

Date of the CVA	19/04/2021
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Section A. PERSONAL DATA

Name and Surname	MIGUEL MORENO MOLINA		
DNI/NIE/Passport		Age	45
Researcher's identification number	Researcher ID	E-9552-2010	
	Scopus Author ID	34969583500	
	ORCID	0000-0002-6065-4095	

* Obligatorio

A.1. Current professional situation

Institution	Aptus Biotech		
Dpt. / Centre			
Address			
Phone	Email	miguel.moreno@aptusbiotech.com	
Professional category	Chief Scientific Officer (CSO)	Start date	2020
Keywords	Use of biochemical, microbiological and biological tools; Conventional techniques; Biosensors; Electrochemistry; Optician; Microchips; Nanotechnology; Luminescence spectrometry (fluorescence, quimio(bio) luminiscence, etc); Spectrophotometry; Cell culture; Tissue culture; Applied biology; Molecular evolution; Molecular markers and recognition		

A.2. Academic education (Degrees, institutions, dates)

Bachelor/Master/PhD	University	Year
Biomedicina	Universidad de Alcalá	2005
Licenciado en Biología Especialidad Biología Celular y Molecular	Universidad de Alcalá	1998

A.3. General quality indicators of scientific production

Total Articles in Publication List: 29

Sum of the Times Cited: 1068 Average Citations per Article: 46.4 h-index: 14 Verified reviews: 30 Last Updated: 04/19/2021 10:31 GMT

Section B. SUMMARY OF THE CURRICULUM

My research experience is mainly focused on the study of surface-biomolecule interactions as well as on the in vitro selection of aptamers. Combined, are essential for biosensor development. Along my Ph.D. at UAH I worked on a proof of concept procedure for the selective immobilization of oligonucleotides-functionalized gold nanoparticles on arrayed screen-printed gold electrodes. We developed the functionalization of gold nanoparticles with thiolated oligos and set up the electrochemical reactions needed to electrodeposit selectively those modules on different positions of gold arrayed microelectrodes. The immobilized modules were selectively hybridized with PCR products and electrochemically detected on the electrodes surface. In addition, as part of my Master degree, I started my research line in aptamers. We designed a novel SELEX methodology using colloidal gold to select high affinity single stranded DNA aptamers against *Leishmania infantum* KMP-11, a major component of the cell membrane of kinetoplastid parasites. Moreover, combining these selected aptamers and the electrodeposition technology developed, we were able to build up an electrochemical aptasensor for the detection of such *Leishmania* protein. Also, I collaborated in Biotools in the design of a kit based on real time PCR to detect and identify six different animal species commonly used in food samples through the amplification of the cytochrome b gene. The major research lines of my first postdoctoral stage at CNB were the development of DNA nanobiosensors for the detection of single nucleotide polymorphisms. Several kinds of signal transducers were used to detect the hybridization reaction: nanomechanical cantilevers, Mach-Zender interferometers and SPR. I utilized other well-established techniques like radio-

labelling and fluorescent labelling in order to test different immobilization strategies of DNA oligonucleotides on gold, silicon oxide and silicon nitride surfaces. After that, at UEA I continued aimed at developing new modifications for gold nanoparticles for cancer treatment using PDT. The nanoparticles synthesised in organic phase with phthalocyanines, PEG and antibodies showed the water solubility required for the in vivo treatment of tumours in mice. I gained experience in the synthesis and modification of gold nanoparticles using different approaches in organic solvents and buffers. In Bioapter, I work on the development of aptamers against whole cells of *Legionella* spp in order to develop a biosensor to detect bacteria in water samples. At CAB, I have been exploring the development of RNA and DNA aptamers against small molecules relevant in biotechnology and useful as biomarkers of extant or extinct life, as well as viral related proteins. The targets that we have used are those of interest in biotechnology and astrobiology such as amino acids, nucleotides, low MW metabolites or antibiotics, as well as viral related proteins. Additionally, we have utilized AFM to visualize RNA molecules, a novel approach to study the connection between sequence-function-structure. Currently, in Aptus Biotech, I am the scientific responsible of the company managing the scientific and research operations, including basic and applied research projects, as well as the development of new processes.

<http://www.researcherid.com/rid/E-9552-2010>

<https://orcid.org/0000-0002-6065-4095>

Section C. MOST RELEVANT MERITS (ordered by typology)

