

IKERKETA
ERREKTOREORDETZA

VICERRECTORADO DE
INVESTIGACION



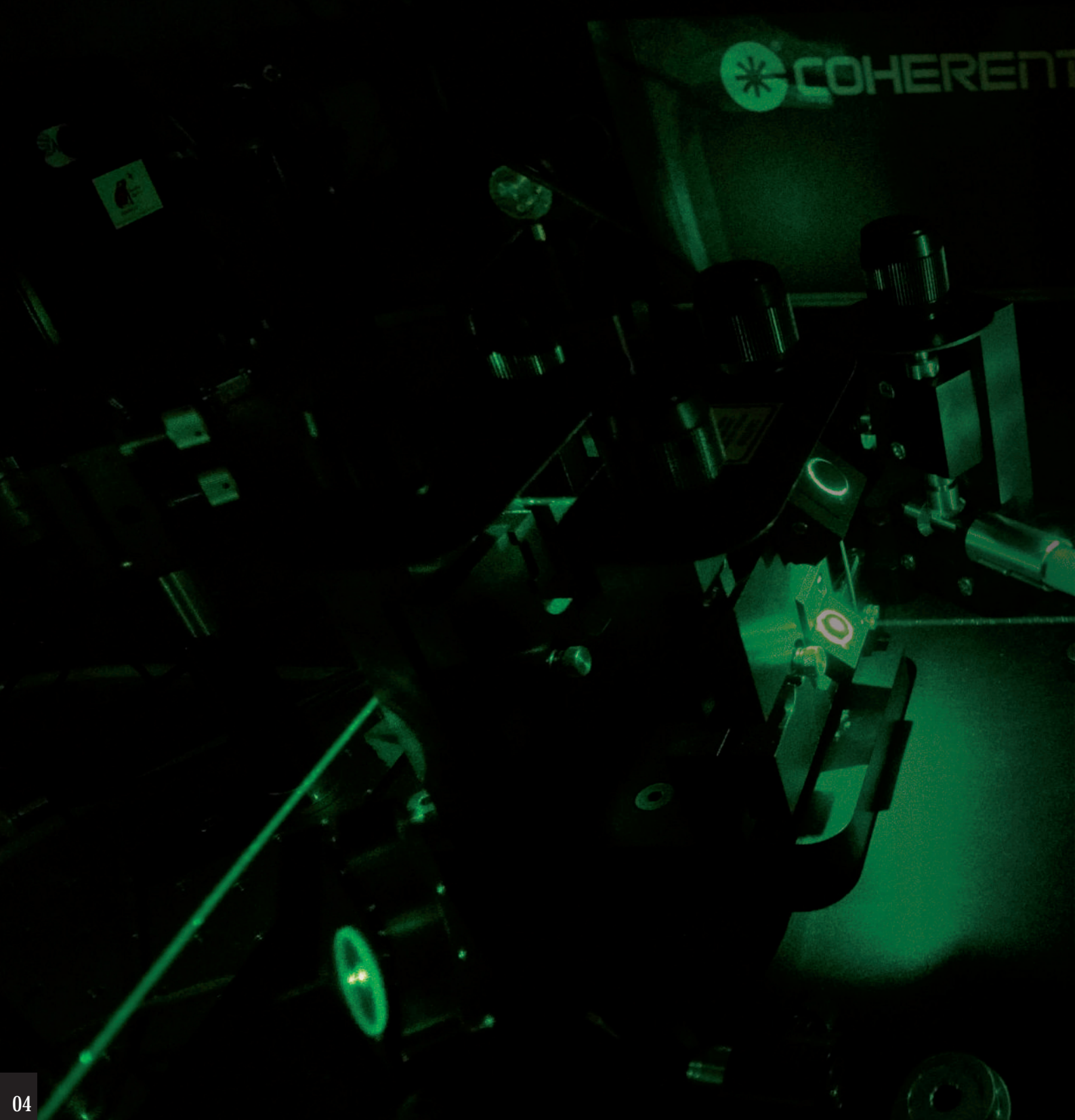
Universidad
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■ Introduction

Research and innovation at present constitute the essential driving force behind the socio-economic development of a country. Within this context, the university has become a key element in the system geared towards advances and progress and, in particular, in the transfer and assessment of knowledge to society as a whole. An attempt is thus made to help to transform the traditional economy in a relevant way into a more advanced, knowledge-based one.

We should highlight the fact that the dissemination of scientific knowledge to the rest of the social fabric manifests itself in many ways, among which can be found scientific publications, patents and licences and the promotion and creation of new businesses (EMIs). This also occurs via training and communication among the different sectors of concepts, values and opinions, promoted and contrasted through scientific-technical and academic channels.

Within this framework of activity, the General Research Services (SGIker) - In keeping with the plural nature of those agents that make up the system - provide researchers and technologists with the tools required to enable them to develop their studies via both highly-skilled technical and scientific advice and high-performance scientific-technological equipment.

The structures of this type of general service constitute a valuable resource available to universities and, in general, those centres devoted to research, in order to meet the demands of the scientific and technological community in any research related to pure science, engineering, medicine, art and social science.

The commitment on the part of the UPV/EHU to ensure it is equipped with SGIkers with specialist personnel and a state-of-the-art scientific-technological infrastructure has without doubt in turn helped to ensure that its prestige increases both within Spain and overseas - as competitiveness needs to be understood within a global context, and this goal can only be attained via excellence in terms of research and innovation.

Lastly, our thanks go to the people (technicians, advisors, users and entities) that make it possible for the SGIkers to fulfil the purpose for which they were created.



■ Maribel Arriortua
SGIker Director

■ Materials and Surfaces

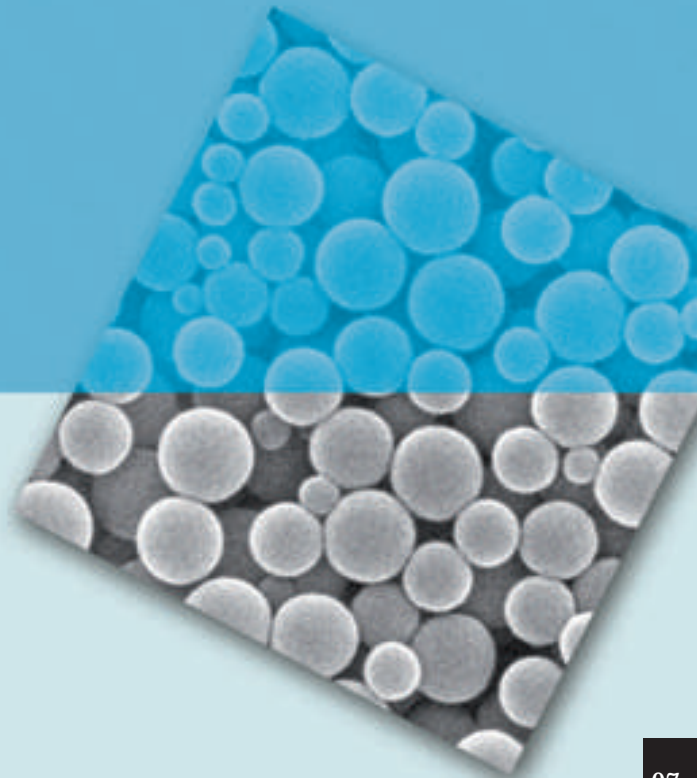
■ Polymer characterisation





Science and the Technology of Materials applied to the field of polymers is currently focused on the relation existing between the obtaining processes, the present structures and the final properties of the polymeric materials. An exhaustive characterisation of the polymeric material to be studied is needed in order to aim these relations at bigger scientific and technological development.

Microscopy is one of the most used techniques, which provides the best results when it comes to performing structural, superficial and morphological characterisation in the case of colloidal dispersion of the polymers. Therefore, the purpose of this Service is to provide the equipment, technical assistance and the specialist training in order to characterise them.



Relevant equipment

The Service's scientific infrastructure includes a transmission electronic microscope, along with the necessary equipment to prepare samples:

- 200kV and high resolution transmission Electronic Microscope. Fitted with LaB6 filament, digital image system and 70° inclination. It includes:
 - STEM Unit with clear field/dark field detector.
 - X-ray microanalysis unit (EDX).
 - Cryomicroscopy. Cooling holder with temperature control to liquid nitrogen.
 - Beryllium double tilted specimen holder
 - Single titled sample holder.
- Ultramicrotome used to cut hard polymeric materials with a Tg over ambient temperature.
- Cryo-chamber that is adjusted to the ultramicrotome to obtain low temperature cutting, indicated for soft Tg materials under ambient temperature.
- Vitrobot Mark IV to prepare samples in solution to be measured by cryomicroscopy.



Fields of application

The main services consist of the morphological study of the multi-component polymer materials and semi-crystalline polymers, and to determine the colloidal dispersion particle size. Due to the great progress in the field of analytical microscopy in recent year, a qualitative and quantitative analysis of the different components that make up the phases of a multicomponent material is also possible.

Moreover this Service adapts to new needs related to the study of new polymeric materials.



