



## Profolio of Researchers and Research Teams

# NANOTECHNOLOGIES APPLIED TO THE DESIGN OF DRUG DELIVERY SYSTEMS

(Last update 03/04/2013)

**Code:** GI-1643

**Department:** Farmacia e Tecnoloxía Farmacéutica

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### Research field

- Nanotechnologies applied to biomateriales of pharmaceutical and biomedical interest
- Bioadhesive Nano and microsystems for transmucosal drug delivery
- Nanomedicine and cancer
- Nanomedicine and gene therapy
- Nanomedicine and vaccines
- Nanomedicine and Tissue Engineering

### Technology services

- Advice in the design and characterization of new drug delivery systems
- Nano and microencapsulación of drugs and vaccines
- Chemical characterization and nano physical-chemistry and microsystems of drug delivery: chemical composition, particle size, morphology, potential z

- Biological evaluation in cell culture: toxicity and action mechanism of nanosistemas, improve from the cellular permeability to drugs, intracellular drug release. Cellular lines: Thief-2, Calu-3, HEK-297, MCF-7

- Biopharmaceutical evaluation and pharmacokinetic of nanosystems and drugs in animal models (mouse, rat, rabbit)

### Key words

Drug delivery, nonbiotechnology,  
nonmedicine, biomaterial,  
bioadhesion,  
nanoparticles, microparticles,  
colloidal systems.

### Researchers

<b>Name</b>	<b>Position</b>
Torres López, M.D.	Coordinator
Alonso Fernández, M.J.	Member
Csaba, N.S.	Member
García Fuentes, M.	Member
Remuñán López, C.	Member
Sánchez Barreiro, A.	Member
Santander Ortega, M.J.	Member
Seijo Rey, M.B.	Member
Abellán Pose, R.	IFP
Borrajo Alonso, E.	IFP
Correia Pinto, J.F.	IFP
González Aramundiz, J.	IFP
López Cebral, R.	IFP
Párraga Meneses, J.	IFP
Pensado López, A.	IFP
Teijeiro Valiño, C.M.	IFP
Vicente Ozores, S.	IFP
Vila Sanjurjo, C.	IFP
González Paredes, A.	PA

### RTD PROJECTS ( period: 2009 - 2013 )

**Title:**

NanoFar: European Doctorate in nanomedicine and pharmaceutical innovation

**Tipology:** (PI) Programas Internacionais

**Duration:** 01/10/2012 - 30/09/2015

**Main investigator:** Alonso Fernández, María José

**Title:**

New Oral Nanomedicines: Transporting Therapeutic Macromolecules across the Intestinal Barrier (TRANS-INT)

**Tipology:** (PI) Programas Internacionais

**Duration:** 01/05/2012 - 30/04/2017

**Main investigator:** Alonso Fernández, María José

**Title:**

Estudio de la interacción de nanomateriales con antígenos: una aproximación sistemática para el desarrollo de nanovacunas (subproyecto).

**Tipology:** Plan Nacional

**Duration:** 01/01/2012 - 31/12/2014

**Main investigator:** Alonso Fernández, María José

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**Title:**

Nuevas nanomedicinas orales: transporte de macromoléculas terapéuticas a través de la barrera intestinal

**Tipology:** Accions complementarias

**Duration:** 16/05/2011 - 15/06/2011

**Main investigator:** Alonso Fernández, María José

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**Title:**

Combinación de hidrogeles biomiméticos y nanopartículas como plataformas terapéuticas avanzadas para enfermedades oculares

**Tipology:** Plan Nacional

**Duration:** 01/01/2011 - 31/12/2013

**Main investigator:** Sánchez Barreiro, Alejandro

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**Title:**

Nanomedicamentos xenéticos para o tratamento do cancro

**Tipology:** Proxectos Xunta

**Duration:** 10/08/2010 - 30/09/2013

**Main investigator:** Csaba, Noemí Stefanía

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**Title:**

MATERA+: Naobiomateriales (nanoestructuras de biomateriales como sistemas de liberación).

