NANOTRAINGFORGROWTH II PROGRAMME

This programme aims to provide an opportunity for talented and motivated researchers (from all over the world and all nationalities) to carry out groundbreaking research projects at the International Iberian Nanotechnology Laboratory - INL.
The NanoTRAINForGrowth II is co-funded by the European Union through the Marie Curie Action "Co-funding of regional, national and international programmes (COFUND)".

FIRST CALL

The **first call** brought talented researchers to INL that are now working in cutting-edge projects in the field of nanotechnology. After evaluating the applications submitted to the first call of the NanoTRAINforGrowth II INL Post-Doctoral Fellowship Programme, the INL has selected 4 candidates (Ashok Patel, Sara Abalde-Cela, Lara San Emeterio and David Soriano).

MEET OUR RESEARCHERS

Ashok Patel

Dr Ashok Patel aims to work on his ambitious project of developing complex colloidal particles that carry and deliver fat-binding agents to the intestine. It is his hypothesis that by controlling the de-structuring of these particles in the intestine, the release of the fat-binding agents can be matched to different steps of fat digestion for an efficient multi-step binding that will eventually lead to an overall reduction in fat absorption.
Following the motto of INL that is "Creating value at the smallest scale to tackle challenges at the grandest scale", this project aims at exploring the feasibility of innovating at the colloidal scale to solve the global social issue of obesity.

Sara Abalde-Cela

Dr Sara Abalde-Cela recently joined INL to develop sensing platforms for liquid biopsy based on SERS detection and microdroplets. Her research efforts are focused at the integration of nanotechnology, SERS and microdroplets in microfluidics driven by her interest in biomedical research tools. Dr Sara won several fundings, research awards and recognitions along her career. She has around 30 contributions to conferences and 11 peer-reviewed publications. She has also been involved in science dissemination at schools and start-up programmes in Cambridge, London and Vigo.

Lara San Emeterio Alvarez

Dr Lara started at INL as a research fellow in the Spintronics group, to work on spin wave excitation, propagation and detection using nanopillar magnetic tunnel junctions.
Dr Lara graduated in Physics from the University of Oviedo, and left Spain to do her thesis in England at the University of Leeds, where her research was a study on domain wall motion in perpendicular magnetised wires under the influence of a field and current. After, as a Postdoc, she went to Cambridge University to develop superconductor devices for single photon detectors. She then moved to Grenoble in France to do a Postdoc on magnetic tunnel junctions for MRAM applications.

David Soriano

Within the NanoTRAINforGrowth II programme, Dr David Soriano is involved on the study of defects in 2D materials, such as vacancies in hexagonal Boron Nitride (hBN) layers, as potential sources of single photon emitters (SPE). More specifically, a defect in a wide band gap semiconductor behaves as an isolated atom or quantum dot with discrete energy levels appearing inside the gap. The optical transitions of electrons between these energy levels are within the visible light range and are sensitive to the magnetic state of the defect (similar to the NV centres in diamond). The understanding and perfect characterization of defects in 2D materials are key for further application of these materials in Quantum Technologies.

Know more about our researchers

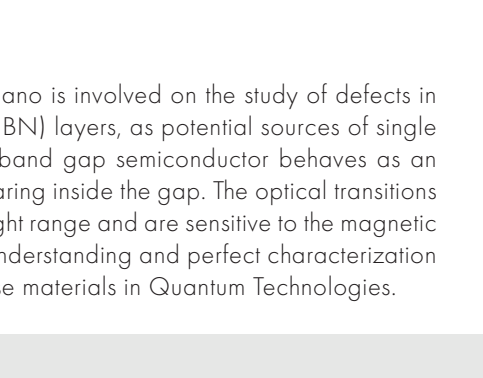
PROJECTS AND OTHER ACTIVITIES

Sara Abalde-Cela

At INL we are on the hunt for a platform that can help oncologists to choose the best therapy for their patients. The COFUND project led by Dr Sara Abalde-Cela in collaboration with Dr Lorena Diéguez relays on nanotechnology and microfluidics to develop a real-time, high-throughput and multiplex cancer-sensing device that is able to monitor cancer progression in a minimally invasive way. Cancer cells travel in blood circulation of metastatic patients. Depending on the number and characteristics of these travellers, the patient will have different prognosis. However, the number of these cells is extremely low compared to healthy cells. This is why we develop microfluidic-based platforms that can separate cancer cells from healthy ones. Once we catch them, we use the Raman fingerprint of different molecules to profile those cancer cells and feed this information to doctors to decide for the most suitable therapy and better assess the prognosis of patients. Results and project concept have been spread to the community at several conferences and scientific events in Portugal, Spain, UK, Japan and Sweden. The feedback from the scientific community has been very positive so far, including some conference awards. Our preliminary results, the support from INL and research community, together with the hope that we can contribute to the cancer fight, encourage us to give our best to this challenging, but exciting project.

