

Date of the CVA	15/04/2021
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## Section A. PERSONAL DATA

Name and Surname	Alejandro Gomez Roca		
DNI/NIE/Passport		Age	39
Researcher's identification number	Researcher ID	I-9213-2012	
	Scopus Author ID	13805774300	
	ORCID	0000-0001-6610-9197	

\* Obligatorio

### A.1. Current professional situation

Institution	FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA		
Dpt. / Centre	Magnetic Nanostructures Group / Institut Català de Nanociencia i Nanotecnologia		
Address			
Phone		Email	
Professional category	Postdoc Researcher	Start date	2017
Keywords	Nanotechnology; Total synthesis; Nanoparticles; Nanostructures; Optical properties; Magnetism		

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

Bachelor/Master/PhD	University	Year
Doctor en Química	Universidad Complutense de Madrid	2009
Programa Oficial de Doctorado en Ciencia y Tecnología de Coloides e Interfases	Universidad Complutense de Madrid	2006
Licenciado en Química	Universidad Complutense de Madrid	2004

### A.3. General quality indicators of scientific production

- PhD thesis directed in the last 5 years: 1 ( Dr. Javier Muro).
- Current thesis: 1 (Aritz Lafuente López de Arbina).
- Total amount of citations (WoS): 3050
- Citation/year (2016-2021): 1407 citations, 281 citations/year
- Number of publications: 49 (Q1 papers: 30)
- H-index: 26
- Normalized H-index:1.62
- i10: 37
- Number of patents: 2

Dr. Alejandro G. Roca worked in different research centres from **Spain** (ICMM, INA-UNIZAR, ICMA and ICN2), **United Kingdom** (University of York) and **Japan** (Tohoku University), and also the **private sector** (Liquids Research Ltd). His expertise spans two research lines related with magnetic iron oxide- based nanoparticles. From ancient times, this material has been used in widespread application ranging from data storage, environmental remediation, catalysis, spintronics or biomedicine because of its interesting magnetic properties, negligible toxicity, biodegradability and electronic structure. The research lines are i) **Development of novel nanofabrication methodologies of magnetic-based nanoparticles for biomedicine with an accurate control over the size, shape and interphase features.** His target materials range from **hybrid heterostructures** with magnetic and optical domains where the heterostructure has the properties of both domains plus the ones arising from the interaction of both domains, and **anisotropic magnetic nanoparticles** like magnetite nanocubes or nanorods, with direction-dependent properties. He is focused on the evaluation

of these **nanomaterials** for their performance in theranostics (contrast agents in different imaging techniques or nanoheters in magnetic and/or optical hyperthermia). **ii) Study of the magnetism of magnetic-based nanostructures.** Only the combination of different **lab-scale techniques** together with **synchrotron/neutron techniques** will lead to the complete knowledge of the structure and magnetism of nanomaterials. He was devoted to study the **Fe<sub>3</sub>O<sub>4</sub> magnetism** with size, oxidation state and when couple to other domains (Mn<sub>3</sub>O<sub>4</sub>), **the magnetism of Mn<sub>3</sub>O<sub>4</sub>** when coupled with Fe<sub>3</sub>O<sub>4</sub>, magnetic structure of antiferromagnetic **nano-CoO polymorphs** and FeO magnetism affected by **internal defects** when transformed to Fe<sub>3</sub>O<sub>4</sub> . He has reached a scientific production with **49 scientific publications** published in **high-reputed journals** (Nano Letters, Chem. Mat., Physics Reports, Small, Nanoscale, Nanomedicine) **being cited more than 3000 times leading to a h-number of 26**. Also, he is authored of 2 book chapter and 2 patents. He is the **Principal Investigator** of 1 funded project (Ramón Areces Foundation, 89.1k €) which gives him the chance to develop his own research line, and also has participated actively in more than **14** projects (Spanish, European and Asian). In 2020, he was awarded with the Ramon y Cajal fellowship ( Materials Science area) which starts in May 2021. Moreover, he has supervised **1 PhD and 3 BsC students and currently he is supervising 2 BSc projects and 1 PhD thesis**. He gave Invited seminars in Summer Schools for undergraduates. He has presented his work as **Invited Speaker 10** times in different International conferences. Moreover, he has also organized conference symposiums and act regularly as chairman.

