

Miguel Berenguel Alonso

PHD IN CHEMISTRY · R&D SCIENTIST AT EURECAT · MICROFLUIDICS, (BIO)SENSORS AND PRINTED ELECTRONICS

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Summary

PhD in Chemistry based in Barcelona with a broad experience in the development of sensors and biosensors for environmental, food safety and biomedical applications. Currently, I work as R&D scientist at Eurecat - Centre Tecnològic de Catalunya, developing sensors and flexible hybrid circuits by using different printing techniques.

Previously, I worked at the Group of Sensors and Biosensors of the Universitat Autònoma de Barcelona, where I developed meso/microfluidics systems for analytical and synthetic applications.

Competences: printing techniques (inkjet, screen-printing), Lab-on-a-Chip design and prototyping, nanotechnology, microfabrication, sensor characterization, project management.

Skills Overview

Manufacturing	Screen Printing, Inkjet, CNC Micromilling, Laser Ablation, Hot Embossing, Bonding					
	Cyclic Olefin Co-polymer (COC), Low Temperature Co-fired Ceramics (LTCC), Paper Screen Printing, Basic knowledge of Electronics					
(Bio)Chemical	Immunomagnetic Separation, Immunoassay, Flow Injection Analysis					
	Nanoparticle Synthesis, Characterization (UV-Vis Absorption, TEM/SEM Microscopy, X-Ray Diffraction)					
Personal	Software			Languages		
Reliable	AutoCAD	● ● ● ● ●	Mendeley	● ● ● ● ●	Spanish	● ● ● ● ●
Eager to Learn	Inventor	● ● ● ● ●	Keynote	● ● ● ● ●	Catalan	● ● ● ● ●
Technical Leadership	Illustrator	● ● ● ● ●	Office	● ● ● ● ●	English	● ● ● ● ●
Team Player	Indesign	● ● ● ● ●	LaTeX	● ● ● ● ●	German	● ● ● ● ●

Education

Universitat Autònoma de Barcelona

PHD CHEMISTRY

- Development of microfluidic systems for analytical, biological and synthetic applications.

MSc CHEMICAL SCIENCE & TECHNOLOGY

- Development of a magnetic actuator in order to control magnetic beads inside microfluidic systems.

BSc CHEMISTRY

- Specialization courses on Analytical Chemistry, particularly in (Bio)Sensing strategies and applications.

Bellaterra, Spain

Oct. 2011 - PRESENT

Oct. 2010 - Sept. 2011

Sept. 2005 - Sept. 2010

Research Experience

UAB – Group of Sensors and Biosensors

PHD STUDENT

- PhD thesis research consisted of three different projects, linked together by the microfluidic technology. 3-D microfluidic systems were developed in COC and LTCC substrates using a multilayer fabrication approach, for various applications. Doctoral research carried out under the supervision of Dr. Mar Puyol and Prof. Julián Alonso-Chamarro.
- Development of a magnetic actuator for immunomagnetic separation and its application to the detection of E.Coli O157:H7 whole cells on-chip. The analysis was based on an Enzyme Linked Immunomagnetic assay with fluorescence detection of the enzymatic substrate.
- Development of a COC microfluidic system for the entrapment and culture of oocytes (immature egg cells). A hybrid fabrication process –based on hot embossing and micromilling– was developed in order to obtain microfluidic features in the range of 50 – 100 microns, necessary to trap the oocytes. Oocytes were cultured in the microfluidic system, thus minimizing the errors associated with manual operation and reducing manipulation stress on the cells.
- Development of LTCC monolithic microfluidic systems for nanoparticle synthesis at high temperature and pressure, integrating both fluidics and electronics. The fabrication process combined laser ablation and screen-printing techniques for the fluidics and heating elements, respectively.

Bellaterra, Spain

Oct. 2011 - PRESENT

- Development of a magnetic actuator for applications of magnetic beads in microfluidic systems. It consisted of a rotating unit containing the magnets, which enabled both the entrapment and movement of the magnetic beads in the microfluidic system. The system enhanced the kinetics of reactions on-chip due to the mixing provided. Simulations of the magnets' arrangements were carried out to optimize their relative position and configuration.

University of Twente

Enschede, The Netherlands

UNDERGRADUATE RESEARCHER

Aug. 2009 - Jul. 2010

- Research stay at the Supra Molecular Chemistry & Technology (SMCT) research group of Prof. D. Reinhoud at the University of Twente, under the supervision of Prof. Aldrik H. Velders and Dr. Albert Ruggi.
- Research aimed at the synthesis and photophysical characterization of caged Iridium complexes. These compounds shared the outstanding luminescence properties of other Iridium complexes such as high quantum yields and long lifetimes, but furthermore they showed a low oxygen quenching, probably due to the shielding provided by the ligand structure.

