International career development opportunities with INL

Call for Expressions of Interest for Postdoctoral Research

The International Iberian Nanotechnology Laboratory (INL) is launching a Call for Expressions of Interest (EOI) for Postdoctoral Research fellow positions. The International Iberian Nanotechnology Laboratory (INL) is an institution with an international legal status, registered at the United Nations created to foster interdisciplinary research in Nanotechnology and Nanosciences. INL is a global centre of excellence in applied nanotechnology research, aiming to attract the world's best scientists and engineers.

The selected fellows will have a chance to work on breakthrough science; will have access to cutting-edge technologies, to new state-of-the-art infrastructure and to personal career assistance. Fellows will have an opportunity for gaining international research experience as an integral part of their Fellowship, preparing them for an international career and ensuring access to high-quality research facilities.

Deadline 1st cut-off date: For expressions of interest is **30 September 2013**

Topics of Interest

- Nanostructured Fuel Cell Electrocatalysts
- Characterization of Biointerfaces by QCM and Ellipsometry Measurements
- Light scattering properties of nanostructures designed for biomedical applications
- Intra coronary plaque probing
- Cancer biomarker detection
- Nanoparticle-based metastatic cancer therapies
- Cell Biology/Biophysics/Microscopy
- Ultrafast Spectroscopy Laser Specialist
- Nanotechnologies for water and food analysis
- Nanostructured Solar Cells
- **Spin-caloritronics in magnetic tunnel junction nanodevices**

Application

In a first step, interested applicants should send CV and motivation letter to the contact person indicated under the respective topic of interest. This is a multi-stage application process that involves an **Expression of Interest** (EOI) stage, an invited **Full Application** stage and an **Interview** stage. Only applicants whose Expression of Interest is shortlisted will be contacted and invited to submit a Full Application.

Topics for Expressions of Interest:

1 -Nanostructured Fuel Cell Electrocatalysts

The International Iberian Nanotechnology Laboratory (INL) is seeking for a highly-qualified, self-motivated postdoctoral researcher to join the Group NESCS led by Dr. Lifeng Liu to work on "Nanostructured Fuel Cell Electrocatalysts". The successful candidate will be responsible for the development of alloy based electrocatalysts and non-noble metal electrocatalysts for fuel cells. The candidate should have adequate knowledge in electrochemistry, particularly in electrocatalysis, and extensive hands-on experience in synthesis of metal/alloy or carbon nanostructures, materials characterization techniques such as SEM, TEM, XRD, XPS and cyclic voltammetry, as well as elevation of electrocatalytic performance using RDE/RRDE. Experience in membrane electrode assembly (MEA) or fuel cell test at a system level is a plus, but not mandatory. The group NESCS has a number of advanced instruments for electrocatalysis research including a high-accuracy potentiostat/galvanostat, a multi-channel battery/fuel cell tester and a RRDE. In addition, the successful candidate will also be able to access other public state-of-the-art equipment such as SEM, AFM, XRD, surface area analyzer, TGA/DSC and the clean room facilities.

A successful candidate should have a PhD degree in materials science and engineering, physical chemistry, physics or a relevant field of study. The applicant should have strong enthusiasm for work, excellent communication skills and a good track-record of disseminating experimental results to scientific community. Further enquiries should be made to Lifeng liu: lifeng.liu@inl.int

2 - Characterization of Biointerfaces by QCM and Ellipsometry Measurements

The International Iberian Nanotechnology Laboratory (INL) seeks a highly qualified self-motivated postdoctoral researcher to participate in its research on "Characterization of Biointerfaces by QCM and Ellipsometry Measurements." The successful candidate will be expected to design and prepare model surfaces functionalized with biomolecules (primarily DNA) and to characterize the physical and chemical properties of these biointerfaces as well as their biorecognition activity using *in situ* and complementary *ex situ* analytical methods.