## Section B. SUMMARY OF THE CURRICULUM

### Organización de conferencias

1. Evento Workshop "Magnetic Nanosystems for Biotechnology and Medicine", CSIC, MADrid, 24-26/06/2007
2. Evento Symposium "Surfaces and Interfaces of Thin Films, Multilayers and Nanocompositers", IUMRS-ICEM 2018, Daejeon (Corea del Sur), 19-24/08/2018

### Experiencia como evaluador

1. Evaluator for ANEP (AEI, Materiales)
2. External Evaluator : Argentina and Croatian Scientific agencies
3. Evaluator Marie Curie MSC-Cofund
4. PhD Panel referee: 2 (Helena Gavilan Rubio 2017 and Cristina Navarro Senent 2020)
5. MSc Panel referee: 1 ( Master of Advance Nanoscience and Nanotechnology, Universitat Autònoma de Barcelona)
6. BSc Panel referee: Nanoscience degree

### Charlas invitadas

- 1-Autores: A. G. Roca; M. Estrader; A. López-Ortega; S. Estradé et al.  
Título:Size Dependent Magnetism in FeO/Fe<sub>3</sub>O<sub>4</sub> Core/Shell Nanoparticles  
Congreso IUMRS 15 Lugar: Taipei, Taiwan Fecha: Junio 2014
- 2- Autores:A. G. Roca; M. Estrader; A. López-Ortega; S. Estradé et al.  
Título Size Dependent Magnetism in FeO/Fe<sub>3</sub>O<sub>4</sub> Core/Shell Nanoparticles  
Congreso EMN Open Chengdu Lugar Chengdu, China Fecha Septiembre 2014
3. Autores Alejandro G. Roca; E. Fantechi; N. G. Bastus; V. Pundes; J. Nogues.  
Título Magneto-plasmonic nanostructures for theranostic applications  
Congreso EMN Open in Guangzhou Lugar Guangzhou, China Fecha Diciembre 2015
- 4- Autores Alejandro G. Roca; E. Fantechi; N. G. Bastus; V. Pundes; J. Nogues.  
Título Design and synthesis of iron oxide-gold hybrid heterostructures for theranostic applications  
Congreso AXA-ICMM Workshop Lugar Madrid, España Fecha Diciembre 2015
- 5- Autores: Alejandro G. Roca; E. Fantechi; N. Bastus; V. Pundes; J. Nogues.  
Título Magneto-Plasmonic Nanostructures for Theranostic Applications  
Congreso CC3DMR Lugar Incheon, Corea del Sur Fecha Junio 2016
- 6- Autores: A. G. Roca, E. Fantechi, A. López-Ortega, N. G. Bastus, et al.  
Título Understanding the synthesis of Au-Fe<sub>3</sub>O<sub>4</sub> nanocrystals for biomedical applications

Congreso 78th Autumn JSAP meeting Lugar Fukuoka, Japón Fecha Septiembre 2017  
7- Autores: A. G. Roca, Z. Li, E Fantechi, A. Aranda-Ramos, C. Nogues, J. Nogues, B. Sepulveda

Título: Magnetoplasmonic heterostructures for theranostic applications

Congreso: 23rd Int. Conference on Nanomaterials and Nanotechnology, Lugar: Londres, Reino Unido Fecha Marzo 2018

8- Autores: A. G. Roca, E. Fantechi, Z. Li, A. López-Ortega, A. Aranda-Ramos, C. Nogués, B. Sepúlveda, J. Nogués

Título: Magnetoplasmonic Heterostructures for Theranostic Applications

Congreso: 51st Heyrovský Discussion Lugar: Třešť, República Checa Fecha Mayo 2018

9- Autores: J. Muro-Cruces, A. G. Roca, A. López-Ortega, M. Hemadi, I. V. Golosovsky, and J. Nogués

Título: Improving The Properties Of Iron Oxide In Theranostic Applications By The Use Of Elongated Nanoparticles

Congreso: IUMRS-ICEM 2018 Lugar: Daejeon, Corea del Sur Fecha: Agosto 2018

10- Autores: A.G. Roca, Z. Li, A. Aranda-Ramos, A. Lopez-Ortega, P. Güell-Grau, J.L. Tajada, L. Pou-Macayo, et al.