Extracurricular Activity

University of Applied Sciences Utrecht

Utrecht, The Netherlands

LEADERSHIP FOR SUSTAINABLE INNOVATION

Jul. 2015

- 2-week intensive course aimed at developing leadership competences with a strong focus on sustainable innovation challenges within organizations. Led by Prof. M Hernández at the Hogeschool Utrecht summer school.

University of Michigan (Coursera)

Utrecht, The Netherlands

INTRODUCTION TO FINANCE

Feb. - May 2015

- Massive Online Open Course (MOOC) offered by the University of Michigan through Coursera, led by Prof. Gautam Kaul. The course was devoted to the fundamental methods and skills of finance vital for understanding valuation of any asset, personal or corporate, and thus approach decision-making.

University of Applied Sciences Utrecht

Utrecht, The Netherlands

PROJECT MANAGEMENT, FROM THEORY TO PRACTICE

Aug. 2014

- 2-week intensive project management course with a hands-on approach. It also led to the obtention of the PRINCE2 Foundation Certificate. Led by Prof. G. Silvius at the Hogeschool Utrecht summer school.

Universitat Autònoma de Barcelona

Bellaterra, Spain

X WORKSHOP ON RAPID METHODS AND AUTOMATION IN FOOD MICROBIOLOGY

Nov. 2011

- 4-day long workshop aimed at broadening and spreading the theoretical and practical knowledge about innovative methods for rapid detection, enumeration, isolation and characterization of foodborne and waterborne microorganisms and their products.

Universitat Autònoma de Barcelona

Bellaterra, Spain

MAGNETIC PARTICLE BASED PLATFORMS AND BIOASSAYS

Jul. 2011

- 2-day workshop within the Biomax Network summer school (Marie Curie actions). The topics of the sessions included magnetic particle synthesis, characterization, actuation strategies, detection and integration in biosensors, bioassays and microfluidic devices.

Teaching & Mentoring

Research Projects

D. CLOT, BACHELOR FINAL PROJECT

Feb. - Jul 2015

- Síntesi de Nanopartícules Magnètiques Mitjançant Sistemes Microfluídics

J.M. DE BRITO GOMES, ERASMUS PROJECT

Feb. - May 2013

- Automated Nitrite Determination by Multicommution in Withdrawal Pumping Mode.

Courses

CHEMICAL REACTIVITY

Feb. - Jul 2015

- General chemistry course for students of Nanoscience & Nanotechnology. Solving course problems and tutorial sessions.

CHEMISTRY PRACTICUMS

2011 - 2015

- Regularly supervised different laboratory practicums for undergraduate students of different scientific bachelor degree programs.

Awards, Fellowships & Certifications

2014 **PRINCE2 Foundation**, Project management certification obtained at the Utrecht Hogeschool.

The Netherlands

2014 **2nd Prize**, Jornades Doctorals Chemistry Dept. UAB.

Bellaterra, Spain

2012 **FI Fellow**, Predoctoral Scholarship granted by the Generalitat de Catalunya.

Barcelona, Spain

Interests

- Beer Brewing** I have set up a little brewery at home to play around with malts and hops.
- Make** I have recently started to tinker with Arduino to make cool little projects. Plus I am learning a bit of programming.
- Photography** I love to capture (almost) anything on camera. It gives me a new perspective of things and people.
- My Child** Is this a hobby? I don't know...but I love to spend time and playing with my six-month old daughter.

Publications

JOURNAL ARTICLES

Gold/silver/gold trilayer films on nanostructured polycarbonate substrates for direct and label-free nanoplasmonic biosensing

Gerardo A. López-Muñoz, M.-Carmen Estévez, Marc Vázquez-García, Miguel Berenguel-Alonso, Julián Alonso-Chamarro, Antoni Homs-Corbera, Laura M. Lechuga

Journal of Biophotonics, 11, e201800043.

Automatic Microfluidic System to Perform Multi-Step Magneto-Biochemical Assays

S. Gómez-de Pedro, M. Berenguel-Alonso, P. Couceiro, J. Alonso-Chamarro, M. Puyol

Sensors and Actuators B: Chemical, In Press, 2017.