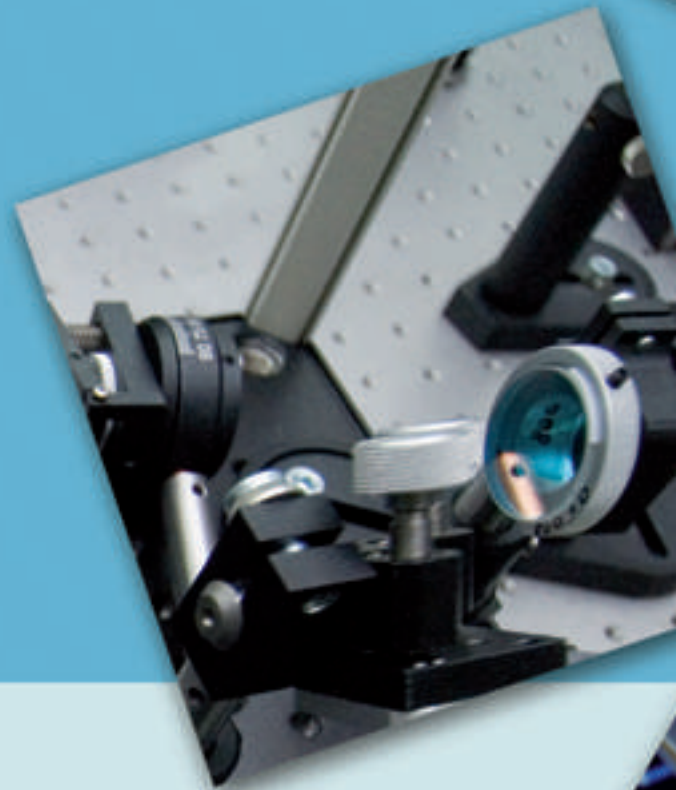
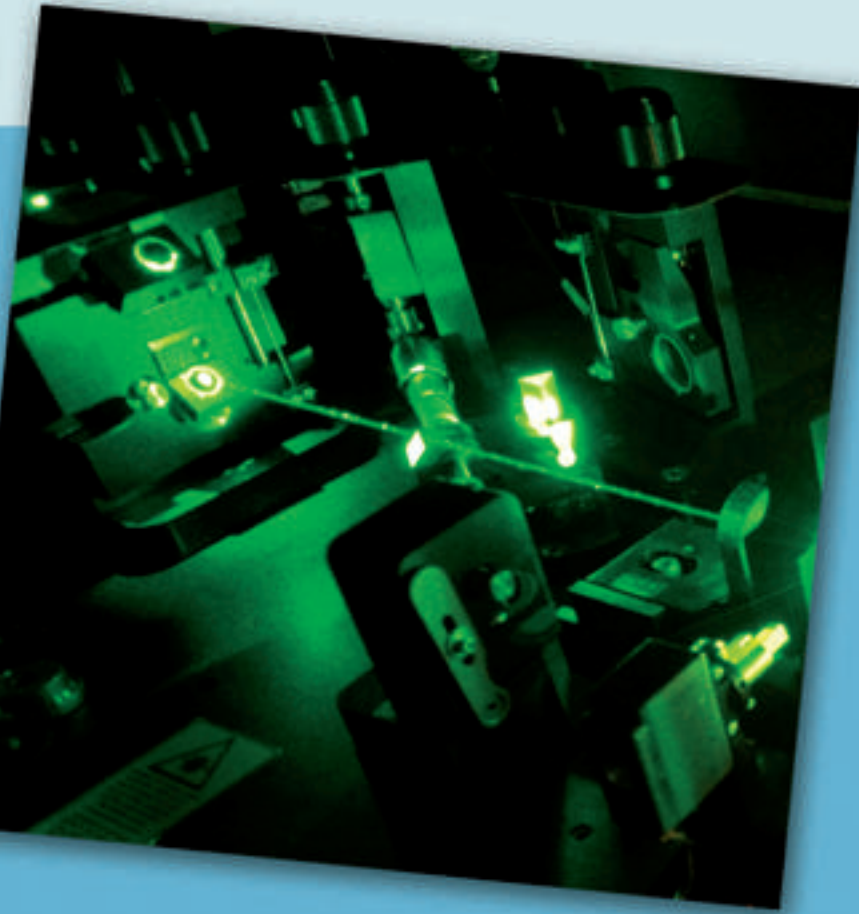
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■ Materials and Surfaces

■ Laser Facility Laboratory



$$\begin{aligned} p(A) &= 0.25 \\ p(A) &= 0.40 \\ p(B|A) &= 0.10 \\ p(B) &= 0.75 \\ p(B|A) &= 0.30 \\ p(A|B) &= \frac{p(A \cap B)}{p(B|A)} = \frac{p(A) \cdot p(B|A)}{p(B|A) \cdot p(A)} = \frac{(0.25)(0.10)}{(0.75)(0.30)} = 0.4444 \end{aligned}$$

Laser technology has developed greatly since the appearance of the first device in 1960, based on the stimulated emission of the ruby laser. Different advances in the field of optics have enabled laser radiation to be obtained from infrared to soft X rays, in light pulses of nearly any duration (up to the physical limit of a single oscillation of the electrical field). The special characteristics of these sources have made them essential tools in fundamental studies, among others, of chemistry, physics and biology, and have allowed applications of interest to be developed in other fields, such as the science of materials, electronic engineering, optic communication, and even medicine.



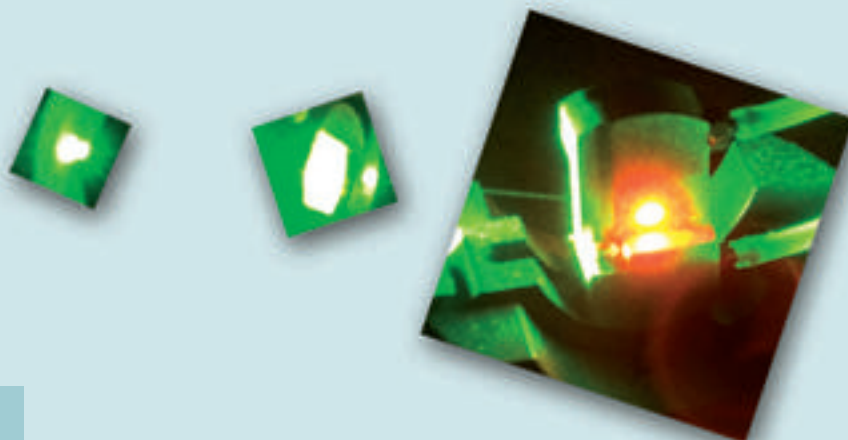
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Relevant equipment

The equipment of this SGIker unit consists of a full set of nanosecond lasers (excimer lasers, Nd:YAG, different VIS-UV syntonizable colouring systems, etc.) of a ultrashort pulse system. This femtosecond laser consists of an oscillator and a Ti:zafiro regenerative amplifier whose output is a pulse train of 40 fs. and 2 mJ. Frequencies can be reached of around 10^{14} W/cm² by means of moderate focalisations. Furthermore, the femtosecond equipment includes an OPA with a synchronizable output in the 240-2100 nm interval. In the short term, it is planned to extend the system to enable synchronisation of up to 200 nm.

The Laser Facility also has at its disposal the necessary instruments to carry out spectroscopy experiment in supersonic jets, laser ablation of metals, PLD, etc.



Range of services

The Laser Facility Laboratory provides the necessary technology and knowledge to apply ultrashort (femtosecond) and ultraintense laser pulses in order to resolve different scientific and technological problems.

Research:

Over recent years, the Laser Service has provided technical support for different research projects:

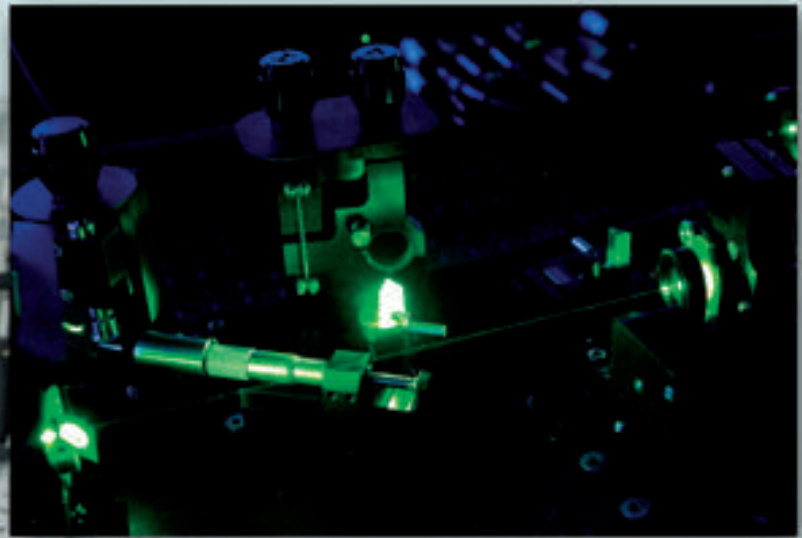
- Time-of-flight mass spectrometry resolved in time. This appliance is used to study any type of photophysical processes, with femtosecond resolution, of samples in supersonic molecular beams.
- Upconversion fluorescence system, which enables previous studies to be extended to condensed phase samples.
- Quantum dot spectroscopy.
- Optical characterisation techniques of liquid crystals by means of second harmonic generation with ultrashort IR pulses.
- Micro-machining line.

In addition to the available equipment and the described experiment techniques, the Laser Facility provides technical support for instrumentation development and a general advisory service on ultra-short pulse lasers and their applications.

Fields of Application

Nano and femtosecond laser applications are of great strategic and fundamental interest in different areas of science and technology. Here are just some of them.

- Femtosecond spectroscopy.
- Laser spectroscopy (REMPI, ZEKE, LIF, etc)
- Alabation of metals, alloys and oxides.
- Proteomics and metabolomics (MALDI technique).
- Molecular and atomic coherence.
- Coherent control of chemical reactivity.
- Tin intensity phenomena: barrier suppression ionizing, high order harmonic generating, etc.
- Photonics, in general.
- Non-linear optics.