Título: "Magnetoplasmonic Nanodomes as a novel structure for biomedical applications

Congreso: GEFES 2020 Lugar: Madrid (Spain). congreso celebrado online Fecha: Septiembre 2020

### Otros méritos relevantes en los últimos 5 años

- Acreditación de LECTOR Y AGREGADO por parte de la Agencia per a la Qualitat del Sistema Universitari de Catalunya (AQU).

- Mejor poster en el congreso ICM 2015, entidad IUPAP, celebrado en Barcelona el 7/7/2015

## 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.** Muro-Cruces, Javier; Roca, Alejandro G.; Lopez-Ortega, Alberto; et al; Nogues, Josep. (2/11). 2019. Precise Size Control of the Growth of Fe<sub>3</sub>O<sub>4</sub> Nanocubes over a Wide Size Range Using a Rationally Designed One-Pot Synthesis ACS NANO. AMER CHEMICAL SOC. 13-7, pp.7716-7728. ISSN 1936-0851.
- 2 Scientific paper.** Elvira Fantechi; Alejandro G. Roca; Borja Sepulveda; et al;. 2017. Seeded Growth Synthesis of Au-Fe<sub>3</sub>O<sub>4</sub> Heterostructured Nanocrystals: Rational Design and Mechanistic Insights Chemistry of Materials. Journal of the American Chemical Society. 29-9, pp.4022-4035. ISSN 0897-4756.
- 3 Scientific paper.** Torruella, Pau; Ruiz-Caridad, Alicia; Walls, Michael; et al; Estrade, Sonia. 2018. Atomic-Scale Determination of Cation Inversion in Spinel-Based Oxide Nanoparticles NANO LETTERS. AMER CHEMICAL SOC. 18-9, pp.5854-5861. ISSN 1530-6984.
- 4 Scientific paper.** Li, Zhi; Aranda-Ramos, Antonio; Guell-Grau, Pau; et al; Sepulveda, Borja. 2018. Magnetically amplified photothermal therapies and multimodal imaging with magneto-plasmonic nanodomes APPLIED MATERIALS TODAY. ELSEVIER SCIENCE BV. 12, pp.430-440. ISSN 2352-9407.
- 5 Scientific paper.** Ichikawa, Rodrigo U.; Roca, Alejandro G.; Lopez-Ortega, Alberto; Estrader, Marta; Peral, Inma; Turrillas, Xabier; Nogues, Josep. 2018. Combining X-Ray Whole Powder Pattern Modeling, Rietveld and Pair Distribution Function Analyses as a Novel Bulk Approach to Study Interfaces in Heteronanostructures: Oxidation Front in FeO/Fe<sub>3</sub>O<sub>4</sub> Core/Shell Nanoparticles as a Case Study SMALL. WILEY-V C H VERLAG GMBH. 14-30. ISSN 1613-6810.

