

Irene Fernández Cuesta

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Education

PhD in Physics, March 2009.

National Center of Microelectronics and Autonomá's University (Barcelona, Spain).

Master Degree in Material Sciences and Solid State Physics, September 2006.

Autonomá's University (Barcelona, Spain).

Graduated in Physics, July 2004.

Complutense University (Madrid, Spain).

Appointments and Affiliations

Applied Physics Department - UHH.

Marie Curie Postdoctoral Fellow

Since July 2014.

P-BLINC Corp.

Co-founder, Chief Executive Officer and Chief Technical Officer

Since November 2012.

The Molecular Foundry (Lawrence Berkeley National Laboratory)

Project scientist.

October 2012 – July 2013

The Molecular Foundry (Lawrence Berkeley National Laboratory)

Marie Curie IOF grant holder

October 2010 – October 2012

DTU•Nanotech (Technical University of Denmark).

Postdoc.

April 2009 – July 2010

National Center of Microelectronics – Institute of Barcelona (CNM – IMB, CSIC).

Predocctoral grant holder from CSIC and the Spanish Ministry of Education and Science

September 2004 – March 2009

Complutense University of Madrid – Materials Science Department.

Undergrad grant holder

September 2003 – August 2004

Institute of Polymer Sciences and Technology (ICTP, CSIC).

Summer undergrad project

June 2003 – August 2003

Patents and Scientific Publications

Patent:

Fernandez-Cuesta, I. and S. Cabrini, *Optofluidic devices and methods for sensing single particles*, U.S. Patent Application Ser. No: 61/814,484. (2013)

Articles:

[19] I. Fernandez-Cuesta, E. Montinaro, D. Gargas, A. Schwartzberg, A. Weber-Bargioni, P. J. Schuck, A. Kristensen and S. Cabrini
Real time, individual particle detection with a nano-fluidic channel integrated with an optical nanoantenna
Submitted (2014)

[18] A. Schleunitz, M. Vogler, I. Fernandez-Cuesta, H. Schiff and G. Gruetzner
Innovative and Tailor-made Resist and Working Stamp Materials for Advancing NIL-based Production Technology
J. Photopolym. Sci. Technol, **26** 1 119 (2013)

[17] C. L. C. Smith, B. Desiatov, I. Goykmann, I. Fernandez-Cuesta, U. Levy, and A. Kristensen *Plasmonic V-groove waveguides with Bragg grating filters via nanoimprint lithography*,
Optics Express, **20** 5 5698 (2012)

[16] C.L.C Smith, B. Desiatov, I. Goykmann, I. Fernandez-Cuesta, U. Levy, A. Kristensen
Bragg grating filters in plasmonic V-groove waveguides
Proceedings of the Conference on Lasers and Electro-Optics (CLEO) (2012)

[15] I. Fernandez-Cuesta, A. L. Palmarelli, X. Liang, J. Zhang, S. Dhuey, D. Olynick, and S. Cabrini,
Fabrication of fluidic devices with 30nm nanochannels by direct imprinting,
J. Vac. Sci. Technol. B, **29** 06F801 (2011)

[14] A. Bonanni, I. Fernández-Cuesta, X. Borrísé, F. Pérez-Murano, S. Alegret and M. del Valle
DNA hybridization detection by electrochemical impedance spectroscopy using interdigitated gold nanoelectrodes
Microchim Acta **170**, 275 (2010)

[13] S. Merino, A. Retolaza, V. Trabadelo., A. Cruz, P. Heredia. J.A.Alduncín, D. Mecerreyes. I. Fernández-Cuesta, X. Borrísé, F. Pérez-Murano.
Protein patterning on the micro- and nanoscale by thermal nanoimprint lithography on a new functionalized copolymer
Journal of Vacuum Science and Technology B. **27**, 2439 (2009)

[12] I. Fernandez-Cuesta, R. B. Nielsen, A. Boltasseva, X. Borrise, F. Pérez-Murano and A. Kristensen.
Excitation of fluorescent nanoparticles by plasmons confined and propagating in V-grooves
Applied Physics Letters, **95** 20 (2009)