**Tipology:** Proxectos Xunta

**Duration:** 08/08/2010 - 30/09/2012

**Main investigator:** Sánchez Barreiro, Alejandro

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**Title:**

New nanomedicines able to overcome critical biological barriers (BBB and mucosal barriers).

**Tipology:** Proxectos Xunta

**Duration:** 01/01/2010 - 30/10/2010

**Main investigator:** Alonso Fernández, María José

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**Title:**

Nanomedicinas con capacidad quimiotáctica como sistemas supresores de la tumorigenicidad en glioblastomas

**Tipology:** Proxectos FISs

**Duration:** 01/01/2010 - 30/06/2013

**Main investigator:** Csaba, Noemí Stefanía

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**Title:**

Nanotransportadores microencapsulados para liberación pulmonar de material genético

**Tipology:** Proxectos FISs

**Duration:** 01/01/2010 - 31/12/2013

**Main investigator:** Remuñán López, Carmen

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**Title:**

Polymeric particulate systems for the controlled delivery of pro-angiogenic factors in tissue engineering application. ACCIÓN INTEGRADA CON ITALIA

**Tipology:** Accions integradas

**Duration:** 01/01/2010 - 31/12/2011  
**Main investigator:** García Fuentes, Marcos

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**Title:**  
'Linfonocarrriers' para el tratamiento del cáncer metastásico (LYMPHOTARG) (ERA-NET)  
**Tipology:** Contratos coa UE  
**Duration:** 01/01/2010 - 30/06/2013  
**Main investigator:** Alonso Fernández, María José

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**Title:**  
Nanotransportadores microencapsulados para administración pulmonar de material xenético (nanopulmogenic)  
**Tipology:** Proxectos Xunta  
**Duration:** 06/08/2009 - 03/12/2011  
**Main investigator:** Remuñán López, Carmen

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**Title:**  
Development of novel nanocarriers for anticancer drug delivery: Targeting tumor cells within the lymph nodes  
**Tipology:** Proxectos Xunta  
**Duration:** 01/01/2009 - 01/12/2009  
**Main investigator:** Alonso Fernández, María José

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### Technological customers and partners

- Advanced in Vitro Cell Technologies, S.A.
- EM-Silicon Nanotechnologies
- FAES FARMA, S.A.
- Fundación Científica de la Asociación Española contra el Cáncer
- NANOGAP SUB-NM-POWDER, S.A.
- Novo Nordisk A/S
- Vaxil BioTherapeutics Ltd

### Patents

**Application:** P9601685  
**Application date:** 29/07/1996  
**Title:**  
Aplicación de nanopartículas a base de polímeros hidrofílicos  
**Inventors:** - Alonso Fernández, María José  
- Calvo Salve, Pilar  
- Remuñán López, Carmen  
- Vila Jato, José Luis

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**Application:** P200201694  
**Application date:** 19/07/2002  
**Title:**  
Nanopartículas para la administración de ingredientes activos, procedimiento para la elaboración de dichas partículas y composición que las contienen  
**Inventors:** - Alonso Fernández, María José  
- Alonso Sande, María  
- Cuña Vilán, Margarita María  
- Remuñán López, Carmen  
- Vila Jato, José Luis

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**Application:** P9501035  
**Application date:** 26/05/1995

**Title:**

ESTABILIZACION DE SISTEMAS COLOIDALES MEDIANTE FORMACION DE COMPLEJOS IONICOS LIPIDO-POLISACARIDO.