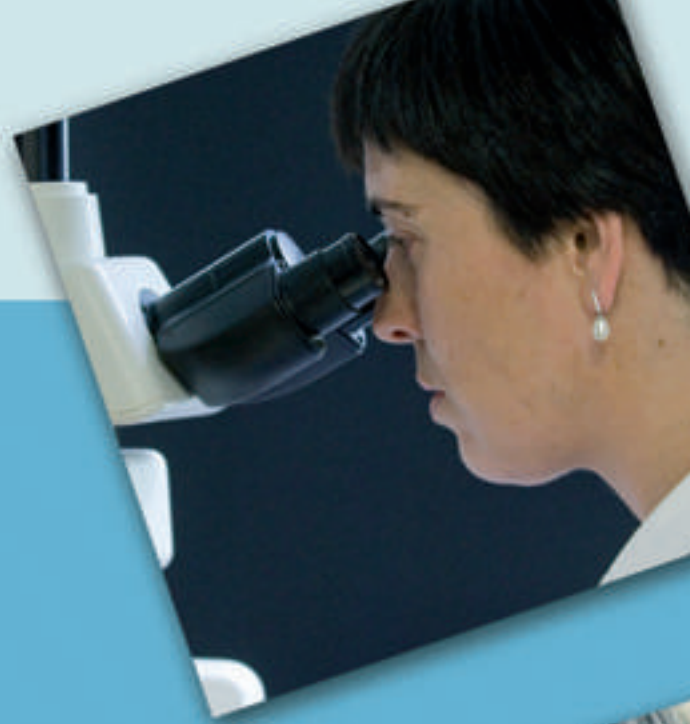
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■ Materials and Surfaces

- Geochronology and Isotopic Geochemistry



GEOCHRONOLOGY AND ISOTOPIC GEOCHEMISTRY GENERAL RESEARCH SERVICE

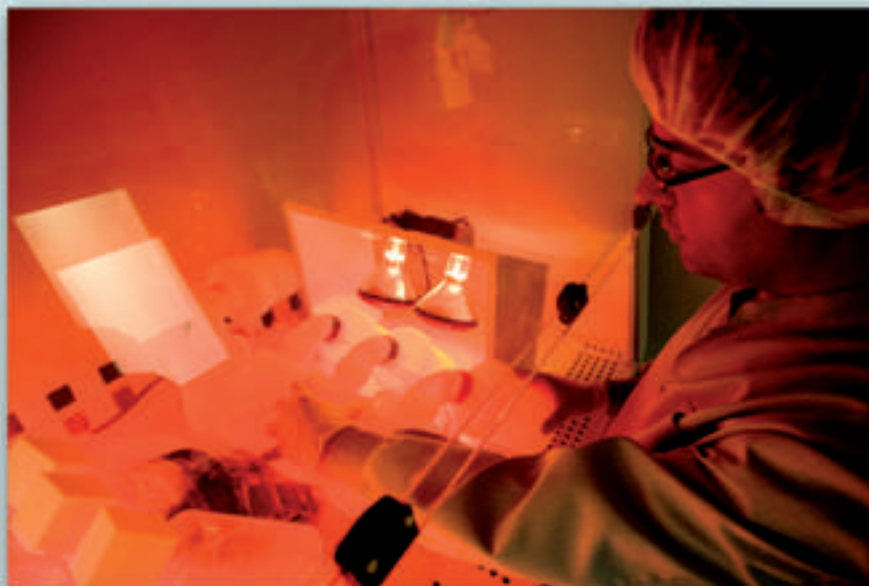
The Service provides isotopic and elemental analysis of synthetic and natural products requested by researchers and technologists belonging to the academic community and nationwide and worldwide private and public institutions. The main fields of applications of the analysis performed, among others, are:

- The absolute dating of extraterrestrial and terrestrial materials and mineral deposits and rock geochemical studies.
- Control of contaminants, toxicology and nuclear safety.
- Climate change studies and variations in the water composition and atmosphere over time.



Relevant equipment

- Magnetic sector mass spectrometer with inductively-coupled plasma source and multi-collection (MC-ICPMS), equipped with 9 Faraday boxes and 9 ion multipliers, with optional interphase for dry plasma and double desolvation system.
- Magnetic sector thermal ionization mass spectrometry (TIMS), fitted with 8 automated Faraday cages, optic pyrometry, secondary electron multiplier for RPQ and ion counting.
- Inductively coupled plasma quadrupole mass spectrometer (Q-ICP-MS), fitted with collision cell and Xi interface for environmental analysis.
- Laser ablation coupled spectrometers (Q-ICP-MS and MC-ICP-MS) for isotopic and elemental microanalysis.
- Mineral crushing, grinding and separation (crushers, ring and disk grinders, Wifley table, dense liquids, magnetic separators, abrasion, etc.).
- Ionic chromatographer to analyse anions or cations with chemical suppression and sample processor with line ultrafiltering.
- White room to process samples equipped with laminar flow booth, solution equipment, heavy, sub-boiling distillation in quartz and teflon.
- Equipment to prepare samples (including microwave digestion and automatic fusion equipment).



Range of services

- Isotopic and elemental quantitative analysis.
- Analysis of trace and major elements (including rare soils).
- Rb, Sr, Sm, Nd, U and Pb concentration and isotopic analysis for radiometry or as material tracers such as rocks, minerals, metal ores, archaeological alloys, fossils, hypersalinated and fresh water, rock wool, dregs, filters (PM10, PM2.5) bone remains, teeth, etc.
- Training by means of specific courses. Support for various degrees and Master's degrees.

GEOCHRONOLOGY AND ISOTOPIC GEOCHEMISTRY GENERAL RESEARCH SERVICE

Fields of application

- Anthropology.
- Archaeometry.
- Sciences of the Materials.
- Earth Sciences.
- Environment.
- Biomedicine.



Location and contact details

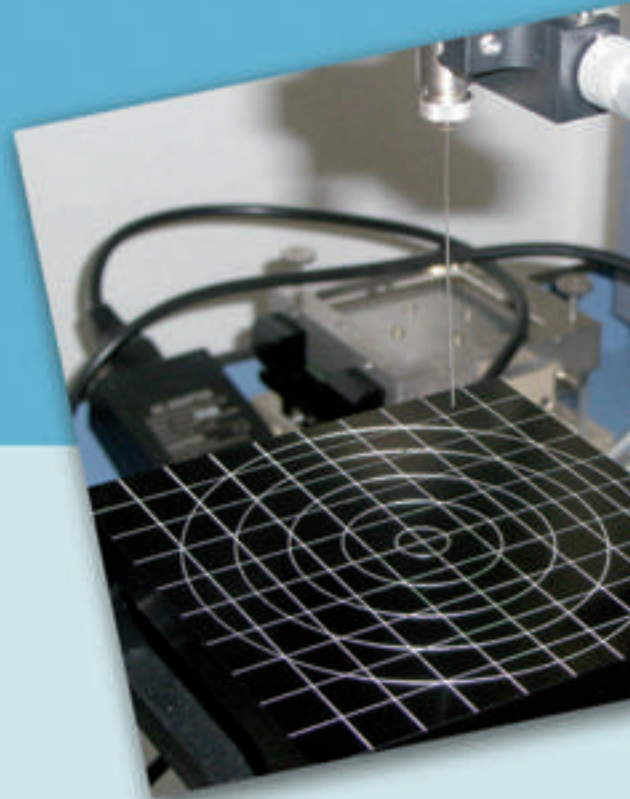
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■ Materials and Surfaces

- Nanotechnology - Mesostructure - Macrobehaviour



This Service facilitates the clarification of the final behaviour relations of parts, performed using different manufacturing technologies with different types of materials, with their inner micro and mesostructure. Right from the start, it has strengthened the area of composite materials and nanotechnologies for different applications.

Its mission is to facilitate optimising manufacturing (micro) technologies and parts made using multicomponent materials, offering services that range from the nano level of the materials to their macrostructure. It is aimed at the meso-micro-macro analysis of material in relation to the production processes used, that is, to the characterisation of their structure-final behaviour relation given the process variables used.



Relevant equipment

Microscopies:

- Atomic Force Microscopy.
- Confocal Microscopy.
- Optical Microscopy.

Molecular Dynamic, Rheological, Electrical DMA and Viscoelastic Behaviour:

- DMA Dynamic-Mechanical Analysis.
- Viscoanalyser.
- DRS Dielectric Relaxation Spectroscopy.
- Ares – Rheometrics with coupled Optical Microscopy and Dielectric Equipment.
- PVT 100 Equipment + Thermal Conductivity.

Thermal Analysis:

- Differential Scanning Calorimetry (DSC).
- TGA/SDTA Thermalgravimetric Analyser.

Optical Properties:

- Semilab Ellipsometer.

Mechanical Analysis:

- Instron (different accessories), mechanical testing.
- Miniature mechanical testing.
- Impact instrumentalized pendulum.

Sample preparation:

- Ultramicrotomics.
- Microtomics.
- Spin Coating.
- Dep Coating.
- Pneumatic sample cutter press.
- Sundry (polishers, cutters).



Range of services

The Service has different units (Microscopies; Molecular Dynamic, Rheological, Electrical and Viscoelastic Behaviour; Thermal Analysis; Mechanical Analysis and Preparing sample associated to the other Units).

Education and training by means of specific courses. Educational support for various UPV/EHU degrees and Master's degrees.

Fields of Application

The scientific-technical infrastructure of this General Service enables analysis to be performed in the following areas:

- Nanostructured materials, Nanocomposites, Nanotechnologies, Self-assembled structures.
- Nanolithography, nanostructuring on surfaces.
- Nanoparticles and nanotubes.
- Encapsulation, micro-electromechanical chips and systems.
- Medicine appliances, molecular component appliances, biotechnological and biological applications.
- Liquid crystals, dendrimers.
- Catalysers.
- Topographic measurements, roughness, even in soft samples, study of surface properties of materials from atomic to micrometric level.
- Interface study.
- Preparing samples for their subsequent microscopic analysis, both for fine and ultrafine preparations.
- Adhesives, paints, varnishes, lacquers and coatings in general: modifications, new formulas, drying conditions, appearance of defects (pores, cracks, cracking, weakness).
- Optimising manufacturing processes.
- Optimising processing conditions (injection, extrusion,...): avoiding the appearance of surface defects (uniform distribution of colouring and pigments, black spots, wrinkling, flow marks,...).
- Load dispersion, reinforcing.
- Effect of the coupling agent efficiency, surface treatments.
- Corrosion of metal parts: effect of the atmospheric conditions, surface ageing.
- Acoustic insulation (damping).
- Fatigue: appearance of cracks and micro-cracks.
- Composite materials: fatigue behaviour, atmospheric agents.
- High-frequency dielectric, printed circuits.
- Others that can be studied on request.