- [11] R.B. Nielsen, I. Fernandez-Cuesta, A. Boltasseva, V.S. Volkov, S.I. Bozhevolnyi, A. Klukowska, and A. Kristensen.
Channel Plasmon Polariton Propagation in Nanoimprinted V-Groove Waveguides
Optics Letters. **33** (23) 2800 (2008)
- [10] R.B. Nielsen, A. Boltasseva, A. Kristensen, S.I. Bozhevolnyi, V.S. Volkov, I.F. Cuesta, and A. Klukowska.
Fabrication of plasmonic waveguides by nanoimprint and UV-lithography
Advanced Fabrication Technologies for Micro/Nano Optics and Photonics, art. 688304, 88304. (2008)
- [9] X. Cartoixa, R. Rurali, I. Fernandez-Cuesta, F. Perez-Murano, and J. Suñé.
Fabrication of ordered arrays of quantum wires through hole patterning
Journal of Physics - Conference Series. **100**(5), 052049 (2008)
- [8] I. Fernandez-Cuesta, X. Borrise, A. Retolaza, S. Merino, D.A. Mendels, O. Hansen, A. Kristensen, and F. Perez-Murano.
Determination of stress build-up during nanoimprint process in triangular polymer structures
Microelectronic Engineering, **85**(5-6), 838 (2008)
- [7] D.A. Mendels, I. Fernandez-Cuesta, X. Borrise, A. Retolaza, S. Merino, O. Hansen, A. Kristensen, and F. Perez-Murano.
A finite element mesh tailored to full NIL process modelling: hot embossing, cool-down and stamp release
Microprocesses and Nanotechnology, **278** (2007)
- [6] C. Gourgon, N. Chaix, H. Schiff, M. Tormen, S. Landis, C.M.S. Torres, A. Kristensen, R.H. Pedersen, M.B. Christiansen, I. Fernandez-Cuesta, D. Mendels, L. Montelius, and T. Haatainen.
Benchmarking of 50 nm features in thermal nanoimprint
Journal of Vacuum Science & Technology B, **25**(6), 2373. (2007)
- [5] A. Boltasseva, K. Leosson, T. Rosenzweig, R.B. Nielsen, R.H. Pedersen, K.B. Jorgensen, I. Fernandez-Cuesta, J. Jung, T. Sondergaard, S.I. Bozhevolnyi, and A. Kristensen.
Fabrication of plasmonic waveguides for device applications
art. no. 663804, Photonic Metamaterials., 63804. (2007)
- [4] I. Fernandez-Cuesta, R.B. Nielsen, A. Boltasseva, X. Borrise, F. Perez-Murano, and A. Kristensen.
V-groove plasmonic waveguides fabricated by nanoimprint lithography
Journal of Vacuum Science & Technology B, **25**(6): p. 2649 (2007)
- [3] I. Fernández-Cuesta, X. Borrisé and F. Pérez-Murano
AFM local anodic oxidation of thin Si₃N₄ layers for robust prototyping of nanostructures.
Journal of Vacuum Science & Technology B, **24** (6) 2988 (2006)
- [2] I. Fernandez-Cuesta, X. Borrise and F. Perez-Murano.
Atomic force microscopy local oxidation of silicon nitride thin films for mask fabrication
Nanotechnology. **16**(11) 2731 (2005)
- [1] I. Fernandez, A. Cremades and J. Piqueras.
Cathodoluminescence study of defects in deformed (110) and (100) surfaces of TiO₂ single crystals
Semiconductor Science and Technology. **20**(2) 239 (2005)

Contribution to International Conferences

- Irene Fernandez-Cuesta, Corrado Carbone, Enrica Montinaro, Scott Dhuey, Daniel Gargas, P.James Schuck and Stefano Cabrini

Nanofluidics integrated with plasmonics for ultra-high sensitivity devices

SPIE Optics+Photonics

2013. San Diego, CA. **Invited.**

- Irene Fernandez-Cuesta

An integrated lab-on-a-chip for single nanoparticle detection

2013. **Invited seminar** at KLA-Tencor, Milpitas, CA.

- Irene Fernandez-Cuesta, C.Carbone, S.Dhuey, A.Taber, D.Gargas, P.J.Schuck, S.Cabrini

A lab-on-a-chip with 30 nm nanochannels and plasmonic bowtie nanoantenna

International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication, *EIPBN*.

2013. Nashville, TN. Oral

-Irene Fernandez-Cuesta C. Carbone, E. Montinaro, S. Dhuey, S. Cabrini

Nanofluidics and plasmonics: integration for ultra-high sensitivity devices

SPIE Advanced Lithography

2013. San Jose, CA. **Invited.** Opening the Nanoimprint Applications session

- Irene Fernandez-Cuesta

Nanofluidics and plasmonics: integration for ultra-high sensitivity devices

Microresist Technology GmbH 20th anniversary workshop.