The candidate should have experience in preparing surfaces functionalized with biological molecules; experience in preparing other types of molecular or polymer films will be beneficial. Expertise in setting up and operating a combined quartz crystal microbalance (QCM) and ellipsometry system and in data analysis from such measurements is essential for this position. The candidate will be expected to use complementary surface analytical techniques, which may include infrared spectroscopy, x-ray photoelectron spectroscopy (XPS), imaging ellipsometry, and surface plasmon resonance (SPR). It will be an advantage if the candidate is familiar with solution characterization of biomolecules, such as UV-Vis spectroscopy, and with chemical and biochemical protocols employed in cleaning surfaces and in preparing biofunctionalized surfaces and performing assays.

Before the intended starting date at the INL, a successful candidate should have earned a PhD degree in chemistry, physical chemistry, chemical engineering, molecular biology, biophysics, bioengineering, or a related field of study. The applicant should have interest in working on interdisciplinary projects, excellent English communication skills, and a good track record of disseminating research results.
enquires should be directed to Dr. Dmitri Petrovykh: dmitri.petrovykh@inl.int

3 - Light scattering properties of nanostructures designed for biomedical applications.

The INL applied nano-optics group is seeking a highly motivated and skilled researcher to study light scattering properties of nanostructures designed for biomedical applications. The work will initially involve the characterization and optimization of a spectroscopic imaging ellipsometer custom designed in collaboration with the instrument manufacturer to worldwide unique specifications. Afterwards, main focus of the work is expected to shift to application of the instrument to nanostructures, thereby taking optimal advantage of the new characterization possibilities. A novel numerical computation framework for light scattering of nanoparticles will be available to the applicant for further development and validation.

The Applied Nano-Optics group at the International Iberian Nanotechnology Laboratory focuses on the development of new optical instrumentation using guiding principles derived from nanotechnology. Current team members are Adelaide Miranda, who obtained her PhD from the University of Porto in nanoparticle synthesis, and the team leader Pieter De Beule, an optical instrumentation specialist with a PhD degree obtained from the Photonics Group from Imperial College London.

The successful applicant must have obtained a PhD in Physics or Engineering in a topic closely related to optics and photonics. Experience in instrumentation development and computer scientist skills - we program in LabVIEW, MATLAB and C++ - are quintessential for this position. Good laboratory practice including laser safety knowledge is required. Further enquires for this position can be directed to Pieter De Beule: pieter.de-beule@inl.int

4 - Intra coronary plaque probing

INL seeks to hire a researcher (electrical engineer, physicist) with a strong background in instrumentation to develop an intra-coronary, catheter based, label (nanoparticle) excitation/detection system eventually compatible with the imaging systems already in use in hospitals (infrared spectroscopy, coherent optical tomography, intracoronary ultrasound). Work will be done in collaboration with the intervention cardiology groups.

The successful applicant must have obtained a PhD in Physics or Engineering in a related topic. Experience in instrumentation development is a must. Further enquiries for this position can be directed to Paulo Freitas: paulo.freitas@inl.int

5 - Cancer biomarker detection

Efforts have been made to develop efficient methods for screening and early detection of various forms cancer, yet with serious limitations. The lack of efficient methods impairs the prevention of the disease progression in a curable stage and in many cases the surveillance of cancer patients. These constraints affect the disease control and highlight the urgent need to develop novel tools and approaches for early detection of the disease especially in a pre-invasive stage. The continued search for selective cancer biomarkers (at cell or DNA level) and their detection in multiplexed microfluidic lab on chip platforms, from small blood samples or other body fluids, offers the possibility of implementing highly sensitive diagnostic tools for cancer early detection or treatment follow-up.

INL seeks to appoint a researcher to develop new methods to improve prognostics and early diagnosis of cancer. She/he should have experience in areas of nanomedicine. The work will be done in collaboration with cancer research institutions with which INL has established research links. The continued search for selective cancer biomarkers (at cell or DNA level) and their detection in multiplexed microfluidic lab on chip platforms, from small blood samples or other body fluids, offers the possibility of implementing highly sensitive diagnostic tools for cancer early detection or treatment follow-up. Further enquires for this position should be made to Veronica romao: veronica.romao@inl.int or Paulo Freitas paulo.freitas@inl.int

6 - Nanoparticle-based metastatic cancer therapies.