Lara San Emeterio Alvarez

As part of INL outreach activities, during two days in September we had what was called the Open House, this was a way to show the people from Braga and surroundings what we do at INL and how it is useful for society. We had an attendance of over 2000 people and we had stands with easy experiments and demonstrations showing all the subjects of research performed at INL. The researchers participated in their respective subjects, I as part of the spintronics group participated in two stands, one where we showed how nanodevices are fabricated and in another where we showed the application of one of our devices fabricated in the lab used as part of a final product. I had a very nice time and I love being able to explain science to the general public, it is a great experience and it is nice to see the reaction of people when they see how we work and what we do and they understand the experiment. This was a good time for other INLers to see what other researchers work on, since INL covers a large range of subjects from biology, chemistry, food science and physics, which are very different from what one specifically research on a daily basis, giving us the opportunity to interact and learn something different.
The Open House was a great experience and something we all enjoyed and I hope it will be repeated.



David Soriano

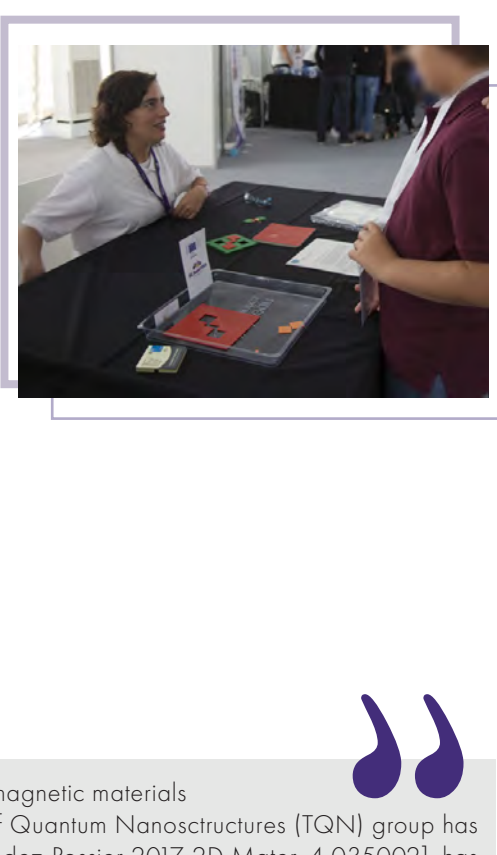
The recent discovery of two-dimensional ferromagnetic materials (CrI3 and Cr2Ge2Te6), in which the Theory of Quantum Nanosctructures (TQN) group has been strongly involved [J. L. Lado and J. Fernández-Rossier 2017 2D Mater. 4 035002], has opened new venues for the implementation of magnetic devices at the nanoscale. As a member of the TQN group, I am participating in several projects related to the optical and electrical detection of ferromagnetism in this type of materials. Regarding optical detection, we have found that vanadium diselenide (VSe2), a 2D ferromagnetic crystal with an atomic structure very similar to MoS2, is able to induce a strong valley splitting in transition metal dichalcogenides by proximity effect. Valley splitting is a fingerprint of ferromagnetism and can be detected by photoluminescence. The splitting found in recent experiments with CrI3/WSe2 heterostructures are of the order of 3.5 meV. Our calculations demonstrate a valley splitting of the order of 10 meV when substituting CrI3 by VSe2 in these heterostructures, the higher value reported so far. On the other hand, the TQN group is collaborating with an experimental group at MIT to better understand the mechanism governing spin transport in Graphene/CrI3 heterostructures. The impact of the ferromagnetic layer on the transport properties (or conductivity) of graphene is an important problem to address in order to elucidate new techniques leading to the electrical detection of 2D ferromagnetic crystals.

I have already presented these advances in two international conferences: Ab-initio spin orbitronics in Pescara (Italy) and 2D Materials and Interfaces for Spintronics in Barcelona (Spain). In the second one, I participated as an invited speaker and I had the opportunity to show my work to a broad audience working in 2D materials. Since the aim of this conference was to increase the collaboration between research centers in Spain and Taiwan, I also took the opportunity to introduce INL and start some collaborations with researchers in Taiwan.

Ashok Patel

As a known figure in my field, this year itself I have been invited to speak at 5 different conferences/meetings in 4 different countries.

I will give a brief account of one such experience as a speaker at the recently concluded São Paulo School of Advanced Sciences on Reverse Engineering of Processed Foods in Brazil. This advanced school was sponsored by FAPESP (one of the most important funding foundation in Brazilian science) and hosted by School of Food Engineering, University of Campinas. The purpose of the meeting was to invite world-renowned researchers to share their expertise and knowledge with young researchers (100 in total) who were hand-picked from all over the world. A large number of topics related to food processing, food innovations, food-body interactions etc. were discussed at this intensive course which lasted for eight days.
My own lectures on 'Edible oil structuring' were well-received and the informal sessions provided ample opportunities to network with young established researchers. Along with the multidisciplinary lectures on a wide range of topics, the school also gave the participants a chance to visit research institutions that are actively involved in the field in the state of São Paulo. Last but not least, the organizing committee made sure that the speakers were wholeheartedly introduced to the amiable local culture.



SECOND CALL

The INL opened the **second call** of the programme between **March and May 2017** to strengthen its research lines with highly qualified Research Fellows. INL received more than 200 applications from candidates of 41 nationalities. The selected researchers will join INL until December 2017.

Know more