2013. Berlin, Germany. **Invited.**

- Irene Fernandez-Cuesta, E. Montinaro, S. Dhuey, D. Gargas, A. Taber, P. J. Schuck and S. Cabrini

Nanochannels with plasmonic nanoantenna: a lab on chip for single molecule detection

Molecular Foundry Users Meeting

2013. Berkeley, CA. Talk, **selected as 1 of the 4 research highlights for the plenary session.**

- Enrica Montinaro, Irene Fernandez-Cuesta, Arne Schleunitz, Helmut Schiff and Stefano Cabrini

Wafer scale fabrication of 3D inlets in nanofluidic devices

Nanoimprint and Nanoprint Technology (NNT)

2012. Napa Valley, CA. Oral

- I. Fernandez-Cuesta, E. Montinaro, S.Dhuey, A. Taber, D.Gargas, P.J.Schuck, S.Cabrini

Sensing with 30 nm nanochannels with plasmonic bowtie nanoantenna

International Conference on Micro- and Nano-Engineering (MNE).

2012. Toulouse, (France). Oral

- I. Fernandez-Cuesta, S.Dhuey, D.Olynick, D.Gargas, P.J.Schuck, S.Cabrini

30 nm nanochannels with plasmonic bowtie nanoantenna

International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication, *EIPBN*.

2012. Kona, HI. Oral

- C. L.C. Smith, B. Desiatov, I. Goykhmann, I. Fernandez-Cuesta, U. Levy, and A. Kristensen

Bragg grating filters in plasmonic V-groove waveguides

Conference on Lasers and Electro-Optics (CLEO)
2012. San Jose, CA. Oral.

- Irene Fernandez-Cuesta, Anna Laura Palmarelli, Xiaogan Liang, Scott Dhuey, Deirdre Olynick, Gabi Gruetzner and Stefano Cabrini
Fabrication of 30 nm nanochannels integrated with bowtie nanoantenna
International Conference on Micro- and Nano-Engineering (MNE).
2011. Berlin (Germany). Oral

- C. L. C. Smith, I. Fernandez-Cuesta, A. Kristensen
Gratings in metallic V-groove channel plasmon polariton waveguides
International Conference on Micro- and Nano-Engineering (MNE).
2011. Berlin (Germany). Poster

- C. L. Smith, I. Fernandez-Cuesta, and A. Kristensen
Gratings in plasmonic V-groove waveguides
Conference on Lasers and Electro-Optics (CLEO)
2011. Baltimore (ML). Poster.

- I. Fernandez-Cuesta, A. L. Palmarelli, X. Liang, J. Zhang, S. Dhuey, D. Olynick and Stefano Cabrini
Fabrication of sub-20nm nanochannels integrated with bowtie nanoantenna
International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication, *EIPBN*.
2011. Las Vegas (NV). Oral.

- I. Fernandez-Cuesta
Nanolithography for sensing applications
Nanotech insight 2009.
2009. Barcelona (Spain). **Invited Speaker - Plenary session.**

- I. Fernandez-Cuesta, A. Bonanni, X. Borriese, M. del Valle and F. Pérez-Murano.
Interdigitated nanoelectrodes fabricated by electron beam lithography for genosensing
International Conference on Micro- and Nano-Engineering (MNE).
2009. Ghent (Belgium): Oral.

- I. Fernandez-Cuesta, L. Sole, X. Borriésé, C. Fernandez-Sanchez, A. Baldi, and F. Pérez-Murano.
Fabrication of interdigitated nano-electrodes
Nanolitho08.
2008. Barcelona (Spain): Oral

- Irene Fernandez-Cuesta, C. Fernandez-Sanchez, A. Baldi, X. Borriese and F. Perez-Murano
Interdigitated nanoelectrodes for (bio)sensing
Workshop on Life Sciences
2008. Mahon (Spain). Talk, **on plenary session.**

- I. Fernandez-Cuesta, L. Sole, X. Borriésé, C. Fernandez-Sanchez, A. Baldi, and F. Pérez-Murano.
Interdigitated nanoelectrodes fabricated by nanoimprint lithography for nanoparticles detection.
International Conference on Micro- and Nano-Engineering (MNE).
2008. Athens (Greece): Poster.