Location and contact details

Donostia Politécnica School

Facilities:

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Equipamiento instrumental 02A3

Laboratorio I+D OAA4

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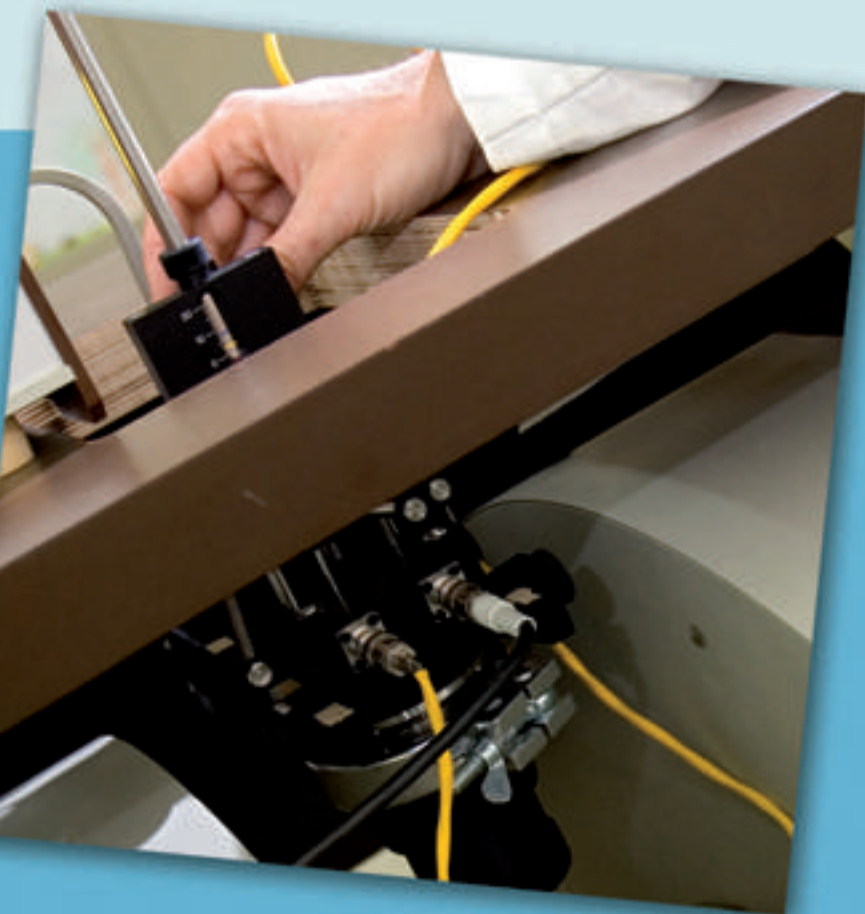
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■ Materials and Surfaces

- Magnetic Measurements General Service



Research in Physics, Chemistry, Biochemistry and the Science of Materials require proprieties to be characterised and determined more accurately and reliably. Magnetic and magneto-resistant materials, superconductors, rare-earth-doped glass, etc. are among the new materials that are widely used in electronics, communications, the car industry, household appliances, etc. On the other hand, research into new physical phenomena and new materials at low temperatures, and low magnetic fields is now routine in the majority of international and national centres.



Relevant equipment

- SQUID magnetometer with 7 Tesla superconductor magnet (MPMS-7T, temperature: 2K-400K).
- VSM magnetometer with 14 T superconductor magnet (CFM cryogenic, temperature: 2K-325K).
- VSM magnetometer with 9 T superconductor magnet (PPMS, temperature: 2K-325K).
- VSM magnetometer with 2 T electromagnet (temperature: 150K-1000K).
- Spin resonance magnetometer in X band (9GHz, temperature: 4K-500K).
- Spin resonance magnetometer, Q band (30GHz) (temperature: 4K-300K).
- Spin resonance magnetometer in L and S band (gas, 3.5GHz, ambient temperature).
- Hysteresis cycle inductive tracer with 30 mTesla Helmholtz coils, DC at 50 HZ, (ambient temperature).
- Kerr effect surface magnetising magnetometer (MOKE) with 0.4 Tesla electromagnet (ambient temperature).
- Resistivity measurements with 14 T superconductor magnet (temperature 2K-325K).

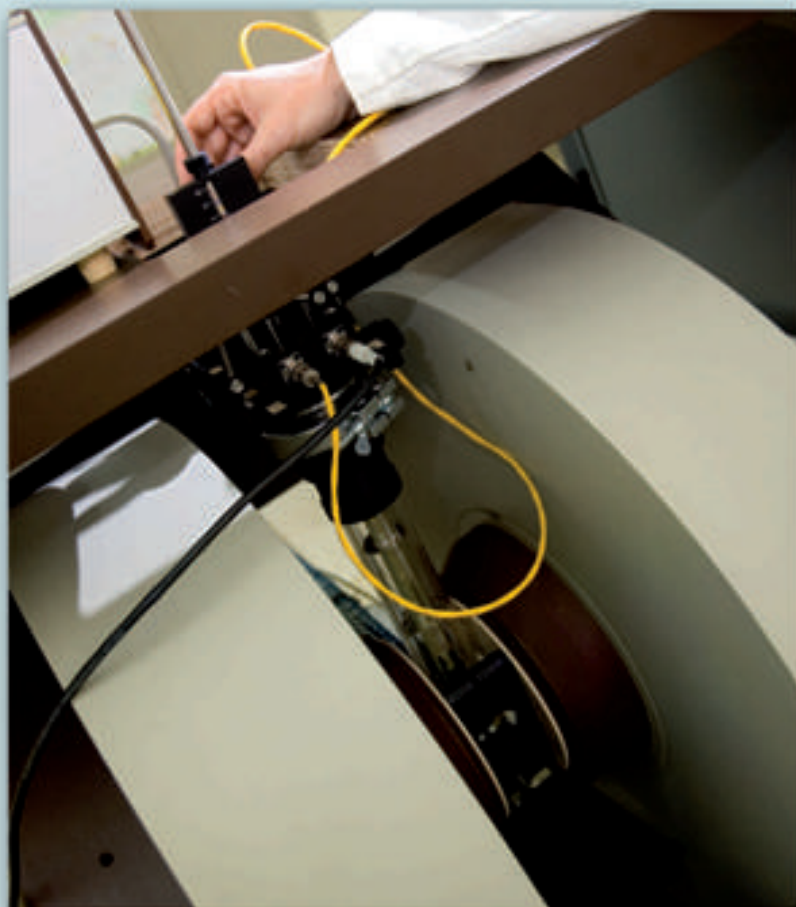
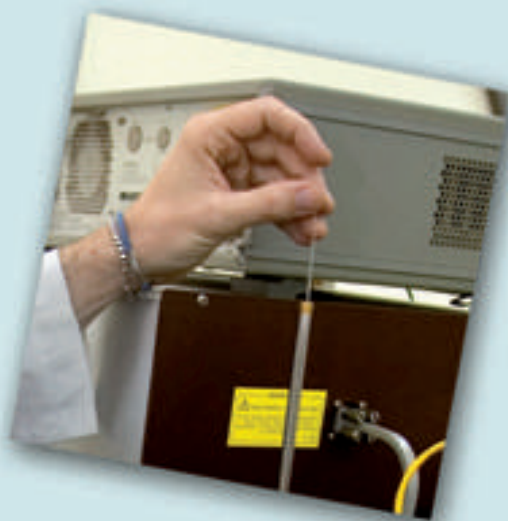


Range of services

- Measuring magnetization and susceptibility according to the temperature.
- Determining transition temperatures (Curie, Neel).
- Determining gyromagnetic factors, splitting metal ion levels.
- Magnetic particle size for studies of small oxide, metal particles, etc.
- Magneto-resistance and resistivity.
- Measuring hysteresis cycles, permeability, coercivity, for soft materials and permanent magnets.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

Fields of Application

- Characterising magnetic materials for electrotechnics: magnetic sheeting, permanent magnets.
- Characterisation of paints, tapes and other magnetic recording media.
- Characterising magnetic thin film.
- Study of phase transformation and coexistence in magnetic materials.
- Determining transition metal impurities, free radicals, etc...
- Analysis of organic radicals and composites.



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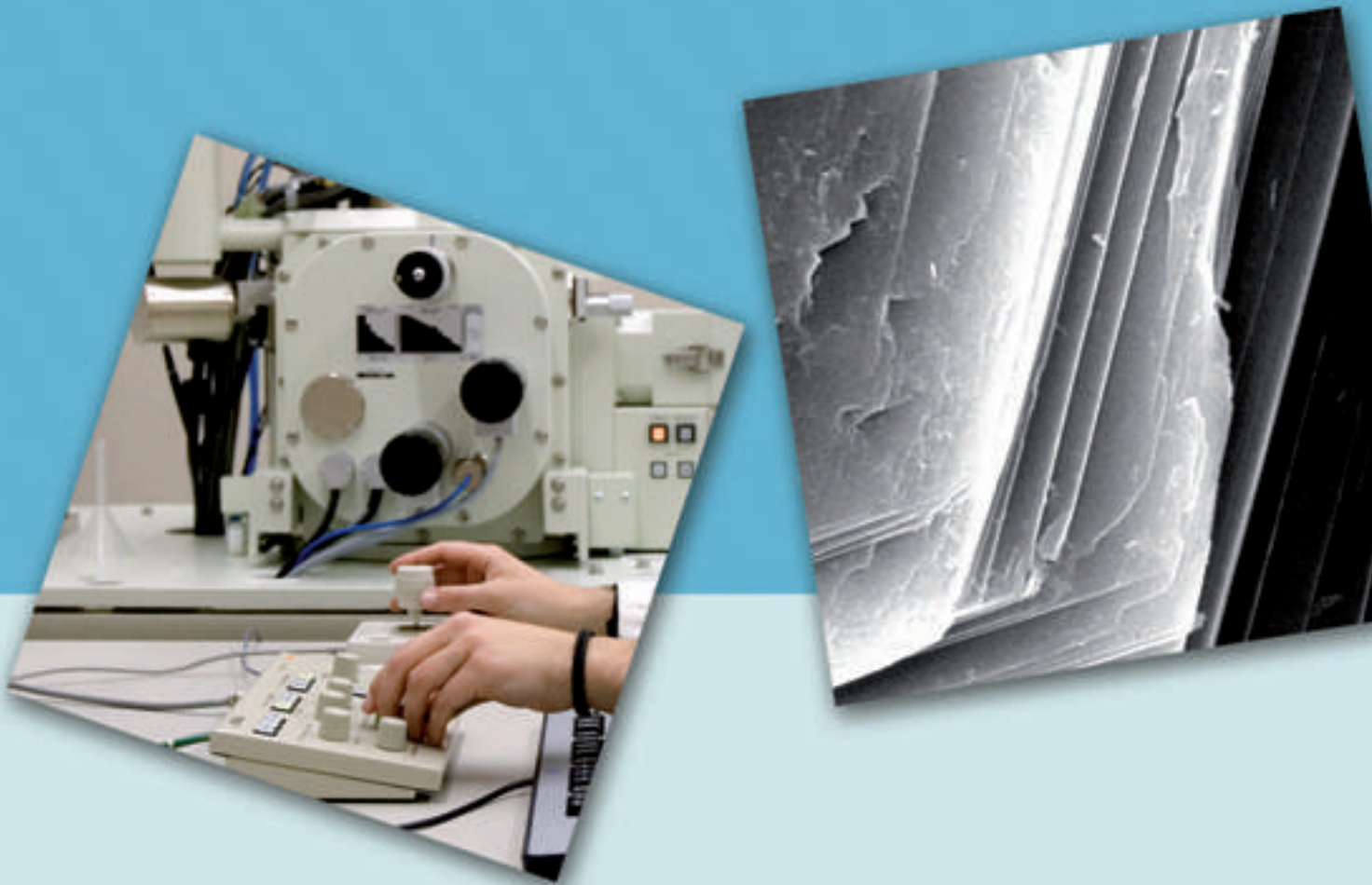
■ Materials and Surfaces