C.1. Publications

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores

- 1 Scientific paper.** Moreno, Miguel; Fernández-Algar, María; Fernández-Chamorro, Javier; Ramajo, Jorge; Martínez-Salas, Encarnación; Briones, Carlos. 2019. A Combined ELONA-(RT)qPCR Approach for Characterizing DNA and RNA Aptamers Selected against PCBP-2 Molecules. 24-7. ISSN 1420-3049.
- 2 Scientific paper.** Moreno, M.; Vázquez, L.; López-Carrasco, A.; Martín-Gago, J.A.; Flores, R.; Briones, C. 2019. Direct visualization of the native structure of viroid RNAs at single-molecule resolution by atomic force microscopy RNA Biology. Taylor & Francis. 0-0, pp.1-14.
- 3 Scientific paper.** Delgado, Soledad; Moreno, Miguel; Vázquez, Luis; Martín-Gago, José A.; Briones, Carlos. 2019. Morphology Clustering Software for AFM Images, Based on Particle Isolation and Artificial Neural Networks IEEE Access. 7, pp.160304-160323.
- 4 Scientific paper.** Bueno, Rebeca; Marciello, Marzia; Moreno, Miguel; et al; Martín-Gago, José A. 2019. Versatile Graphene-Based Platform for Robust Nanobiohybrid Interfaces ACS Omega. 4-2, pp.3287-3297.
- 5 Scientific paper.** Marín-Yaseli, Margarita R.; Moreno, Miguel; de la Fuente, José L.; Briones, Carlos; Ruiz-Bermejo, Marta. 2018. Experimental conditions affecting the kinetics of aqueous HCN polymerization as revealed by UV-vis spectroscopy Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy. 191, pp.389-397. ISSN 1386-1425.
- 6 Scientific paper.** Veronica Martin; Celia Perales; Maria Fernandez-Algar; et al;. 2016. An efficient microarray-based genotyping platform for the identification of drug-resistance mutations in majority and minority subpopulations of HIV-1 quasispecies PLOS ONE. Public Library of Science (Aries Systems). 11, pp.e0166902.
- 7 Scientific paper.** Camerin, Monica; Moreno, Miguel; Marin, Maria J.; et al; Russell, David A. 2016. Delivery of a hydrophobic phthalocyanine photosensitizer using PEGylated gold nanoparticle conjugates for the in vivo photodynamic therapy of amelanotic melanoma Photochem. Photobiol. Sci. The Royal Society of Chemistry. 15, pp.618-625.
- 8 Scientific paper.** García-Sacristán, Ana; Moreno, Miguel; Ariza-Mateos, Ascensión; et al; Briones, Carlos. 2015. A magnesium-induced RNA conformational switch at the internal ribosome entry site of hepatitis C virus genome visualized by atomic force microscopy Nucleic Acids Research. 43-1, pp.565-580.

- 9 **Scientific paper.** Briones, Carlos; Moreno, Miguel. 2012. Applications of peptide nucleic acids (PNAs) and locked nucleic acids (LNAs) in biosensor development *Analytical and Bioanalytical Chemistry*. 402-10, pp.3071-3089. ISSN 1618-2642.
- 10 **Scientific paper.** Moreno, M.; Gonzalez, V. M.2011. Advances on Aptamers Targeting Plasmodium and Trypanosomatids *Current Medicinal Chemistry*. 18-32, pp.5003-5010.
- 11 **Scientific paper.** Moreno, M.; Gonzalez, V. M.; Rincon, E.; Domingo, A.; Dominguez, E.2011. Aptasensor based on the selective electrodeposition of protein-linked gold nanoparticles on screen-printed electrodes *Analyst*. ISSN 0003-2654.
- 12 **Scientific paper.** Stuchinskaya, T.; Moreno, M.; Cook, M. J.; Edwards, D. R.; Russell, D. A.2011. Targeted photodynamic therapy of breast cancer cells using antibody-phthalocyanine-gold nanoparticle conjugates *Photochemical & Photobiological Sciences*. 10-5, pp.822-831. ISSN 1474-905X.
- 13 **Scientific paper.** Ramos, E.; Moreno, M.; Martin, M. E.; Soto, M.; Gonzalez, V. M.2010. In Vitro Selection of Leishmania infantum H3-Binding ssDNA Aptamers Oligonucleotides. 20-4, pp.207-213. ISSN 1545-4576.
- 14 **Scientific paper.** Camerin, M; Magaraggia, M; Soncin, M; Jori, G; Moreno, M; Chambrier, I; Cook, MJ; Russell, DA. 2010. The in vivo efficacy of phthalocyanine-nanoparticle conjugates for the photodynamic therapy of amelanotic melanoma *European Journal of Cancer*. 46-10, pp.1910-1918.
- 15 **Scientific paper.** Moreno, M.; Rincon, E.; Perez, J. M.; Gonzalez, V. M.; Domingo, A.; Dominguez, E.2009. Selective immobilization of oligonucleotide-modified gold nanoparticles by electrodeposition on screen-printed electrodes *Biosensors & Bioelectronics*. 25-4, pp.778-783.
- 16 **Scientific paper.** Burguete, M. I.; Galindo, F.; Gavara, R.; Luis, S. V.; Moreno, M.; Thomas, P.; Russell, D. A.2009. Singlet oxygen generation using a porous monolithic polymer supported photosensitizer: potential application to the photodynamic destruction of melanoma cells *Photochemical & Photobiological Sciences*. 8-1, pp.37-44. ISSN 1474-905X.
- 17 **Scientific paper.** Lechuga, LM; Tamayo, J; Alvarez, M; et al; Bernad, A. 2006. A highly sensitive microsystem based on nanomechanical biosensors for genomics applications *Sensors and Actuators B-Chemical*. 118-1-2, pp.2-10.
- 18 **Scientific paper.** Carrascosa, LG; Moreno, M; Alvarez, M; Lechuga, LM. 2006. Nanomechanical biosensors: a new sensing tool *Trac-Trends in Analytical Chemistry*. 25-3, pp.196-206.
- 19 **Scientific paper.** Sepulveda, B; del Rio, JS; Moreno, M; Blanco, FJ; Mayora, K; Dominguez, C; Lechuga, LM. 2006. Optical biosensor microsystems based on the integration of highly sensitive Mach-Zehnder interferometer devices *Journal of Optics a-Pure and Applied Optics*. 8-7, pp.S561-S566.
- 20 **Scientific paper.** Alvarez, M; Carrascosa, LG; Moreno, M; Calle, A; Zaballos, A; Lechuga, LM; Martinez-A, C; Tamayo, J. 2004. Nanomechanics of the formation of DNA self-assembled monolayers and hybridization on microcantilevers *Langmuir*. 20-22, pp.9663-9668.
- 21 **Scientific paper.** Moreno, M; Rincon, E; Pineiro, D; Fernandez, G; Domingo, A; Jimenez-Ruiz, A; Salinas, M; Gonzalez, VM. 2003. Selection of aptamers against KMP-11 using colloidal gold during the SELEX process *Biochemical and Biophysical Research Communications*. 308-2, pp.214-218.
- 22 **Encyclopaedia article.** Miguel Moreno. 2015. Aptasensor *Encyclopedia of Astrobiology*. M. Gargaud et al (Editor) Springer Verlag GmbH. pp.114-115.
- 23 **Book chapter.** Moreno, Miguel. 2019. Sensors | Aptasensors *Academic Press*. pp.150-153. ISBN 978-0-08-101984-9.
- 24 **Book chapter.** V. M. González; M. E. Martín; M. Moreno. 2013. Aptamers Targeting Protozoan Parasites *Biomedical Applications of Aptamer Technology*. Ed. John G. Bruno. Nova Science Publishers (Operational Technologies Corp).
- 25 **Book chapter.** M. Álvarez; K. Zinoviev; M. Moreno; L.M. Lechuga. 2008. Cantilever Biosensors *Optical Biosensors: Today and Tomorrow*. Frances S. Ligler and Chris Rowe Taitt (Editors). 10, pp.419-452.

