

## Disruptive chemistry for flexible electronics

### IMDEA - Nanociencia Institute

[www.nanociencia.imdea.org](http://www.nanociencia.imdea.org)

### CENTRE DESCRIPTION

IMDEA Nanociencia is a young interdisciplinary research centre dedicated to the exploration of basic nanoscience and the development of applications of nanotechnology in connection with innovative industries.

Our purpose-built building was inaugurated in 2014 and features state-of-the-art facilities for 21st century science, where the frontiers between fields disappear and Physics, Chemistry, Biology, Engineering, and Medicine merge. It features more than 30 operative laboratories with over € 16 M worth of equipment -including the Centre for Micro and Nanofabrication. We are located at the UAM Campus, with access to all the facilities of one of Spain's largest and most prestigious Universities. The UAM Campus is just a few minutes away from Madrid's lively city centre, connected by "cercanías" trains and several bus lines.

We are over 150 scientists, with different professional and personal backgrounds. Approximately 40% of our PhD and postdocs come from outside Spain, representing every corner of the world, from Germany to China, from the USA to Singapore –a true international environment in which to develop your scientific career. Women make up 36% of our scientific and 62% of our management staff. No matter who you are or where you come from, you will feel welcome from the very first minute.

We take science seriously and value quality over quantity. Our scientists enjoy tackling complex multidisciplinary problems, often within in-house collaborations, so all of our students receive truly interdisciplinary training. We also enjoy publishing in the very best journals, with >200 publications a year, and an institutional h index of 79. Check out our webpage <http://nanociencia.imdea.org/>, facebook @IMDEANanociencia or twitter @IMDEA\_Nano for more information.

So if you are a talented, hard-working individual with a real interest in Science, IMDEA Nanociencia is the right place for you! Come work with us!

### ADDRESS

Faraday 9, 28049 Madrid, Madrid

### AREA OF KNOWLEDGE

Physical Sciences, Mathematics and Engineering

### GROUP OF DISCIPLINES

Chemistry and Chemical Engineering

## GROUP LEADER

Prof. David Écija

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Research Group Website: <http://nanociencia.imdea.org/nanoarchitectonics-on-surfaces/group-home>

## Research project/ Research Group description

Prof. Ecija's group (ERC Consolidator Grant 2017) focuses on the study of physical-chemistry and molecular nano-science at interfaces. To this aim, state-of-the-art scanning probe microscopies, photoelectron and optical spectroscopies are combined with density functional calculations.

On-surface synthesis has emerged as a powerful discipline to tailor specific chemical complexes and covalent structures on surfaces, which are elusive or high demanding by conventional chemistry. Hereby, novel conjugated materials have captivated tremendous interest for both fundamental studies of  $\pi$ -systems and important organic optoelectronic applications.

The main goals of this project are: i) The design of graphene nanoribbons with unprecedented member rings; ii) The engineering of linear and extended conjugated hydrocarbons, including poly-acenes, polynes and poly-naphthylenes; and iii) The fabrication of linear porphyrinoid tapes.

To this aim, ex-professo synthesized molecular precursor species will be deposited on pristine metals or ultra-thin film materials such as NaCl, h-BN, or graphene. Next, by tip-induced pulses or external stimuli such as temperature or light, on-surface chemical reactions will be steered to afford reaction intermediates and final desired products. The inherent physico-chemical properties of the molecular precursors, reaction intermediates, and reaction products will be explored by a unique and powerful surface science instrumentation including scanning tunneling microscopy, scanning tunneling spectroscopy, non-contact atomic force microscopy, tip-induced electroluminescence, optical spectroscopy, and X-ray spectroscopies.

Thanks to this very powerful surface science approach to covalent chemistry, a novel generation of nanomaterials will be grown on distinct functional supports and their study will propel the development of a new generation of organic devices.

## Job position description

The position is open to candidates with a background in Chemistry, Materials Science or Physics. Open minded applicants, with a passion for novel chemistry and physical phenomena at the nanoscale, and a curiosity for advanced instrumentation are highly welcome.

The PhD candidate will be in charge of a state-of-the-art ultra-high vacuum system, hosting a preparation chamber and a low-temperature stm/nc-afm, capable of low-temperature scanning tunneling microscopy, scanning tunneling spectroscopy, non-contact atomic force microscopy, and tip-induced electroluminescence studies. Furthermore, the applicant will be in weekly contact with another ultra-high vacuum system hosting a variable-temperature STM and a X-ray photoelectron spectroscopy set-up, to benefit from the sinergy of both instrumental systems. The main roles of the applicant will be

the design, growth and characterization at the nanoscale of the distinct reaction products, analysis and dissemination of results.

In addition, a fluent communication with our chemical collaborators (Prof. Nazario Martín, Prof. Tomás Torres, Prof. Johannes L. Sessler, Prof. Davide Bonifazi, and Prof. Antonio M. Echavarren) and with our theoretical colleagues (Prof. Pavel Jelineck, Prof. Fernando Martin, Prof. Javier García de Abajo, Dr. Ari P. Seitsonen, and Dr. Jonas Björk) is expected.

During the three-year PhD period two stays at world-leading microscopy facilities are envisioned, i.e. at the E-20 Physico-Chemistry Group of the Technical University of Munich (Prof. Johannes .V. Barth) and at the Institute of Physics of the Czech Academy of Sciences (Prof. Pavel Jelineck).

The exposure to such state-of-the-art facilities, challenging project, and world-leading researchers will ensure an excellent formation of the PhD candidate, steering both the scientific and interdisciplinary professional skills, while expanding notably her/his network of collaborators for future professional development.