At the cancer therapy level, major challenges exist for metastatic cancer treatment where cancer cells spread through several organs forming small clusters of malignant cells. Challenges exist at stopping cancer progression during the various phases of the metastatic cell dissemination. Here, nanoparticle based therapies together with proper targeting strategies (organ or cell) can be studied to combat cancer spread at the various stages of the metastatic process. INL seeks to appoint a researcher with a nanomedicine background, which will work in close collaboration with nanoparticle synthesis teams at INL, and with cancer research institutes with whom INL has collaborations, studying nanoparticle based therapies for fighting early forms of cancer. Further enquiries should be made to Paulo Freitas: Paulo.freitas@inl.int or Jose Rivas: jose.rivas@inl.int

7 - Cell Biology/Biophysics/Microscopy position

The International Iberian Nanotechnology Laboratory (INL) is seeking for a highly-qualified, self-motivated postdoctoral researcher to participate in the research of the Biophotonics group on "light modulation of protein function and cellular metabolism". The successful candidate will be responsible for carrying out research on photonic modulation of cellular processes including cellular activation/deactivation of receptor membrane proteins.

The successful candidate will be responsible for carrying out research on mammalian cellular processes, including cellular activation/deactivation of receptor membrane proteins. The candidate will work with human cancer cell lines. For all cell types the research will focus on detecting the effects of UV-light on cellular EGFR dependent activation, on key metabolic EGFR dependent pathways and on cell morphology.

The candidate should have specialized knowledge about mammalian cell biology and mammalian cell culture, cellular metabolism, protein immunoassays, protein structure, protein/cell labelling with fluorescent dyes, fluorescence confocal microscopy, cancer cell metabolism and cell imaging. Knowledge in fluorescence spectroscopy of biological systems is necessary. Experience in most of the above-mentioned areas is highly preferred. The candidate is expected to have experience in data analysis. The successful candidate will be expected to carry out research on photonic control of cellular systems and biomolecules (cell/protein targeted photo-stimulation), in close collaboration with a laser specialist.

A successful candidate should have a PhD degree cellular biology, protein science or a relevant field of study. The applicant should have strong enthusiasm for work, excellent communication skills in English and a good track-record for disseminating results to scientific community. Further enquires on this position should be made to Teresa Petersen: teresa.petersen@inl.int

8 - Ultrafast Spectroscopy Laser Specialist

The International Iberian Nanotechnology Laboratory (INL) is seeking for a highly-qualified, self-motivated postdoctoral researcher to participate in the research of the Biophotonics group on "ultrafast spectroscopy of medically relevant biological molecules". The successful candidate will be responsible for carrying out research on biological systems using femtosecond laser technology and will be responsible for the daily maintenance of a femtosecond laser lab.

The candidate should have specialized knowledge in the use of femtosecond laser technology, carrying on optical alignments, fluorescence lifetime measurements (including knowledge on using streak camera technology) of proteins and other biomolecules, photo-induced electron transfer in biological systems, multi-photon excitation, and hands-on experience in the maintenance of a femtosecond laser system. Knowledge in fluorescence spectroscopy of biological systems, including proteins, is necessary. Ideally the candidate should have knowledge about protein structure and function. Experience in most of the above-mentioned areas is highly preferred. The candidate is expected to have experience in data analyses. The successful candidate will be expected to carry out steady state and time resolved spectroscopy on biomolecules, in particular on medically relevant proteins. The candidate will carry on spectroscopy studies of proteins and other molecules using, e.g., fluorescence spectroscopy and circular dichroism spectroscopy. Further enquiries should be made to Teresa Petersen: teresa.petersen@inl.int

9-Nanotechnologies for water and food analysis

INL seeks to hire a researcher with a strong background on water and food analysis for a fellow position to work in the Environment monitoring, security and food quality control department. The successful applicant should have a PhD in Food technology, Biology, Chemistry or Biochemistry and be familiar with the processes of extraction and purification of diverse compounds from complex biological matrices such as bivalves or fishes, biosensors and new detection methods validation. He/she will work within INL biotoxins group providing support for the development of new detection methods for marine and freshwater toxins based on nanotechnological approaches. Candidates should be also familiar with surface chemistry and biofunctionalization processes. Knowledge in water detoxification and/or toxicological studies will be considered a plus. He/she is also expected to carry his/her own research activities and collaborate with other

