



Funcionalidad en sistemas químicos, físicos y biológicos complejos

Angeles Heras Caballero// Inmaculada Aranz Corral

**Unidad de Química Física. Departamento de Química en
Ciencias Farmacéuticas. Facultad de Farmacia. UCM**

InFiQuS

TRANSBIOMAT (UCM)

<https://www.ucm.es/transbiomat/>



The **RESEARCH AND TRANSFER GROUP IN BIOTECHNOLOGY AND APPLIED MATERIALS (TRANSBIOMAT, Ref. 970904)**, combines the **three functions** of the **University: Teaching, Research** and **Technology Transfer**.

RESEARCH AREA: *"Biopolymers: preparation by biotechnological methods, green chemicals, functional characterization and applications in pharmacy, biomedicine, agri-food and cosmetics."*

ACTIVITIES:

- **study of biopolymers** and **functional materials**, as well as **biocatalyzed processes (biotransformations)** and **microbiological processes**, both from a basic and applied point of view.

FOCUS:

the design and synthesis of hydrophilic systems based on chitosan and chito-oligosaccharides:

- **Smart encapsulation of active ingredients**
- **Development of highly demanded conjugates:**
 - *Food*
 - *Cosmetic*
 - *Pharmaceuticals.*

In this sense, it is efficiently embedded within the philosophy of the **Circular Economy.**

InFiQuS

TRANSBIOMAT (UCM)

UCM Members

Angeles M. Heras (0000-0002-7209-6190) Full Professor. Co-Director

Andrés R. Alcántara (0000-0003-4856-4000)- Full Professor. CO-Director

Jose María Sánchez-Montero. Full Professor.

Concepción Civera (0000000256847572) Professor.

Niuris Acosta (0000-0001-5145-8781) Professor.

Inmaculada Aranaz (0000-0002-1495-9744) Assistant Professor (Permanent)

María Fernandez Assistant Professor (Permanent)

Ismael López (0000-0002-9941-8305) Assistant Professor (Non-Permanent)



External Members

Dr Ernesto Doncel-Perez. Head of Neuro-Regenerative Chemistry Group (GQNR). Tetraplegic Hospital of Toledo, Spain

Dr. Francisco Sanchez del Valle. Surgeon. Professor of Surgery. Central Defense Hospital, Madrid.

Prof Francisco Goycoolea. Chair in Biopolymers. Universidad de Murcia . Leeds University, UK

Dra. Beatriz Miralles. Científico Titular. Institute for Research in Food Sciences(CIAL, CSIC-UAM), Madrid

Dra. Isabel Fraile. Investigador Postdoctoral. Bayreuth University

Predocctoral Students

Alonzo Durante
Saeedeh Pouri
Ruben Gil

TRANSBIOMAT (UCM) RESEARCH PROJECTS (last 5 years)



- **Implementation of green chemistry technology for the valorization of agri-food by-products: sustainable design of chitosan-based biomaterials.** Ministerio de Ciencia e Innovación Spain. 2022-12 until 2024-11. GRANT CODE: TED2021-129564B-100. **183.000 €**
- **DEsign of CAlytic processes with Deep Eutectic Solvents (DECADES) HORIZON-MSCA-2021-DN-01-01** Marie Skłodowska-Curie. GRANT CODE: 101072731, 03-2023 hasta 02-2027. **250.000 €**
- **Facing the challenge of wound healing: Efficient antihemorrhagics and chronic wounds (HEWOCHI).** Ministerio de Ciencia e Innovación Spain. 2022-12 until 2024.12. GRANT CODE: PID2021-123045OB-I00. **114,950.00 €**
- **Green tailor-made chitosans: from polymer synthesis to sustainable material design for biomedical applications** Ministerio de Ciencia e Innovación Spain 2020-06 until 2023-05 GRANT CODE: PID2019-105337RB-C22. **96,800.00 €**
- **BIOSURF, Integrated platform for the sustainable production of bio-based surfactants from renewable resources** Fondazione Cariplo Italy 2021-06 until 2023-11 GRANT CODE: 2020-1094 – Bando 2020 – Economia Circolare: ricerca per un futuro sostenibile. 276,950.00 € **12,300.00 € (Art. 83 UCM)**
- **Chitosan-based new advanced materials as mimics of biologically relevant natural polysaccharides** Universidad Complutense de Madrid Spain 2020-01 until 2020-12 GRANT CODE: PR87/19-22676. **12,000.00 €**
- **Biomaterials based on functionalized chitosans for SNC regeneration.** Ministerio de Ciencia e Innovación Spain 2016-2019 GRANT CODE: MAT2015-65184-C2-1-R. **126,000.00 €**

