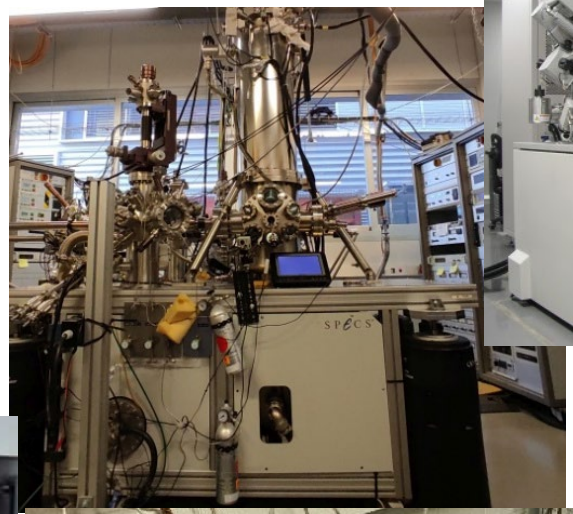
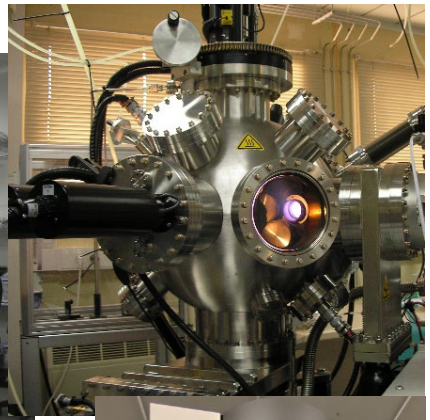
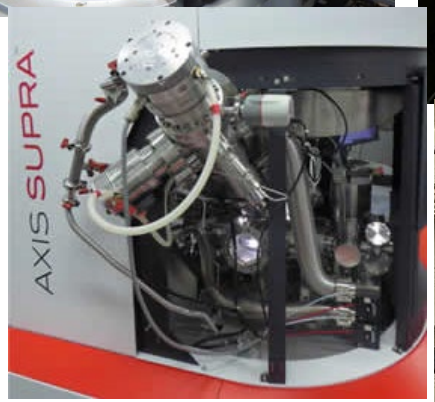
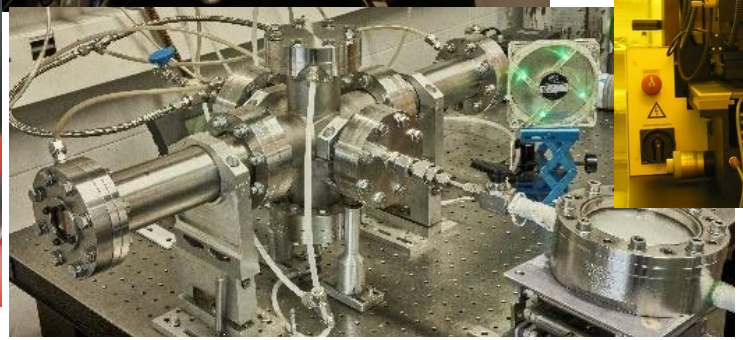
PRACTICAL

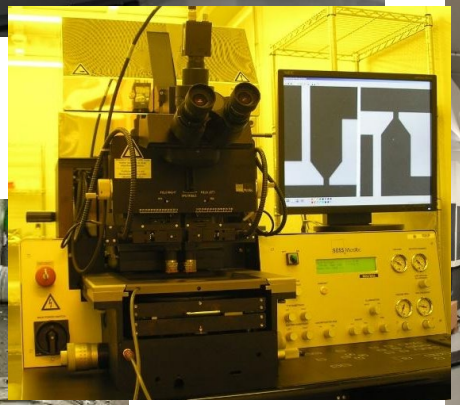












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INTERNATIONAL

Completely taught in English

Post-graduate Programme of Fundación Carolina

Erasmus Mundus Master on Membrane Engineering: international students join NANOMAT in spring term

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Structure of the new plan (712), beginning 2026-2027

30 ECTS compulsory, 12 ECTS optional, 18 ECTS Master's dissertation

BOLETÍN OFICIAL DEL ESTADO
Núm. 148 Viernes 20 de junio de 2025 Sec. III. Pág. 82310

III. OTRAS DISPOSICIONES

UNIVERSIDADES

12610 *Resolución de 9 de junio de 2025, de la Universidad de Zaragoza, por la que se publica la modificación del plan de estudios de Máster Universitario en Materiales Nanoestructurados para Aplicaciones Nanotecnológicas.*

To appear soon at: **https://estudios.unizar.es/estudio/ver?id=637&anyo_academico=2026**