- Electron Microscopy and Materials Microanalysis General Service



ELECTRON MICROSCOPY AND MATERIALS MICROANALYSIS

The Electron Microscopy and Materials Microanalysis Service has the appropriate infrastructure for the microstructural characterisation of materials both for bulk samples (microanalysis and sweeping electronic microscopy) and for thin samples (microanalysis and transmission electronic microscopy).



Relevant equipment

- Sweeping Electronic Microscopy with W filament, 3.5nm resolution, consisting of:
 - Secondary electron detector.
 - Retro-dispersed electron detector.
 - Microanalysis using R-X photon energy (EDX) (with 133ev resolution and with Berilio window).
 - Microanalysis using wave length of the R-X photons (WDX) with two spectrometers with two crystals each.
 - The whole unit can be used in fully automated mode (including the plate).
 - Special plate to work with thin sheets, in the same way as in microprobe (with transparency lighting of the object)
- Transmission Electronic Microscope with a LaB₆ filament, 2Å resolution, consisting of:
 - EDX microanalysis, with super-ultra-thin window for light elements and 137.4eV resolution.
 - TV camera and CCD cameras of high resolution image acquisition.
 - Double tilt sample holders.
 - Rotation-tilt sample holders.
 - Single-tilt sample holders and Berilio single-tilt sample holder for microanalysis.
 - Heating double tilt sample holders (Gatan 652 model) with temperature adjustment up to 1000 °C.
 - Double tilt sample holders with temperature control up to liquid nitrogen temperature.
 - Remote control system with automatic setting and recovery programmes of the positions and "in situ" orientation of the sample.
- Schottky type field emission sweeping electronic microscopy Resolution at 30KV, in secondary electron mode, 1.2nm.
 - Secondary electron detector.
 - Retro-dispersed electron detector.
 - Microanalysis using the R-X photon energy (EDX).
 - Retro-dispersed electron diffraction detector (EBSD).
- Sample preparation equipment for Sweeping Electronic Microscopy (Bal-Tec SCD-004 sputtering unit; Carbon coating unit).
- Sample preparation equipment for Transmission Electronic Microscopy fitted with:
 - Evaporator for preparation of grilles.
 - Ultrasound cutting system.
 - Concave dimple grinder.
 - Ion pumping system.
 - Cleaner by plasma.

Range of services

The Service offers the possibility to obtain micrography images using sweeping electronic microscopy, both of the topography of a surface (fracture facies, coatings, micro-threads, etc.) and of atomic number contrast images (samples with different compositional phases) or crystalline contrast images (polycrystalline sample with uniform composition). It also carries out qualitative (the chemical elements in each of the phases) and quantitative (chemical formula of each phase) microanalysis of multi-phase samples. The microscopy can also produce element maps (distributions in a multi-phase region of the sample or in a phase whose composition can vary) and linear sweepings (intensity profile of each element along a line specified by the user, which is useful, for example, when segregations exist).

Training is provided by means of specific courses and educational support for various degrees and Master's degrees.

Instrumental techniques used

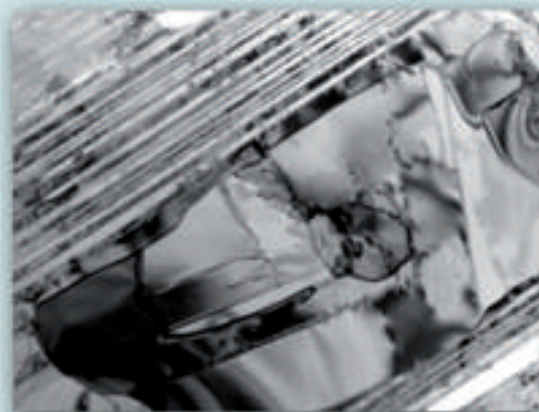
- Sweeping electronic microscopy with EDX and WDX.
- Transmission electronic microscopy with EDX.
- High resolution sweeping electronic microscopy with EDX and EBSD.

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■ Materials and Surfaces

■ X-ray

◆ General Service Materials and Molecules Unit

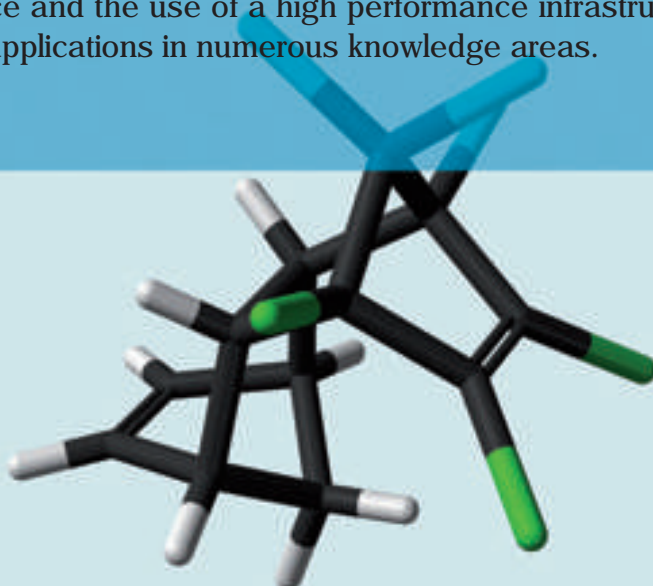


As part of the X-Ray General Service, the Molecules and Materials Analysis Unit focuses on the structural study of inorganic or organic materials, in the form of monocrystals or polycrystalline sample, under a wide range of conditions.

This unit covers all aspects of studying a crystalline structure based on monocrystal diffraction data: selecting or assembling the monocrystal, prior symmetry studies, diffraction data collection, structural resolution and the analysis of the results.

The available equipment also enables structural studies to be tackled using polycrystalline diffraction data. This technique enables the crystalline phases present in the sample to be identified without destroying it, which enables the material to be recovered without any deterioration. Its crystalline structure, the presence of residual tensions or texturation, material fatigue, etc., can be characterised in a wide range of materials. These studies are performed by means of analysing the profile of the diffractogram, by using the Rietveld method when required.

The X-ray Service: The Molecules and Materials Unit supports basic and applied research by means of technical-scientific advisory service and the use of a high performance infrastructure in analysing materials by X-ray diffraction, with applications in numerous knowledge areas.



Relevant equipment

- Monocrystal diffractometer: with four-cycle goniometer and Kappa geometry, fitted with a Sapphire 2 CDD bidimensional detector and Enhance optics that increases the X-ray intensity. It has OD helijet low temperature (10-90K) and Oxford Cryosystems Cryostem 700 (80-400K) and RKD Hotjet high temperature (300-600K), which allows studies to be carried out in a high temperature range.
- Monocrystal diffractometer: two cycle goniometer fitted with a 340 mm diameter imaging plate bidimensional detector (IP) and a large sound/noise ratio. The large size of the IP and the possibility to rotate the goniometer completely means that very high Bragg angles can be accessed (up to 137° to 2θ). It has an Oxford Cryosystems Cryostream 600 low temperature system (80–400K). Its geometry enables appliances to be adapted to vary the environmental conditions of the measurements, such as diamond cells for high-pressure measurements.
- Polycrystalline sample diffractometer: it operates with Theta- 2θ . It has a Vário (CuK1) primary monochromator and a SolX solid state detector with an energy discrimination window optimised for said radiation. It can work with flat sample automatic charger, transmission geometry of capillary samples.
- Polycrystalline sample diffractometer: it has two configurations with Theta-Theta geometry, secondary monochromator and PIXcel ultrarapid detector. A configuration operates with a 45-position automatic charger and the second is used for high temperature measurements (Anton Paar HTK 16).

Range of services

Monocrystal sample:

- Visual selection and preparation (assembly) of the crystal. The samples are accepted as previously filtered crystals or in solution, with the latter being the preferable option in many cases.
- Prior quality measures and preliminary data-taking, the moment when the monocrystal to be measured is selected, the unit cell parameters are determined, along with its symmetry (preliminary). When necessary, the ICSD and CSD crystallographic data bases are consulted with this information to determine whether the crystalline phase in question has already been determined and published in international data bases. If that is not the case, the preliminary data taking allows the most appropriate diffractometer to be selected and the measurement conditions be optimized: temperature, angular range, time,...
- Diffraction data collection. The data taking is performed at 100K by default, except in those cases when the user requests the contrary, or the preliminary data indicate the formation of an intersecting twin, non-desired phase transition, crystal degradation or any other non-desired effect when the temperature is reduced. In any case, the data taking can be performed at a wide range of temperatures (10-600K) and can be performed at different temperatures for phase transition studies.
- Data processing. The process can end here if the user has sufficient knowledge to solve and refine the structure.