TRANSBIOMAT (UCM) Industry



- 5 PATENTS
- PROJECT CONTRACTS WITH INDUSTRY:
 - Farmalab Omega Zeta,
 - Beetle Genius 3.0
 - Lagosta Sarl. (Switzerland)
 - Laboratorios Almirall
 - Laboratorios Leti
 - **AB Biotics**
 - **Mealfood Europe S.L**
 - **Tebrio S.L**



TRANSBIOMAT (UCM)

TRAINING CAPACITY (last 10 years)



- 6 Ph. D. Theses + 3 ongoing
- 11 Master's Theses
- 12 Final Bachelor Degree Projects (5 experimental)
- 2 Youth Guarantee program (CAM)

VISITING STUDENTS FOR SCIENTIFIC STAYS (last 5 years)

- University of Sfax (Tunisia)
- Ferhat Abbas University of Setif (Argelia)
- Università degli Studi di Urbino Carlo Bo (Italy)
- University of Gdansk. (Poland)
- University College, London (UK)
- Universidad CES (Colombia).
- Università de Milano (Italy)
- Πανεπιστήμιο Ιωαννίνων, University of Ioannina(Greece).

Teaching (SPAIN):

- Pharmacy (Degree, UCM)
- Pharmacy and Human Nutrition (Double Degree, UCM)
- Biomaterials (Master's Degree of Biomaterials, UCM)
- Applied Biocatalysis and Biotransformations (Master's Degree of Industrial and Environmental Biotechnology , UCM).
- Therapeutics Targets Biotransformations (Master's Degree of Industrial and Environmental Biotechnology , UCM).

VISITING PROFESSORS' SCIENTIFIC STAYS (last 5 years)

- Aldona Dobrzycka-Krahel. University of Gdansk
- Francisco Gooycolea. Universidad de Murcia-Leeds University
- Carlos Peniche. Universidad de la Habana. (Cuba)



- **Implementation of green chemistry technology for the valorization of agri-food by-products: sustainable design of chitosan-based biomaterials.**
- **Facing the challenge of wound healing: Efficient antihaemorrhagics and chronic wounds**
- **DEsign of CAlytic processes with Deep Eutectic Solvents**

TRANSBIOMAT (UCM) ONGOING COLLABORATIONS



- **Francisco Sánchez del Valle.** In vivo testing Hospital Gómez Ulla-Universidad de Alcalá de Henares
- **Francisco Goycoolea Valencia.** Biopolymers physical-chemical characterisation Universidad de Murcia-Leeds University
- **Juan Carlos del Valle.** DES simulations. Universidad Autónoma
- **Marta Berrocal.** Soil improvement. Universidad Politécnica de Madrid
- **Luis Vicente López Llorca.** Coacervates for agriculture. Universidad de Alicante
- **Isabel Fraile** Smart biomaterials. Universidad de Bayreuth, Alemania
- **Fátima Marcos** Paleontology and heritage. Facultad de Bellas Artes. UCM
- **Federico Navarro** Microbiological assays Facultad de Farmacia . UCM

TRANSBIOMAT (UCM)

ONGOING COLLABORATIONS IN PLURIDISCIPLINAR INSTITUTE



GESCAMET- BIOIMAC Vasoconstriction studies- 1 Project under evaluation

Unidad Asociada CSIC Cell culture assays

Laboratorio de Membranas Mitocondriales Nanoparticles analysis by AFM



Green polymer isolation and design of Catalytic processes with Deep Eutectic Solvents

Physico-chemical, functional and biological characterization of biopolymers and biomaterials

Pharmaceutical formulation and biomaterials preparation

TRANSBIOMAT (UCM) EQUIPMENT



- Rheometer
- Size exclusion chromatography (Photodiode array, refraction index, light scattering)
- Spray-drier (mg to g scale)
- Zeta potential and DLS
- Nanodrop
- Viscosimeters
- Fluorimeter
- Kjeldahl Digestor
- Ultraturax
- Muffle furnace
- Spectrophotometer
- Lyophilizer