

THE INTERNATIONAL IBERIAN NANOTECHNOLOGY LABORATORY FACTS, PROSPECTS AND STRATEGIC GOALS

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1 - Facts and Prospects

INL – the International Iberian Nanotechnology Laboratory was created by decision of the governments of Portugal and Spain in November 2005. At the time it was decided that it would function as an international research organization in the field of nanoscience and nanotechnology (N&N). With its statutes already approved in both countries, INL has a legal framework similar to that of other international laboratories located in Europe like CERN, ESO or EMBL.

During 2006 and 2007, INL went through its first stages, with the creation of an installation commission, and an international advisory board, and the definition of the initial strategic areas of research. The first facility concepts were discussed with specialized design teams in the second half of 2007 and, in January 2008, a Basis of Design (BoD) was chosen as the starting point for the design of its future campus. The campus was designed to house up to 200 researchers and associated staff, in state-of-the-art facilities. The first phase, to be completed until 2010, will include a main scientific building and a residence for staff and visiting professors. At a later stage, an incubator and a science outreach building will be added. Fig.1 shows a physical model of the future facilities, after completion of phases 1 and 2. In the second half of 2007 the first phase of a PhD grant program where INL financed PhD stipends in Nanotechnology topics in selected Portuguese and Spanish research institutions was launched. January 2008 also saw the laying down of the symbolic first stone of the future campus, in a ceremony, in Braga, presided by the Prime Minister of Portugal and the President of the Government of Spain.

Besides high quality personnel and installations, cutting-edge scientific instruments are the most important ingredient of any international laboratory. INL will include the following central laboratory facilities.

Central Micro and Nanofabrication Clean room

This facility will be built around a class 100 clean room (ca. 450m² useful area in phase 1, with expansion to 600m² in Phase 2) with dedicated bays for nanolithography (10nm minimum features, e-beam and nanoimprint), and optical lithography (direct write laser and mask aligners). The nanolithography bay is designed for stringent EMI requirements (< 40nT, from 1Hz to 80Hz) and VCE vibration standards. Apart from standard deposition/etch, wet process and thermal treatment, and characterization bays, the clean room will include a separated bay for biochemical assays and process steps, and an isolated bay for special material processing.

Central Scanning Probe Microscopy Laboratory

This laboratory will support SPM activity from standard imaging to advanced applications. A small number of standard SPMs will be available for regular imaging. An advanced facility, especially intended for biological/ biochemical applications, will provide SPM coupled with confocal optical microscopy. There will also be one SPM especially intended for the development of new techniques, supported by standard test and measuring equipment.

Central Biology and Biochemistry (CBB) facility

CBB will provide support for biology and biochemistry research groups. It will have equipment for FPLC/HPLC protein purification, spectrophotometry/ nano chop, mass spectrography with gas chromatography, flow cytochemistry and cell sorting, real-time PCR, confocal microscopy and centrifugation (ultra and low-speed) and cell culture. Supporting infrastructures, such as optical and fluorescence microscopes, down to -70°C chambers and freezers, a dark room and a sterile chamber with laminar flow are also contemplated.

Central Structural and Interface Characterization (CSIC) Laboratory

The CSIC will incorporate 4 specially designed low noise, shielded rooms, where in-house detailed structural characterization of thin films, interfaces, and nanostructures will be performed. Some of the techniques will be installed are an HRTEM with aberration control (and a possible cryogenic stage) and a dual beam FIB. The installation of an atom probe system is being considered. Two of this low noise shielded rooms are being reserved for special equipment design and test, and for low noise device test.

2. Strategic Goals

When the idea of creating INL was publicly announced for the first time in 2005, it was stated that its mission would be to implement a strong cooperation of both countries in ambitious science and technology joint ventures. So INL aims at being a common point of reference for the excellence groups of the Iberian Peninsula and a key factor in increasing the scientific collaboration between the two countries. On the other hand, most of Iberian groups are working on Nanoscience, only a few of them on Nanotechnology. Similarly to USA, Japan and other European countries, INL also aims at boosting Nanotechnology, leading to practical applications, collaboration with already existing enterprises and the creation of spin-off companies. Obviously, the fundamentals of Nanoscience will be useful for this strategy. Finally, INL will offer new equipment, not yet existing in many of the Portuguese and Spanish laboratories, and will try to complement the already existing instrumentation of both countries.

In summary, it is a strategic goal of the Laboratory to act as a cohesive and strengthening factor in both the Spanish and Portuguese N&N communities and, above all, as a link between them. Furthermore, in its earlier stages, INL will also need their support and help. To fulfil its stated mission, INL must necessarily be perceived by as an impartial and useful entity. With your help we hope to be able to succeed.



Fig 1. A physical model of the future INL campus (from the Basis of Design)