- Structural resolution, tuning and results presentation (report). The results obtained are sent to the users in the form of reports, graphs and/or tables, always facilitating the source data collected by the diffractometer, along with information relating to the equipment user, measurement conditions, etc. A comprehensive CIF file, ready to be entered in the database and/or for publication, is delivered.

Polycrystalline Sample:

- Diffractogram measuring and processing: the specific diffractometer software is used to prepare the measurement programs as per the needs raised by the users.
- Phase identification: the phases are identified using specific software, combined with the ICDD PDF2-4 database, for the users that so require this service.
- Data processing for crystallinity analysis, crystalline domain size and efforts. The data processing is performed both at the level of individual diffraction maxims and by means of full diffraction diagram processing.
- Quantitative analysis: by means of the theoretical simulation of the diffraction diagrams using full profile tuning with structural model both of pure phases and for compound mixtures. This methodology requires a complex and intense data processing task, along with the registration of X-ray diffraction diagrams in high-resolution polycrystalline sample.
- Data presentation: the results obtained are sent to the users in the form of reports, graphs and/or tables, always facilitating the source data collected by the diffractometer. The users are also given information on the equipment users, measurement conditions, methodology followed to prepare samples, etc.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

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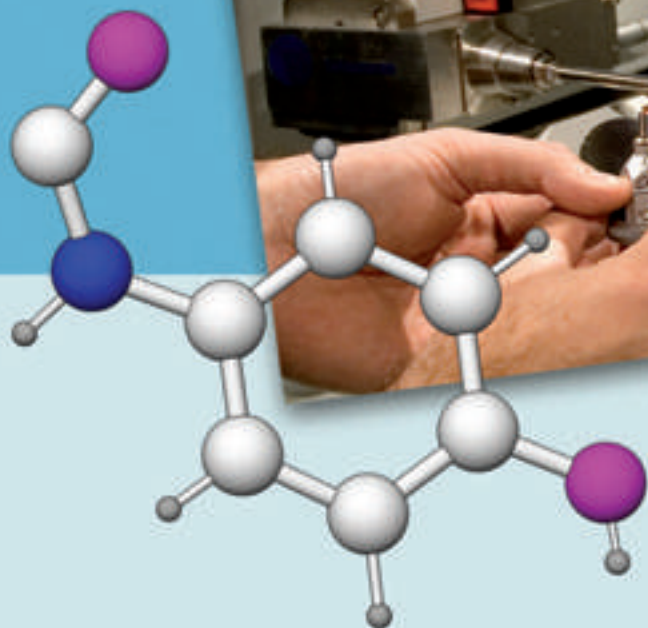
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■ Materials and Surfaces

■ X-ray

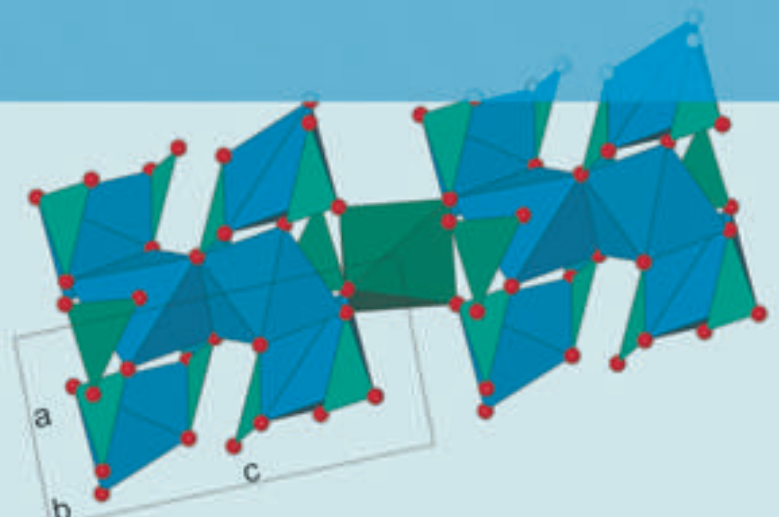
◆ General Service Rocks and Minerals Unit



The X Ray General Service supports basic and applied research in the different knowledge areas of Physical, Chemical and Geological Sciences, Sciences of Materials, Aeronautics, Pharmacy, Biochemistry, Archaeology, Palaeontology, Anthropology and Environmental Sciences. In addition provides service to the Construction, Mining Prospecting and Civil Engineering fields.

The Rocks and Minerals Analytical Unit offers a complete set of performance facilities for the mineralogical and geochemical analysis of rocks, minerals, soils and industrial and building materials, and also archaeological and paleontological remains. It has equipment at its disposal for all phases of sample preparation which is adapted to applied analytical techniques, including grinding, preparation of “bead” and “tablet” supports for X-ray Fluorescence analysis, clay laboratory for separation of fine fractions, and preparation of oriented aggregates, etc.

Among the users of this Unit are to be found different research groups from the University of the Basque Country (UPV/EHU) and also from other universities and public bodies. Numerous companies from the region also frequently request advice about the mineralogical and chemical analysis of materials of geological or industrial origin.



Relevant equipment

This Service has the necessary equipment to prepare samples, perform experiments and interpret results:

- Powder diffractometry, automated and with sample changer.
- Powder diffractometry, automated and with sample changer and PixCel rapid detector.
- X-ray fluorescence spectrometry by wave-length dispersion, automated and with sample changer.
- Laboratory and materials to prepare samples for XRD. Different format and size sample carrier.
- Laboratory to prepare samples for XRF, both in glass bead medium and in pressed powder tablet.
- Specific software for data taking using the available equipment and for processing the ensuing data.
- Muffle furnace, small laboratory equipment, certified international rock and mineral templates.

Range of services

Depending on the types of analysis that are requested the following services will be provided:

- Measuring diffractograms under optimum conditions for the purposes requested.
- Identifying minerals or other crystalline phases, estimating the crystal size using diffractograms, specific clay mineralogical analysis by means of orientated aggregate DRX.
- Chemical analysis of majority elements and trace element in geological and similar samples, including calcination loss.
- Scientific advisory service in order to combine the results obtained in this Service with those from other complementary analytical techniques.
- Petrographic studies of thin sections of rock samples for external advisory services.
- Redirection and issuing result reports.
- Training by means of specific services in conjunction with the Molecules and Materials Unit. Educational support for various degrees and Master's degrees.



Instrumental techniques used

The Service provides the scientific community with the necessary means and knowledge to perform the most common types of analysis geological and similar materials (rocks, minerals, ceramic, refractory products, industrial sands, soils, etc.). In particular, we offer:

- Phase analysis by means of X-ray diffraction (XRD), including specific clay mineralogy analysis in fine fractions.
- Chemical analysis by means of X-ray fluorescence (XRF).
- The possibility of jointly processing those types of data with those obtained using other analytical techniques applied to those materials: conventional petrography, electronic microprobe, etc.

Location and contact details

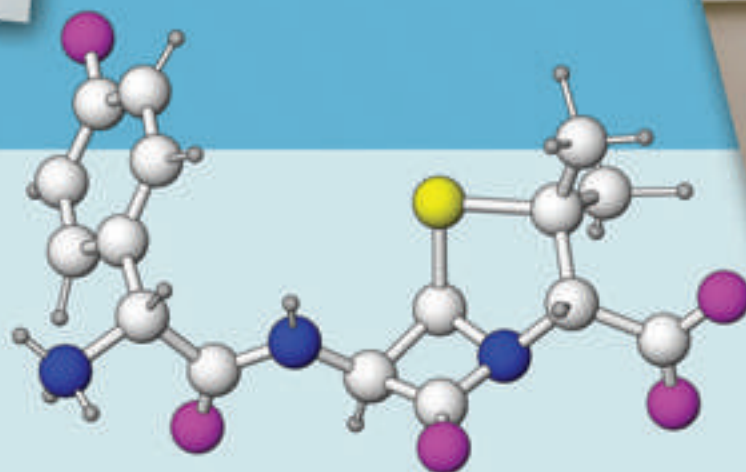
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■ Materials and Surfaces

- Nuclear Magnetic Resonance General Service (NMR)



The NMR Service mainly provides structural studies of organometallic and organic molecules, biomolecules, solid and liquid materials. The current equipment can be used for the simultaneous observation of different nuclei, including: ^1H , ^{13}C , ^{19}F , ^{31}P , ^{29}Si , ...

The NMR service has a unit on each of the UPV/EHU campuses in order to bring the services as close as possible to researchers and technologists.



Relevant equipment

The NMR Service equipment is made up of a total of eight instruments, three of which can be considered as routine (200-300 MHz, dissolved samples), exclusively used on a self-service basis for the UPV/EHU basic research. The two 500 MHz units (located in San Sebastián and Leioa), the 400 MHz unit (three channels/CPMAS) installed in Vitoria and the 300 MHz (solids) and 300 MHz (solutions; broadband probe) located in San Sebastián are used to provide external services.

- Liquid state NMR (300-400 & 500 MHz).
- Solid state NMR (300-400 MHz)



Range of services

Performing NMR spectra of different nuclei, including ^1H , ^{19}F , ^{13}C , ^{31}P , ^{15}N , ^{29}Si , ^{27}Al , ^{113}Cd ... of liquid, solution, gels or solid sample, with simultaneous observation of two or three channels and with Z axis gradients, applicable in, for example:

- Structural identification of unknown compounds by means of 1D and 2D experiments.
- Confirmation of structures and determining compositions in mixtures.
- Direct characterisation of fruit juices by means of the statistical analysis of ^1H and ^{13}C signals.
- Determining residual monomer in aqueous polymerizations.
- Determining polymers and additives in plastic formulas by means of ^1H and ^{13}C combined analysis and heteronuclear correlation 2D experiments.
- Non-chromatographic characterisation and determination of surfactants in aqueous formulations.
- Analysis of narcotic substances and adulterating agents in drugs.
- Determining enantiomeric excess.
- Determining the dissolved structure.
- Conformational analysis of peptides or small proteins in water, DMSO etc... by means of NOESY/ROESY experiments combined with molecular modelling (XPLOR).
- Monitoring reaction, kinetic, molecular association constant processes.
- Determining diffusion coefficients (DOSY).
- Determining T1 relaxation times.
- Polymorphism studies. Distinguishing polymorphs in pharmaceutical formulations by means of CPMAS (^{13}C).