- I. Fernandez-Cuesta, R.B. Nielsen, A. Boltasseva, X. Borriésé, F. Pérez-Murano, and A. Kristensen.
Excitation of fluorescent nanoparticles by plasmons confined and propagating in V-grooves.

International Conference on Micro- and Nano-Engineering (MNE).
2008. Athens (Greece): Oral.

- I. Fernandez-Cuesta, J. Orozco, C. Fernández-Sánchez, A. Baldi, X. Borrísé, and F. Pérez-Murano.
Impedimetric biosensing with interdigitated arrays of nano electrodes fabricated by nanoimprint lithography.
International Conference on Electron, Ion and Photon Beam Technology and Nanofabrication (EIPBN08).
2008. Portland, OR (USA): Poster.

- I. Fernandez-Cuesta, R.B. Nielsen, D. Heinis, A. Boltasseva, X. Borrísé, N. van Hulst, F. Pérez-Murano, and A. Kristensen.
Plasmon confinement in V-groove waveguides fabricated by NanoImprint Lithography.
NanoSpain.
2008. Braga (Portugal): Oral. **Upgraded to the plenary session.**

- I. Fernandez-Cuesta, J. Orozco, C. Fernandez-Sanchez, A. Baldi, X. Borrísé, and F. Pérez-Murano.
Interdigitated nanoelectrodes for sensing: fabrication and characterization.
Nanospain. 2008. Braga (Portugal): Oral.

- Irene Fernandez-Cuesta
Nanoimprint Lithography: Process and Applications.
Workshop on Large Scale Nanostructuration of Functional Materials.
2007. Barcelona (Spain). **Invited Speaker.**

- I. Fernandez-Cuesta, R. B. Nielsen, A. Boltasseva, X. Borrísé, F. Pérez-Murano and A. Kristensen
V-groove plasmonic waveguides fabricated by NanoImprint Lithography.
International Conference on Electron, Ion and Photon Beam Technology & Nanofabrication (EIPBN). 2007.
Denver, CO (USA). **Standard submission, upgraded to Invited.**

- Irene Fernandez-Cuesta
Nanofabrication for Biosensors.
Workshop on NanoBioSensors for Biomedical Applications.
2007. Barcelona (Spain). **Invited speaker.**

- I. Fernandez-Cuesta, R.B. Nielsen, D. Heinis, A. Boltasseva, X. Borrísé, N. van Hulst, F. Pérez-Murano, and A. Kristensen.
Plasmon confinement in V-groove waveguides fabricated by NanoImprint Lithography.
International Conference on Micro- and Nano-Engineering (MNE).
2007. Copenhagen (Denmark): Poster.

- I. Fernandez-Cuesta, X. Borrísé, A. Retolaza, S. Merino, D.A. Mendels, O. Hansen, A. Kristensen, and F. Pérez-Murano.
Determination of stress build-up during NIL process in triangular polymer structures.
International Conference on Micro- and Nano-Engineering (MNE).
2007. Copenhagen (Denmark): Oral.

- I. Fernandez-Cuesta, J. Zabaleta, X. Borrísé, T. Puig, N. Mestres, X. Obradors, and F. Pérez-Murano.
Fabrication of ordered lattices of nanopillars of magnetic perovskite.
International Conference on NanoImprint and NanoPrint Technology (NNT).
2007. Paris (France): Poster.

- I. Fernandez-Cuesta, R. de la Rica, X. Borrisé, and F. Pérez-Murano.
Local Functionalization of Surfaces by EBL and CVD and AFM characterization.
NanoSpain.
2006. Pamplona (Spain): Poster.

- I. Fernandez-Cuesta, X. Borrisé and F. Pérez-Murano.
AFM local anodic oxidation of thin Si₃N₄ layers for robust prototyping of nanostructures.
International Conference on Electron, Ion and Photon Beam Technology & Nanofabrication (EIPBN). 2006.
Baltimore, MD (USA): Poster.

- I. Fernandez-Cuesta, X. Borrisé and F. Pérez-Murano.
Fabrication of interdigitized nanoelectrodes by a combination of AFM local anodic oxidation and nanoimprint lithography.
International Conference on Micro- and Nano-Engineering (MNE).
2006. Barcelona (Spain): Poster.