Materias	Asignaturas	
1 Fundamental Properties of Nanostructured Materials, 6 ECTS	**1** Fundamental Properties of Nanostructured Materials (6 ECTS)	**Obligatorias (30 ECTS)**
2 Synthesis, Assembly and Fabrication of Nanostructured Materials 12 ECTS	**2a** Preparation of Nanostructured Materials (6 ECTS)	
	2b Synthesis and Assembly of Nanostructured Materials (6 ECTS)	
3 Characterization Techniques 12 ECTS	**3a** Physico-Chemical Characterization Techniques (6 ECTS)	
	3b Advanced Microscopies (6 ECTS)	
4 Nanotechnological Applications 9 ECTS (3 ECTS + 6 ECTS)	**4a** Safe and Sustainable Nanotechnologies (3 ECTS)	**Optativas (a elegir 12 ECTS)**
	4b Micro and Nanodevices for Energy and Environmental Applications (3 ECTS)	
	4c Nanostructured Materials for Biomedical Applications (3 ECTS)	
5 Phenomena at the Nanoscale 9 ECTS (3 ECTS + 6 ECTS)	**5a** Materials Modelling (3 ECTS)	
	5b Nanoscale Spintronics and Photonics (3 ECTS)	
	5c Nanomaterials for Electronics and Quantum Technologies (3 ECTS)	
6 Professional Development and Entrepreneurship 12 ECTS (3 ECTS + 9 ECTS)	**6a** Communication Skills and Open Science (3 ECTS)	
	6b Knowledge Transfer and Entrepreneurship (3 ECTS)	
	6c Internships (6 ECTS)	
7 Interdisciplinary, 6 ECTS	**7** Interdisciplinary (6 ECTS)	
8 Master´s Dissertation, 18 ECTS	**8** Master´s Dissertation (18 ECTS)	**TFM**

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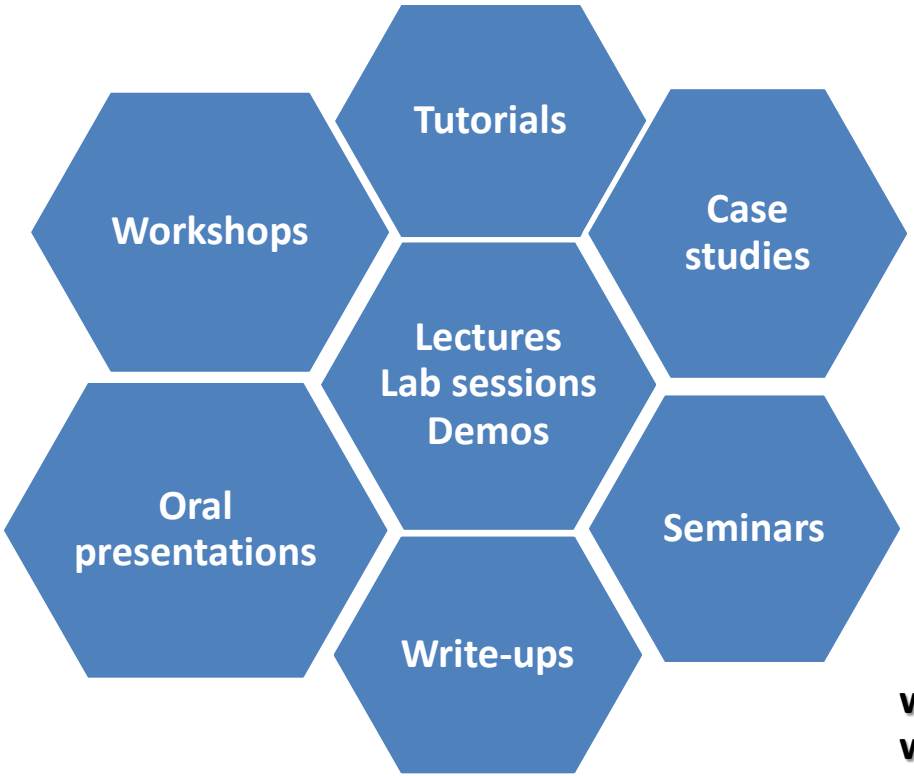
Academic activities…



to achieve

- Fundamental knowledge
- Practical experience
- Communication & Management skills

Career opportunities across a wide range of industry sectors as well as in academia and research

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Grants

Cátedra SAMCA de Nanotecnología
Universidad Zaragoza

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INSTITUTO DE NANOCIENCIA Y MATERIALES DE ARAGÓN

Specific call to cover 100% of tuition fees in NANOMAT:

https://catedrasamcananotec.unizar.es/academico/becas-master-nanomat/

More calls available at:

GOBIERNO DE ARAGON

Universidad Zaragoza

https://inma.unizar-csic.es/formacion/becas-y-ayudas

https://www.aragon.es/tramitador/-/tramite/becas-de-excelencia-para-el-acceso-por-primera-vez-a-estudios-universitarios-oficiales-de-grado-y-master

https://academico.unizar.es/becas/ayudas-de-la-universidad-de-zaragoza-para-alumnos-no-residentes-no-comunitarios

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