Fields of Application

The NMR can be used in a wide range of industrial applications, in Food, Biomolecules, Science of Materials, Forensic Science, Pollution and Occupational Health and Pharmaceuticals. Some examples of our services are:

- Structural identification.
- Structure confirmation.
- Compound identification.
- Sample composition.
- Molecular mobility: Determining the solution conformation.
- Process, kinetic monitoring.
- Polymorphism studies.
- Determining association processes.
- High and low temperature studies.
- Determining enantiomeric excess.

Other options include studying solid samples, new materials, minerals, ceramics, aluminosilicates, resins, cements, polymers, gels, dynamic processes, structural changes with temperature, etc.

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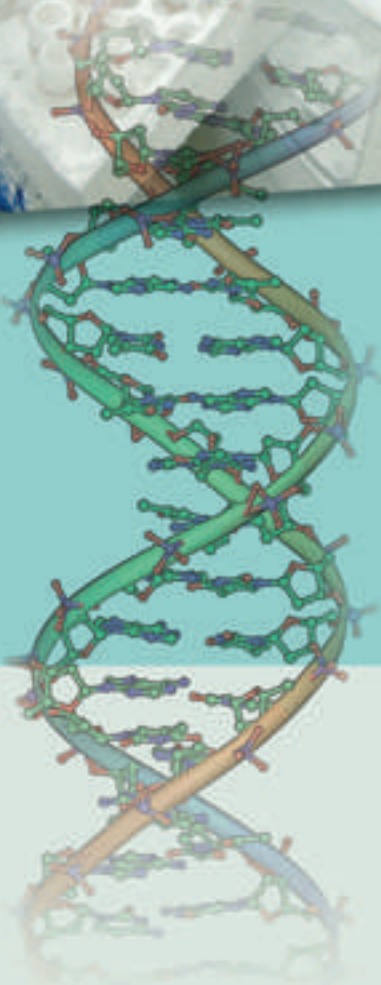
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■ Biotechnology and Biomedicine

■ Genomics and Proteomics General Service

◆ Genomics Unit: DNA Bank





The DNA Bank of the General Genomics and Proteomics Service at the University of the Basque Country (UPV/EHU) supports the basic and applied research in different knowledge areas of Biomedical, Biological, Environmental and Food Sciences, among others, along with providing input in different fields of Clinical Health.

The objective of the DNA Bank Unit is to facilitate high-quality samples, from different sources that enable a wide range of genotyping-based studies to be conducted. Genotyping is the basis of many activities related to Genomics.

Apart from sample collection, the DNA Bank diagnoses variations in the genome bases related to cancer and neurodegenerative diseases for early diagnosis, and offers better predictions regarding evolution and optimising the individual response to therapeutic treatments.

From the perspective of Food, Environmental and Biological Sciences, the DNA Bank analyses genomes of plants, animals and micro-organisms of food and agricultural interest, including the screening of genetically modified organisms, species identification in processed food and pedigrees of pets and high performance animals (dogs, horses, cats...).

The DNA Bank Unit also works as court-appointed experts to provide evidence relating to kinship diagnostics (paternity, maternity and other family links) and DNA analysis of traces in criminal proceedings.

This service is also provided in the private sector. These services are possible thanks to the DNA Bank specialising in nuclear and mitochondrial DNA, mini-satellite and micro-satellite DNA, intergene, functional and gene SNPs, and analysis using microarrays.



Relevant equipment

- Automated work stations.
- Microarray hybridization and reading system.
- DHPLC.
- Real time PCR.
- Sequencer.
- Pyrosequencer.

Range of services

- Extracting and storing DNA from different sources, such as whole blood, plasma, blood serum, leucocytes, saliva and other body fluids, hair (with and without roots), tissue from biopsies and necropsies, paraffin-embedded tissue, recent bone tissue and from archaeological sites, plant tissue, micro-organisms and processed and non-processed food.
- Separating and storing leucocytes to extract high-molecular-weight DNA and lymphocyte for their subsequent transformation.
- Collecting nuclear family trios.
- Collecting DNA samples of different pathologies.
- Collecting DNA samples of individuals without known pathologies, from different geographical origins.
- The DNA Bank is in contact with other biobanks and researchers and/or clinics. This can help with obtaining DNA from a wide range of pathologies and locations around the world.
- The DNA Bank has a wide catalogue of services, mainly relating to neuro-degenerative diseases (prion diseases, Alzheimer's and Parkinson's), oncobiology (breast cancer and head & neck cancer), obesity and pharmacogenetics.
- Biological Identification and Kinship Service for humans and animal species, such as dogs and cattle.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

Instrumental techniques used

- Manual and robotic extracting and purifying of nucleic acids.
- Managing collections of nucleic acids and mononuclear cells for their subsequent transformation into cell lines.
- PCR and real time PCR.
- Detecting mutations based on DHPLC, SSCs, pyrosequencing and analysis of DNA sequences and methylation.
- Microarray hybridization and reading.

Fields of Application

- ◆ Biomedicine
 - Oncobiology
 - Detecting hereditary and/or somatic mutations in suppressor genes of head & neck and hepatic tumours and breast cancer.
 - Loss of heterozygosity analysis (LOH).
 - DNA methylation studies.
 - Neurobiology
 - Analysis of genes related to Alzheimer's and Parkinson's.
 - Analysis of genetic alterations causing prion diseases.
 - Analysis of mitochondrial DNA.
 - Pharmacogenetics
 - Evaluation of the individualised response to therapeutic treatments.
 - Association studies aimed at identifying genomic variants that confer risks of adverse responses to drugs.
 - Genetic identification: biopsies and neo-natal.
 - Lineage and origin: establishing the origins by means of studying patrilineal and matrilineal genetic lines.
 - Forensic genetics
 - Diagnosing paternity, maternity and other family ties.
 - Identifying individuals and analysing biological traces in criminal proceedings.
- ◆ Biology and the Environment
 - Population studies of anthropological interest: Present population and Archaeogenetics.
 - Identifying plant and animal species.
 - Identifying micro-organism species.
- ◆ Food
 - Identifying species in foods (processed and raw).
 - Detecting genetically modified organisms.
- ◆ Veterinary
 - Diagnosing kinship in different animal species, such as dogs or cattle.
 - Pedigrees and genetic identification in different animal species:
 - Lineage verification.
 - Controlling affiliations.
 - Traceability of animals and their derivative products.

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■ Biotechnology and Biomedicine

■ Animal Husbandry





The aim of the General Animal Unit Service is to provide the facilities that enable laboratory animals to be used for research and other scientific and teaching purposes, provided that these are carried out in accordance with the legal regulations in force. It provides technical advice to users regarding animals used for experiments and their environment and is responsible for ensuring compliance with the regulations in force governing animals used for scientific purposes.

The General Animal Unit Service is made up of three units located on the three UPV/EHU campuses. In each of them, users are considered to be all those researchers and technologists from the UPV/EHU or from other centres or companies who need to use laboratory animals for their research and/or teaching work.

Pursuant to the legislation in force, the UPV/EHU possesses an accredited Ethical Committee for Animal Welfare (CEBA), in charge of assessing and monitoring all the research and teaching projects that require the use of animals in order for such activity to be carried out in accordance with the ethical principles and regulations in force. A favourable report issued by CEBA is essential for the use of the Service.



Relevant equipment

Vizcaya Campus

- Air conditioning system in the building to ensure suitable conditions for the upkeep of research animals.
- Area of rodent production under barrier.
- Quarantine area.
- Experimentation area for non-infectious animals divided into four sectors: rats, mice, amphibians and lagomorphs.
- Laboratory equipped with small equipment and laminar flow cabin. Operating theatre equipped with stereotaxic apparatus, surgical magnifying glasses, inhalatory anaesthetic equipment and small equipment.
- Experimentation area for infectious animals equipped with ventilated racks and bio safety cabin.
- Experimentation area for immuno-depressed animals equipped with ventilated racks and laminar flow cabin.
- Quarantine area.
- Sterilization area equipped with autoclave, Chemical vapour sterilization cabins and UV window.
- Administrative and service area.

Álava Campus

- Air conditioning system in the Animal Unit to ensure suitable conditions for the upkeep of research animals.
- Quarantine area.
- Experimentation area for non-infectious animals divided into four sectors: rats, mice, amphibians and lagomorphs.
- Treatment and experimental work area equipped with inhalatory anaesthetic equipment.
- Administrative and service area.

Guipúzcoa Campus

- Air conditioning system in the Animal Unit to ensure suitable conditions for the upkeep of research animals.
- Quarantine area.
- Experimentation area for non-infectious animals divided into three sectors: rats, mice and lagomorphs.
- Treatment and experimental work area equipped with inhalatory anaesthetic equipment.
- Administrative and service area.

Range of services

- Management and preparation of experimental lots suited to the different research projects.
- Upkeep of animals during experimentation (conventional, infectious, immuno-depressed).
- Management of genetically-modified animal colonies.
- Obtaining pregnant females (date known).
- Marking and obtaining biological samples.
- Supervision of the state and wellbeing of the animals before, during and after the experimentation.
- Specialist advice.
- Training via specific courses. Educational support for different degrees and MAs.

Fields of application

- Any research that requires the use of animals for experimentation. Also includes the use of animals for teaching purposes.
- The Animal Unit at the Bizkaia Campus specialises in the production of animals, their upkeep and the development of services to lend support to basic and applied research in the different fields of Biomedical and Pharmaceutical Areas, among others.
- The Animal Unit at the Araba Campus specialises in the development of services to lend support to basic and applied research in the different fields of Biomedical and Pharmaceutical Areas.
- The Animal Unit at the Gipuzkoa Campus specialises in the development of services to lend support to basic and applied research in the different fields of Psychology.

Location and contact details.