- I. Fernandez-Cuesta, X. Borrisé and F. Pérez-Murano.
Fast antisticking coating at room temperature: process and characterization.
International Conference on Nanoimprint and NanoPrint Technology (NNT).
2006. San Francisco, CA (USA): Poster.

- I. Fernandez-Cuesta, M.J. López, F. Pérez-Murano, and X. Borrisé.
Nanostructures Fabricated by Nanoimprint Lithography.
NanoSpain.
2005. Barcelona (Spain): Poster.

- I. Fernandez-Cuesta, X. Borrisé and F. Pérez-Murano.
Fabrication of Molds for Nanoimprint Lithography using AFM Nanolithography.
NanoSpain.
2005. Barcelona (Spain): Poster.

Teaching, training and mentoring

Academic master class

“33422 Nanolithography Course “ taught at DTU (Technical University of Denmark).

Technological Specialisation Course about Physics and Nanotechnology

- June 2010
- January 2010
- June 2009

Supervision of Undergraduated and Master Students

- Valeria Rustichelli

Master Thesis: *Integration of a spectrometer-on-chip with microfluidics for biosensing*

Supervisors: Irene Fernandez-Cuesta, Stefano Cabrini

LBNL & Master Nanotech (EPFL Switzerland, Politecnico di Torino Italy, Grenoble INP France)

Expected graduation: March 2014.

- Corrado Carbone

Master Thesis: *Integrated optofluidic device for Raman-on-chip*

Supervisors: Irene Fernandez-Cuesta, Stefano Cabrini

UC-Berkeley & Politecnico di Torino.

Expected graduation: July 2014.

- Enrica Montinaro

Master Thesis: *Lab-on-a-chip devices for DNA stretching in nanochannels with plasmonic detection (titolo no definitiva)*

Supervisors: Irene Fernandez-Cuesta, Stefano Cabrini

LBNL & Master Nanotech (EPFL Switzerland, Politecnico di Torino Italy, Grenoble INP France)

Thesis defended September 2012.

- Anna Laura Palmarelli

Master Thesis: *Plasmonic Nanostructures in Nanofluidics for real time characterization of Individual Biological Molecules*

Supervisors: Irene Fernandez-Cuesta, Stefano Cabrini, Fabrizio Pirri, Matteo Cocuzza

UC-Berkeley & Politecnico di Torino.

Thesis defended March 2012.

- Gustav Kvaal and Søren Raza

Bachelors Thesis (Course 34047/33523): *Label-free single molecule DNA analysis by Surface Plasmon-Polariton Resonance*

Supervisors: Rodolphe Marie, Irene Fernandez-Cuesta, Anders Kristensen

Technical University of Denmark, DTU.

Thesis defended June 2010.

- Anas Fahad Al-Azawi

Bachelors Thesis: *Devices of Pinched Flow Fractionation.*

Supervisors: Anders Kristensen, Irene Fernandez-Cuesta, Rodolphe Marie

Technical University of Denmark, DTU.

Thesis defended January 2010.

- Marie Pødenphant Jensen, Lene Gammelgaard, Heidi Puk Hermann and Martin Hangaard Hansen

3-week Project: Visualization of Surface Plasmons

Supervisors: Kristian Mølhave and Irene Fernandez-Cuesta

Technical University of Denmark, DTU.

January 2010.

Organization of Scientific Events

- 2007, Local Organizing Committee for the International Conference in Micro and Nanoengineering (MNE) in Barcelona, Spain.
- 2007, Local Organizing Committee for the Spring Meeting of the NaPa (NanoPatterning emerging Methods) collaboration meeting.
- 2008, Local Organizing Committee for the NanoLitho Conference in Barcelona (Spain)
- 2008, Program Chair for the "PreDoc Scientific Workshop" at the National Center of Microelectronics, Barcelona (Spain).
- 2013, Molecular Foundry Annual Users Meeting. Organizing Committee.

Other achievements

- SBIR Phase I project award from the National Science Foundation (USA)
- O1 visa holder in the USA (granted to individuals with extraordinary abilities)
- Marie Curie IOF scholarship
- Elected Member of the Users Executive Committee (The Molecular Foundry, Berkeley, CA)
- 2 contributions to books/library of processes
- 6 prizes in different Micrograph contests, and a cover in a science fiction commercial novel
- Member of the Scientific Committee of SPIE Optics+Photonics international conference