**Inventors:** - Alonso Fernández, María José  
- Calvo Salve, Pilar  
- Remuñán López, Carmen  
- Vila Jato, José Luis

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**Application:** P200301456  
**Application date:** 20/06/2003

**Title:**

NANOPARTÍCULAS DE ÁCIDO HIALURÓNICO

**Inventors:** - Alonso Fernández, María José  
- Fuente Freire, María de la  
- Seijo Rey, María Begoña del Carmen

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**Application:** P200301570  
**Application date:** 04/07/2003

**Title:**

NANOPARTICULAS DE DERIVADOS POLIOXIETILENADOS

**Inventors:** - Alonso Fernández, María José  
- Csaba, Noemí Stefanía  
- Sánchez Barreiro, Alejandro

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**Application:** P9500907  
**Application date:** 11/05/1995

**Title:**

DESARROLLO DE NANOPARTICULAS A BASE DE POLIMEROS HIDROFILICOS.

**Inventors:** - Alonso Fernández, María José  
- Calvo Salve, Pilar  
- Remuñán López, Carmen  
- Vila Jato, José Luis

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**Application:** P200501331  
**Application date:** 02/06/2005

**Title:**

NANOPARTICULAS QUE COMPRENDEN QUITOSANO Y CICLODEXTRINA

**Inventors:** - Alonso Fernández, María José  
- García Fuentes, Marcos

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## SCIENTIFIC PRODUCTION ( period: 2007 - 2011 )

### Articles in scientific journals

**Article:**

Liposome-chitosan nanoparticle complexes (LCS-NP) : a potential drug delivery system for the ocular surface.

**Journal:** BIOMATERIALS, ISSN: 0142-9612  
2007

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**Article:**

Chitosan Nanoparticle-loaded microspheres: structure and surface characterisation

**Journal:** BIOMACROMOLECULES, ISSN: 1525-7797  
2007

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**Article:**

Development of chitosan sponges for bucal administration of insulin

**Journal:** CARBOHYDRATE POLYMERS, ISSN: 0144-8617  
2007

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**Article:**

Chitosan/Cyclodextrin nanoparticles as macromolecular drug delivery systems.

**Journal:** INTERNATIONAL JOURNAL OF PHARMACEUTICS, ISSN: 0378-5173  
2007

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**Article:**

Chitosan nanoparticle-containing microspheres are compatible with respiratory epithelial cells in vitro.

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICAL SCIENCES, ISSN: 0928-0987  
2007

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**Article:**

Stability and physicochemical characteristics of PLGA, PLGA: poloxamer and PLGA: ploxamine blend nanoparticles A comparative study.

**Journal:** COLLOIDS AND SURFACES A-PHYSICO-CHEMICAL AND ENGINEERING ASPECTS, ISSN: 0927-7757  
2007

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**Article:**

Ocular drug delivery by liposome-chitosan nanoparticle complexes (LCS-NP)

**Journal:** BIOMATERIALS, ISSN: 0142-9612  
2007

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**Article:**

Surface characterisation of lipid/chitosan nanoparticle assemblies, using X-ray photoelectron spectroscopy and Time-of-flight secondary ion mass spectrometry.

**Journal:** JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY, ISSN: 1533-4880  
2007

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**Article:**

Nanoparticles as protein and gene carriers to mucosal surfaces.

**Journal:** Nanomedicine, ISSN: 1743-5889  
2008

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**Article:**

Novel Hyaluronan Nanocarriers for Transmucosal Delivery of Macromolecules.

**Journal:** MACROMOLECULAR BIOSCIENCE, ISSN: 1616-5187  
2008

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**Article:**

Novel Hyaluronic Acid-Chitosan Nanoparticles for Ocular Gene Therapy.

**Journal:** INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE, ISSN: 0146-0404  
2008

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**Article:**

Bioadhesive hyaluronan-chitosan nanoparticles can transport genes across the ocular and transfect ocular tissue.

**Journal:** GENE THERAPY, ISSN: 0969-7128  
2008

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**Article:**

Design of novel polysaccharidic nanostructures for gene delivery.

**Journal:** NANOTECHNOLOGY, ISSN: 0957-4484  
2008

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**Article:**

Novel drug nanocarriers combining hydrophilic cyclodextrins and chitosan.