INL groups (nanoparticles, nanomedicine and nanodevices in particular). The applicant should have strong enthusiasm for work, excellent communication skills in English and a good track-record for disseminating results to scientific community. Further enquiries should be made to Begona Espina: begona.espina@inl.int

10 - Nanostructured Solar Cells

Fellow Opportunity 1:

The International Iberian Nanotechnology Laboratory (INL) is seeking for a highly-qualified, self-motivated postdoctoral researcher to join the Laboratory for Nanostructured Solar Cells to work on the "Development of microstructured solar cells for concentration photovoltaics".

The successful candidate will be responsible for the development of the localized growth of Cu(in,Ga)Se2 semiconductor material using physical and/or chemical deposition methods. The candidate should have experience in some of the following topics: Cu(In,Ga)Se2 chalcopyrite semiconductors, materials growth by physical and/or chemical deposition methods, solar cells, electron microscopy, x-ray diffraction techniques, electrical characterization, clean room semiconductor fabrication techniques.

A successful candidate should have a PhD degree in physics, chemistry, materials science and engineering or another relevant field of study. The applicant should have strong enthusiasm for work, excellent communication skills and a good track-record of disseminating experimental results to scientific community. Further enquiries should be made to Sascha Sadewasser: sascha.sadewasser@inl.int

Fellow Opportunity 2:

The International Iberian Nanotechnology Laboratory (INL) is seeking for a highly-qualified, self-motivated postdoctoral researcher to join the Laboratory for Nanostructured Solar Cells to work on "Scanning probe microscopy of semiconductor nanostructures".

The successful candidate will be perform research on semiconductor quantum dots using several advanced scanning probe microscopy methods in ultrahigh vacuum. The candidate should have experience in some of the following topics: non-contact atomic force microscopy, Kelvin probe force microscopy, scanning tunneling microscopy, ultrahigh vacuum environment, solar cells, semiconductors, quantum dots, ultrahigh vacuum equipment.

A successful candidate should have a PhD degree in physics, materials science, or another relevant field of study. The applicant should have strong enthusiasm for work, excellent communication skills and a good track-record of disseminating experimental results to scientific community. Further inquiries should be made to Sascha Sadewasser: sascha.sadewasser@inl.int

11 - Spin-caloritronics in magnetic tunnel junction nanodevices

Spin-caloritronics is a new emerging field of spintronics where thermal gradients developed in nanostructured devices can play an active role to control and manipulate spin-based effects like thermally driven spin currents and thermally driven magnetization reversal. Such effects are very promising as they would allow to improve energy efficiency in future ICT (information and communication technology) devices. Moreover, the large current densities involved in spin transfer torque (STT) effects imposes a better knowledge of the interplay of heat, charge and spin currents at such conditions.Recently, large tunneling magneto Seebeck ratios were observed in magnetic tunnel junction (MTJ) devices by the PI of this work, showing the potentiality of such devices for on-chip energy harvesting applications.

The INL Spintronics group is seeking for a highly motivated researcher to: 1.) Optimize MTJ stack configuration for future thermoelectric applications and 2.) Study thermal gradient effects on magnetization dynamics for novel spin-caloritronic functionalities. For this the candidate will grow the MTJ stacks, setup and perform dc magneto thermal transport measurements and carry

out heat current induced magnetic excitation measurements in time-resolved and frequency domain.This work will be done in collaboration with the German Metrology Institute (Physikalisch-Technischen Bundesanstalt, PTB) at Braunschweig.

The candidate should have a PhD degree in materials science, engineering or physics in a topic closely related to spintronics, spin torque effects or thermoelectric materials. Experience in instrumentation development and computer scientist skills - LabVIEW, MATLAB, C++, … - is a must. Previous experience in finite element analysis simulation – COMSOL, … - is also required. Excellent communication skills are essential. Clean-room experience will be a plus. Further enquires for this position can be directed to Santiago Serrano-Guisan: santiago.serrano-guisan@inl.int