Rapid prototyping of a Cyclic Olefin Copolymer microfluidic device for automated oocyte culturing

M. Berenguel-Alonso, M. Sabés-Alsina, R. Morató, O. Ymbern, L. Rodríguez-Vázquez, O. Talló-Parra, J. Alonso-Chamarro, M. Puyol, M. López-Béjar

Journal of Laboratory Automation, In Press. 2017.

Versatile lock and key assembly for optical measurements with microfluidic platforms and cartridges

O. Ymbern, M. Berenguel-Alonso, A. Calvo-López, S. Gómez-de Pedro, D. Izquierdo, J. Alonso-Chamarro

Analytical Chemistry, 87, pp. 1503–1508, 2015.

Magnetic actuator for the control and mixing of magnetic bead-based reactions on-chip

M. Berenguel-Alonso, X. Granados, J. Faraudo, J. Alonso-Chamarro, M. Puyol

Analytical and Bioanalytical Chemistry, 406, pp. 6607–6616, 2014.

An iridium (III)-caged complex with low oxygen quenching

A. Ruggi, M. Berenguel-Alonso, D. N. Reinhoudt, A. H. Velders

Chemical Communications, 46, pp. 6726–6728, 2010.

SELECTED CONFERENCE COMMUNICATIONS

Oral Communications

Multilayer Lamination, a well-known approach for the fast prototyping of new tridimensional microfluidic platforms

E. Arasa, O. Ymbern, P. Couceiro, A. Calvo-López, M. Berenguel-Alonso, N. Sáñez, M. Puyol, F. Valdés, J. Alonso-Chamarro

10th Ibero-American Congress on Sensors, 2016, Valparaíso, Chile.

Microfluidic Hydrothermal Synthesis of Highly Luminescent Carbon Dots

M. Berenguel-Alonso, A. Salinas-Castillo, B. Fernández, J. Alonso-Chamarro, L. F. Capitán-Vallvey, M. Puyol

XXV Reunión Nacional de Espectroscopía – IX Congreso Ibérico de Espectroscopía, 2016, Alicante, Spain.

Enhanced Magnetic Bead-Based E.Coli O157:H7 Detection with a Magnetic Actuator

M. Berenguel-Alonso, X. Granados, J. Faraudo, J. Alonso-Chamarro, M. Puyol

XIX Transfrontier Meeting on Sensors and Biosensors, 2014, Bellaterra, Spain.

Magnetic Actuator for the Control and Mixing of Magnetic Bead-Based Reactions On Chip

M. Berenguel-Alonso, X. Granados, J. Faraudo, J. Alonso-Chamarro, M. Puyol

Jornades Doctorals, Dept. Química UAB, 2014, Bellaterra, Spain.

Poster Communications

Low Temperature Co-Fired Ceramics Microreactor for the Synthesis of Carbon Dots with Fluorescence Imaging of the Reaction Progress

M. Berenguel-Alonso, A. Salinas-Castillo, B. Fernández, P. Couceiro, J. Alonso-Chamarro, L. F. Capitán-Vallvey, M. Puyol

20th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS), 2016, Dublin, Ireland.

Fast Prototyping of Passive Valves for Polymeric Centrifugal Microfluidic Platforms using Low Temperature Co-fired Ceramic Masters

O. Ymbern, P. Couceiro, M. Berenguel-Alonso, J. Alonso-Chamarro

20th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS), 2016, Dublin, Ireland.

A novel culture device suitable for culturing bovine oocytes using a cyclic olefin co-polymer based chip

M. Sabés-Alsina, M. Berenguel-Alonso, R. Morató, O. Talló-Parra, J. Alonso-Chamarro, M. Puyol, M. López-Béjar

20th Annual Conference of the European Society for Domestic Animal Reproduction, 2016, Lisbon, Portugal.

Low Temperature Co-fired Ceramic Masters for the Fast Prototyping of Polymer Microfluidic Platforms

O. Ymbern, P. Couceiro, M. Berenguel-Alonso, N. Sáñez, J. Alonso-Chamarro

10th Ibero-American Congress on Sensors, 2016, Valparaíso, Chile.

Novel Magnetic Mixer for Magnetic Bead-Based Microfluidic Bioassays

M. Berenguel-Alonso, X. Granados, J. Faraudo, J. Alonso-Chamarro, M. Puyol

Scientific and Clinical Applications of Magnetic Carriers, 2014, Dresden, Germany.

Novel Automatic Microsystem for Multi-Step Magnetic Bead-Based Biochemical Assays

S. Gómez-de Pedro, M. Berenguel-Alonso, P. Couceiro, J. Alonso-Chamarro, M. Puyol

Scientific and Clinical Applications of Magnetic Carriers, 2014, Dresden, Germany.