- 26 Book chapter.** Laura M. Lechuga; Kirill Zinoviev; Laura G. Carrascosa; Miguel Moreno. 2007. Nanodevices for Biosensing: design, fabrication and applications Nanodevices for Life Sciences. Ed. Challa S.S. R. Kumar, Wiley-VCH Verlag GmbH&Co.KgaA. 4, pp.317-344.
- 27 Scientific-technical report.** Laura G. Carrascosa; Elba Mauriz; Jose Sánchez del Río; Miguel Moreno; Kirill Zinoviev; Ana Calle Martín; Carlos Domínguez; Laura M. Lechuga. 2008. Portable nanobiosensor platforms for ultrasensitive multidetection of biological warfare agents in real time In Commercial and Pre-Commercial Cell Detection Technologies for Defence against Bioterror-Technology, Market and Society NATO Security through Science. Series-B: Physics and Biophysics. Ed. L.M. Lechuga. IOA.
- 28 Proceedings Article.** Sanchez del Rio, J.; Carrascosa, L. G.; Blanco, F. J.; Moreno, M.; Berganzo, J.; Calle, A.; Dominguez, C.; Lechuga, L. M.2007. Lab-on-a-chip platforms based on highly sensitive nanophotonic Si biosensors for single nucleotide DNA testing - art. no. 64771B SPIE Proceedings. 6477, pp.64771B-1-64771A-9.
- 29** A. Domingo; C. Carrasco; G. Fernández; M. Moreno; E. Rincón; R. Vega. 2000. Nucleic acid sequence-specific quantitation: two approaches.European Laboratory Scientist. 1, pp.22-24.
- 30** (p.o. de firmas): A. Domingo; C. Carrasco; G. Fernández; M. Moreno; E. Rincón; R. Vega. 1999. Nucleic acid sequence-specific quantitation by competitive and hemicompetitive PCR BIOTECH International. 11, pp.624-625.

C.2. Participation in R&D and Innovation projects

C.3. Participation in R&D and Innovation contracts

- 1 Desarrollo de biosensores basados en aptámeros para la determinación de bacterias por SPR Bioapter S.L.. Dr. Miguel Moreno y Victor M. Gonzalez.05/2007-01/05/2012. 1.100.000 €.
- 2 Desarrollo y optimización de ensayos basados en PCR en tiempo real para diagnóstico médico y autenticación de alimentos Biotools B&M LABS; S.A./ Universidad de Alcalá. Dr. Alberto Domingo Galán. 30/06/2003-30/10/2003. 8.400 €.

C.4. Patents