**Journal:** NANOTECHNOLOGY, ISSN: 0957-4484  
2008

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**Article:**

Highly Efficient System To Deliver Taxanes into Tumor Cells: Docetaxel-Loaded Chitosan Oligomer Colloidal Carriers.

**Journal:** BIOMACROMOLECULES, ISSN: 1525-7797  
2008

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**Article:**

Microspheres containing lipid/chitosan nanoparticles complexes for pulmonary delivery of therapeutic proteins.

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS, ISSN: 0939-6411  
2008

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**Article:**

Surface characterisation of lipid/chitosan nanoparticles assemblies, using X-ray photoelectron spectroscopy and Time-of-flight secondary ion mass spectrometry.

**Journal:** JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY, ISSN: 1533-4880  
2008

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**Article:**

Insulin-Loaded PLGA nanoparticles for oral administration: An in vitro physico-chemical characterization.

**Journal:** Journal of Biomedical Nanotechnology, ISSN: 1550-7033  
2009

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**Article:**

Chitosan/cyclodextrin nanoparticles can efficiently transfect the airway epithelium in vitro.

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS, ISSN: 0939-6411  
2009

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**Article:**

New generation of hybrid Poly/Oligosaccharide nanoparticles as carriers for the nasal delivery of macromolecules.

**Journal:** BIOMACROMOLECULES, ISSN: 1525-7797  
2009

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**Article:**

Ionically Crosslinked Chitosan Nanoparticles as Gene Delivery Systems: Effect of PEGylation Degree on In Vitro and In Vivo Gene Transfer.

**Journal:** Journal of Biomedical Nanotechnology, ISSN: 1550-7033  
2009

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**Article:**

Chitosan-Alginate Blended Nanoparticles as Carriers for the Transmucosal Delivery of Macromolecules.

**Journal:** BIOMACROMOLECULES, ISSN: 1525-7797  
2009

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**Article:**

Nanoparticles of nasal vaccination.

**Journal:** ADVANCED DRUG DELIVERY REVIEWS, ISSN: 0169-409X  
2009

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**Article:**

Chitosan-hylaruronic acid nanoparticles loaded with heparin for the treatment of asthma.

**Journal:** INTERNATIONAL JOURNAL OF PHARMACEUTICS, ISSN: 0378-5173  
2009

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**Article:**

Ionically crosslinked chitosan/tripolyphosphate nanoparticles for oligonucleotide and plasmid DNA delivery.

**Journal:** INTERNATIONAL JOURNAL OF PHARMACEUTICS, ISSN: 0378-5173  
2009

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**Article:**

Glucomannan, a promising polysaccharide for biopharmaceutical purposes.

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS, ISSN: 0939-6411  
2009

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**Article:**

Preparation and evaluation of alpha-phenyl-n-tert-butyl nitron(PBN)-encapsulated chitosan and PEGylated chitosan nanoparticles.

**Journal:** PHARMAZIE, ISSN: 0031-7144  
2009

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**Article:**

Chitosan-based nanostructures: a delivery platform for ocular therapeutics

**Journal:** ADVANCED DRUG DELIVERY REVIEWS, ISSN: 0169-409X  
2010

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**Article:**

Protein-loaded PLGA: PEO blend nanoparticles: encapsulation, release and degradation characteristics

**Journal:** COLLOID AND POLYMER SCIENCE, ISSN: 0303-402X  
2010

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**Article:**

Improved delivery of angiogenesis inhibitors from PLGA:poloxamer blend micro and nanoparticles

**Journal:** JOURNAL OF MICROENCAPSULATION, ISSN: 0265-2048  
2010

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**Article:**

Chitosan-based Nanoparticles for Improving Immunization against Hepatitis B Infectio

**Journal:** VACCINE, ISSN: 0264-410X



2010

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**Article:**

A comparative study of chitosan and chitosan/cyclodextrin nanoparticles as potential carriers for the oral delivery of small peptides