- 6 **Scientific paper.** Roca, Alejandro G.; Golosovsky, Igor V.; Winkler, Elin; Lopez-Ortega, Alberto; Estrader, Marta; Zysler, Roberto D.; Dolors Baro, Maria; Nogues, Josep. 2018. Unravelling the Elusive Antiferromagnetic Order in Wurtzite and Zinc Blende CoO Polymorph Nanoparticles SMALL. WILEY-VCH VERLAG GMBH. 14-15. ISSN 1613-6810.
- 7 **Scientific paper.** Luo, Ping; Roca, Alejandro; Tiede, Karen; et al; Boxall, Alisatir. 2018. Application of nanoparticle tracking analysis for characterising the fate of engineered nanoparticles in sediment-water systems JOURNAL OF ENVIRONMENTAL SCIENCES. 64, pp.62-71. ISSN 1001-0742.
- 8 **Scientific paper.** Alberto Lopez-Ortega; Alejandro G. Roca; Pau Torruella; Michele Petrecca; Sonia Estrade; Francesca Peiro; Victor Puentes; Josep Nogues. (2/8). 2016. Galvanic Replacement onto Complex Metal-Oxide Nanoparticles: Impact of Water or Other Oxidizers in the Formation of either Fully Dense Onion-like or Multicomponent Hollow MnOx/FeOx Structures Chemistry of Materials. American Chemical Society. 28-21, pp.8035-8051. ISSN 0897-4756.
- 9 **Review.** Roca, Alejandro G.; Gutiérrez, Lucía; Gavilán, Helena; Eugênia Fortes Brollo, Maria; Veintemillas-Verdaguer, Sabino; del Puerto Morales, María. 2018. Design strategies for shape-controlled magnetic iron oxide nanoparticles Advanced Drug Delivery Reviews. ELSEVIER. ISSN 0169-409X.

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

- 1 Opto-magnetic nanostructures for wirelessly controlled nanotherapies ministerio de ciencia y innovacion.(F Josep Nogues Sanmiquel. (CENTRO DE INVESTIGACION EN NANOCIENCIA Y NANOTECNOLOGIA). 01/06/2020-31/05/2023. 217.800 €.
- 2 Magnetic Iron Oxide-Based Nanostructures for Combined Photothermal Therapies (PHOTOFEON) Ministerio de Ciencia e Innovación. Investigación. Alejandro Gómez Roca. (CENTRO DE INVESTIGACION EN NANOCIENCIA Y NANOTECNOLOGIA). 26/08/2019-25/08/2022. 157.000 €.
- 3 Magnetoplasmonic control (actuation and monitoring) of drug release using Fe/Au semi-shells on biodegradable nanoparticles (MAGPLADRUG) Alejandro Gomez Roca. (Fundación Ramón Areces). 04/03/2019-03/03/2022. 89.100 €.
- 4 Multifunctional magneto-photonic nanomaterials for biomedical applications: top-down, bottom-up and hybrid fabrication approaches Josep Nogues Sanmiquel. (FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA). 01/01/2017-31/12/2019. 150.000 €.
- 5 Nanometrology Standardization Methods for Magnetic Nanoparticles (FP7-NMP-2013-LARGE-7) (Instituto de Ciencia de Materiales de Madrid). 01/11/2013-31/12/2017.
- 6 Magnetic and Magnetoplasmonic Nanostructures for Theranostic Applications Josep Nogues Sanmiquel. (FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA). 01/01/2014-31/12/2016. 118.000 €.

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

Magneto-optical nanosensors and actuators: Theranostic Hybrid Magneto-plasmonic nanoparticles FUNDACION PRIVADA INSTITUT CATALA DE NANOTECNOLOGIA. Alejandro Gomez Roca. 07/01/2015-07/01/2017. 3.000 €.

## C.4. Patents

- 1 Borja Sepulveda; Josep Nogues Sanmiquel; Alejandro; Jose Luis Tajada Herraiz; Elvira Fantechi. EP16382301.6. A HYBRID HYPERTHERMIA DEVICE, AND METHODS USING THE SAME Spain. 27/06/2016. FUNDACIÓ INSTITUT CATALÀ DE NANOCIÈNCIA I NANOTECNOLOGIA.
- 2 Maria del Puerto Morales Herrero; Alejandro Gomez Roca; Carlos J. Serna Pereda; Sabino Veintemillas Verdaguer; Domingo Barber; Raquel Mejias Laguna; Sonia Perez Yague. WO2011095661 A1. NANOPARTICULAS MAGNETICAS PARA SU USO EN UNA COMPOSICION FARMACEUTICA Spain. 02/02/2010. Consejo Superior de Investigaciones Cientificas.