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS, ISSN: 0939-6411  
2010

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**Article:**

Improved ocular tolerance to a topical formulation of hyaluronic acid and chitosan-based nanoparticles,

**Journal:** CORNEA, ISSN: 0277-3740  
2010

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**Article:**

From single-dose vaccine delivery systems to nanovaccines

**Journal:** JOURNAL OF DRUG DELIVERY SCIENCE AND TECHNOLOGY, ISSN: 1773-2247  
2010

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**Article:**

Core-Shell Dendriplexes with Sterically Induced Stoichiometry for Gene Delivery

**Journal:** MACROMOLECULES, ISSN: 0024-9297  
2010

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**Article:**

Hyaluronic Acid / Chitosan-g-Poly(ethylene glycol) nanoparticles for gene therapy: an application for pDNA and siRNA delivery

**Journal:** PHARMACEUTICAL RESEARCH, ISSN: 0724-8741  
2010

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**Article:**

Nanoparticles based on PLGA:Poloxamer blends for the delivery of proangiogenic growth factors

**Journal:** MOLECULAR PHARMACEUTICS, ISSN: 1543-8384  
2010

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**Article:**

PLGA:poloxamer blend micro- and nanoparticles as controlled release systems for synthetic proangiogenic factors

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICAL SCIENCES, ISSN: 0928-0987  
2010

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**Article:**

Hyaluronic acid/Chitosan nanoparticles as delivery vehicles for VEGF and PDGF-BB

**Journal:** DRUG DELIVERY, ISSN: 1071-7544  
2010

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**Article:**

Chitosan-coated lipid nanocarriers for therapeutic applications

**Journal:** JOURNAL OF DRUG DELIVERY SCIENCE AND TECHNOLOGY, ISSN: 1773-2247  
2010

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**Article:**

Surface-modified PLGA-based Nanoparticles that can Efficiently Associate and Deliver Virus-like Particles

**Journal:** Nanomedicine, ISSN: 1743-5889  
2010

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**Article:**

The potential of chitosan for pulmonary drug delivery

**Journal:** JOURNAL OF DRUG DELIVERY SCIENCE AND TECHNOLOGY, ISSN: 1773-2247  
2010

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**Article:**

Intracellular trafficking of hyaluronic acid-chitosan oligomer-based nanoparticles in cultured human ocular surface cells

**Journal:** MOLECULAR VISION, ISSN: 1090-0535  
2011

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**Article:**

Chemically modified gelatin as biomaterial in the design of new nanomedicines

**Journal:** ACS Medicinal Chemistry Letters, ISSN: 1948-5875  
2011

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**Article:**

Hybrid nanoparticle design based on cationized gelatin and the polyanions dextran sulfate and chondroitin sulfate for ocular gene therapy

**Journal:** MACROMOLECULAR BIOSCIENCE, ISSN: 1616-5187  
2011

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**Article:**

Expression of MUC5AC in ocular surface epithelial cells using cationized gelatin nanoparticles

**Journal:** MOLECULAR PHARMACEUTICS, ISSN: 1543-8384  
2011

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**Article:**

A new drug nanocarrier consisting of polyarginine and hyaluronic acid

**Journal:** EUROPEAN JOURNAL OF PHARMACEUTICS AND BIOPHARMACEUTICS, ISSN: 0939-6411  
2011

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**Chapter:**

**Title:**

Polysaccharide-based Nanoparticles as Carriers for Drug and Vaccine Delivery

**Book:**

Nanoparticles for Pharmaceutical Applications

(1-58883-089-6)Publicación: 2007

**Editorial:**American Scientific Publishers

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**Title:**

Poly (lactic acid) and poly (ethylene oxide) nanoparticles as carriers for gene delivery.

**Book:**

Gene Transfer. Delivery and Expression of DNA and RNA, a Laboratory Manual.

(978-0-87969-764-8)Publicación: 2007

**Editorial:**Cold Spring Harbor Laboratory Press (CSHL Press)

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**Title:**

Chitosan-polysaccharide blended nanoparticles for controlled drug delivery.

**Book:**

Natural Based Polymers for Biomedical Applications

(978-1-84569-264-3)Publicación: 2008

**Editorial:**Woodhead Publishing Ltd.

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**Title:**

Nanosistemas lipídicos.

**Book:**

Nanotecnología Farmacéutica, Realidades y posibilidades Farmacoterapéuticas

(978-84-936890-8-7)Publicación: 2009

**Editorial:**Real Academia de Farmacia

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**Title:**

Nanopartículas metálicas: Oro

**Book:**

Nanotecnología Farmacéutica, Realidades y posibilidades Farmacoterapéuticas

(978-84-936890-8-7)Publicación: 2009

**Editorial:**Real Academia de Farmacia

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**Title:**

Mucosal Delivery of Liposome-Chitosa Nanoparticle Complexes.

**Book:**

Methods in Enzymology, Liposomes, Part G

(978-0-12-381379-4)Publicación: 2009

**Editorial:**Elsevier

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**Title:**

Nanocapsules as Carriers for the Transport and Targeted Delivery of Bioactive Molecules

**Book:**

Nanocomposite Particles for Bio-Applications

(978-981-4267-78-6)Publicación: 2011

**Editorial:**Pan Stanfor Publishing

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**Doctoral theses:**

**Title:**

Desarrollo de micro- y nanopartículas de polisacáridos para la administración pulmonar y nasal de macromoléculas terapéuticas

**Date of dissertation:** 16/11/2007

**Director:** Carmen Remuñán López, MARÍA JOSEFA ALONSO FERNÁNDEZ

**Author:** Desirée Teijeiro Osorio

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**Title:**

Microencapsulación de nanopartículas de quitosano para la administración pulmonar de macromoléculas terapéuticas

**Date of dissertation:** 26/01/2007

**Director:** Carmen Remuñán López, María Begoña del Carmen Seijo Rey

**Author:** Ana Margarida Moutinho Grenha

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**Title:**

Diseño de nanosistemas poliméricos para la vehiculización de material genético

**Date of dissertation:** 27/11/2009

**Director:** Alejandro Sánchez Barreiro, María José Alonso Fernández

**Author:** Manuela Raviña Fernández

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**Title:**

Nanocápsulas policatiónicas: nuevos sistemas para la liberación intracelular de fármacos antitumorales

**Date of dissertation:** 17/07/2009

**Director:** María José Alonso Fernández, María Dolores Ramona Torres López

**Author:** María Victoria Lozano López

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**Title:**

Nanosistemas para o tratamento da diabetes mellitus por vía transmucosa

**Date of dissertation:** 08/07/2010

**Director:** María José Alonso Fernández, Francisco Martín Goycoolea Valencia, Mallo Ferrer, Federico

**Author:** Ángela Valle Gallego

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**Title:**

Nanomedicamentos para el tratamiento localizado de patologías pulmonares

**Date of dissertation:** 18/11/2011

**Director:** María José Alonso Fernández, María Dolores Ramona Torres López

**Author:** Felipe Andrés Oyarzun Ampuero

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**Title:**

DESENVOLVEMENTO DUN NOVO TRATAMENTO PARA O OLLO SECO BASEADO NA TERAPIA XÉNICA CON SISTEMAS NANOPARTICULARES

**Date of dissertation:** 27/04/2011

**Director:** Alejandro Sánchez Barreiro, María Begoña del Carmen Seijo Rey

**Author:** Giovanni Konat Zorzi

---

**Title:**

SISTEMAS NANOTRANSPORTADORES MICROENCAPSULADOS PARA LIBERACIÓN PULMONAR DE MACROMOLÉCULAS TERAPÉUTICAS

**Date of dissertation:** 27/09/2011

**Director:** Carmen Remuñán López

**Author:** Sonia A.N. Al addi

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