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■ Biotechnology and Biomedicine

■ Genotyping and Sequencing Unit





The Genotyping and Sequencing Unit of the University of the Basque Country, UPV/EHU provides qualified staff and state-of-the-art equipment, working in the field of the automatic sequencing and genotyping of DNA markers.

The unit has a laboratory designed in accordance with the new laboratory good practices recommendations. The Genotyping and Sequencing quality is also endorsed by international genetic analysis entities pursuant to different annual quality and standardisation audit of the results.

The users of the Genotyping and Sequencing Unit of the Genomics Service are researchers and technologists from the Basque Innovation, Technology and Science Network, along with biotechnological companies and Institutions from throughout Spain and Europe, involved in activities related to genetic analysis applied to basic and applied research and/or to clinical diagnostics.



Relevant equipment

This unit's high-performance equipment enables the large-scale identification of variations of the genome by means of the automated management of the necessary reactions for those analytic processes. The most important equipment are:

- Liquid dispensation robots.
- Nucleic acid extraction robot.
- Spectrophotometry and Fluorometry.
- 3 sequencers.
- Thermocyclers.
- Sequencers.
- 7900HT Fast real time PCR.
- Taqman OpenArray Platform.

Range of services

A series of services related to DNA genotyping or analysis are offered:

- Genomic and mitochondrial DNA extraction, quantification and normalisation using different tissues.
- Purifying and quantifying plasmidic DNA and PCR products.
- DNA sequencing.
- Genotyping of micro satellites, CNVs.
- SNP genotyping (SNPlex, SnapShot technologies, Taqman simple arrays or Taqman OpenArray).
- Paternity and individual identification tests in humans and animals.
- Technical support and advisory services.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

Fields of Application

Human Health and Pharmacogenetics

- Association and linking studies aimed at identifying genomic variants that confer risks of adverse responses to drugs.
- Molecular oncology: detecting mutations in oncogenes and tumour suppressor genes.
- Characterisation, diagnostics and prognostics of human diseases.

Legal medicine

- Identifying individuals.
- Paternity testing.

Veterinary and food

- Genetic identification and paternity tests for different animal species aimed at controlling affiliations and

checking pedigrees.

- Traceability of animals and their derivative products.
- Genetic identification. Referring to characters of economic importance, both productive and of likelihood or resistance to disease (QTLs, candidate genes).
- Detecting pathogens.
- Food genetic authentication.

Environmental

- Identifying plant and animal species.
- Evolution and Phylogenetic studies of organisms.
- Conserving animal genetic resources: analysis of differentiation, population structure, diversity and consanguinity of local animal populations by means of applying DNA polymorphisms.
- Agriculture. Identifying genetically modified organisms, studies of resistance to herbicides and/or pesticides.
- Controlling pests.
- Microbiology. Identifying bacterial species.
- Analysing micro-organisms in water samples.



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■ Biotechnology and Biomedicine

■ Gene Expression

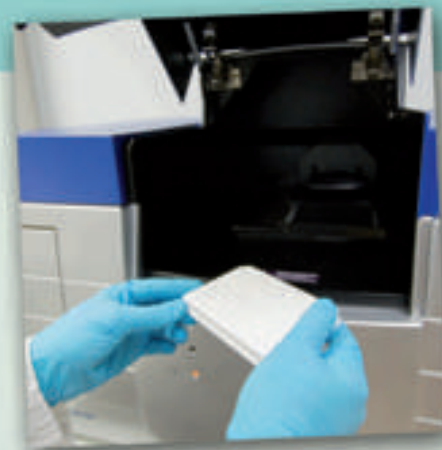




The Gene Expression Unit of the Genomics and Proteomics General Service of the University of the Basque Country, UPV/EHU, was set up in order to provide integral support, to the researchers and technologists of the Basque Network of Science, Technology and Innovation, to those of the local biocompanies, as well as to Institutions throughout Spain and internationally, in order to enable them to include the microarray and gene expression analysis technology in their scientific and technological activities. The Gene Expression Unit offers the following gene expression comparative analysis systems, along with other applications:

Quantitative PCR (qPCR) or real time PCR: measuring the gene expression by means of real time or quantitative PCR (qPCR) enables to achieve more accurate and sensitive quantitative analysis of the nucleic acids.

The Microarray Platform is one of the most advance systems and provides a high quality methodology. It offers a series of pre-designed microarrays for applications such as the monitorization of gene expression, ChIP-chip or CGH arrays (aCGH), microRNA expression; it also allows customised microarrays to be designed with the probes chosen by the client for specific studies in the relevant research field.



Relevant equipment

The Unit has all the necessary equipment to carry out a full microarray experiment, from processing the sample to validating results, including:

- Homogenizer for processing the sample (RNA extraction from tissues, blood and cell cultures).
- Plate bioanalyser, spectrophotometer and fluorimeter for quality control and quantification of the samples (DNA and RNA).
- Thermocyclers.
- Robots for large-scale liquid transfers and molecular biology protocols.
- Real time PCR system with 96 well-plate fast block, 384 well-plate block and block for the TaqMan Low-Density Arrays.
- Microarray hybridization kiln.
- Microarray scanner to obtain results.

Range of services

The Unit offers the experiments and protocols required in any project that involves the application of microarray technology, which arrange from the design of the microarray experiment; processing and quality control of the samples, processing of the microarrays and results analysis; up to the result validation by means of real time PCR:

- RNA extraction from blood, cell cultures and tissues.
- Quality control (QC) of RNA and DNA samples by means of the Agilent 2100 Bioanalyzer.
- Microarray service.
 - Advice on experimental design, statistical analysis and data mining.
 - Advice and customised array design.
 - Gene expression microarray full processing, ChIP-chip, CGH arrays (aCGH), microRNA arrays (miRNAs).
- Gene Expression analysis by means of real time PCR or quantitative PCR (Q-PCR).
 - Advisory services on experimental design; Taqman probe and primer design, and results analysis.
 - cDNA synthesis.
 - Real time PCR development on 96 plates (Fast System), 384 well-plates, and TaqMan Low-Density Arrays using SYBR Green or TaqMan specific probes.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

Research Applications

The quantitative PCR or real time PCR and DNA microarray technologies are highly useful for product research and development in areas related to biomedicine, biosciences, microbiology, veterinary, agriculture, pharmacology, biotechnology or toxicology, particularly:

- Basic research in Biology, Ecology and Physiology: gene expression profile study, validation of microarray data, studies of microRNA expression profiles, with applications in development biology; functional characterisation of the genes; evolutionary studies, epigenetic and gene regulation studies among others.
- Human Health: characterisation of the molecular mechanisms of diseases; identifying genes and variations susceptible to complex diseases; molecular classification of the diseases; molecular diagnostic; identifying predictive and prognostic value; identifying new therapeutic targets; monitoring the response to drugs when developing new therapies and treatments. Detecting and quantifying human pathogens (yeast infections, mycotics, viruses, bacteria).
- Agricultural and environmental biotechnology: environmental monitoring. Detecting and quantifying genetically modified organisms. Detecting and quantifying plant pathogens. Toxicogenomics.
- Industrial biotechnology: developing new strains with applications in the agricultural-food industry and biotechnology.
- Veterinary diagnostics. Detecting and quantifying pathogens in animals.



Location and contact details

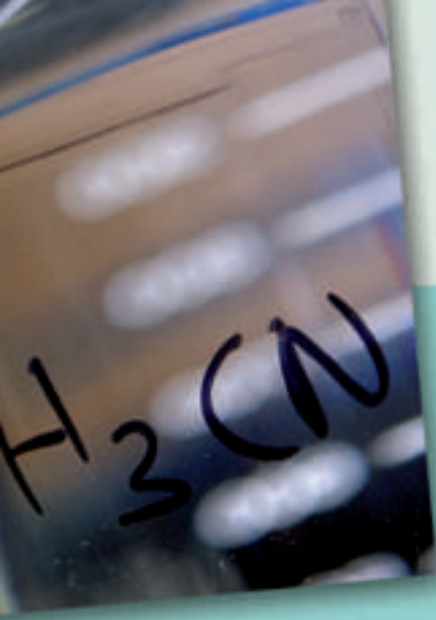
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■ Biotechnology and Biomedicine

■ Proteomics





Proteomics studies the proteome, the set of proteins that are expressed by a genome. The proteome is a highly dynamic element that varies according to the different states and conditions in which a cell or sub-cell compartment can be found. A single genome leads to the expression of different proteomes depending on the cellular state and in response to different cellular requirements.

Due to the technological advances, particularly in mass spectrometry and the development of strong bio-computer tools that enable a large amount of information to be analysed, enormous advances have been made in the proteome analysis. In recent years, proteomic techniques have become essential tools - both in basic protein characterization studies and in applied and clinical research - in the search for therapeutic biomarkers targets of many diseases.



Relevant equipment

- Electrophoresis.
- MALDI and Q-Tof mass spectrometers with MALDI and ESI ionization sources.
- Liquid chromatography systems.
- Data analysis computer applications:
 - Search engines.
 - Quantification and image analysis.

Range of services

The UPV/EHU Proteomics General Service offers a wide range of routine services and also the possibility to approach new experiments to meet the requirements of the users. It likewise provides advice on designing the experiments and preparing the samples for the users.

Its range of technological services include:

- Determining multiprotein complexes or purified protein molecular mass.
- Protein identification.
- Phosphorylation characterisation and identification.
- Proteome fractioning.
- Differential proteome studies by means of mass spectrometry.
- 2D gel differential quantification and image analysis.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.



Fields of application

The possible application of the proteomic techniques covers a wide spectrum of scientific areas.

Biochemistry, molecular biology and biotechnology. Multiprotein complexes or protein structural characterisation: measuring the molecular mass and determining amino-acid sequences, determining interaction regions between proteins, identifying proteins using samples in gel or in solution and with different degrees of complexity, identifying and characterising posttranslational modification, absolute and relative protein quantification.

Human Health: Searching for protein bio-markers associated to diseases, searching for therapeutic targets.

Environmental sciences: Identifying protein alterations caused by stress situations, identifying contamination or toxicity markers.



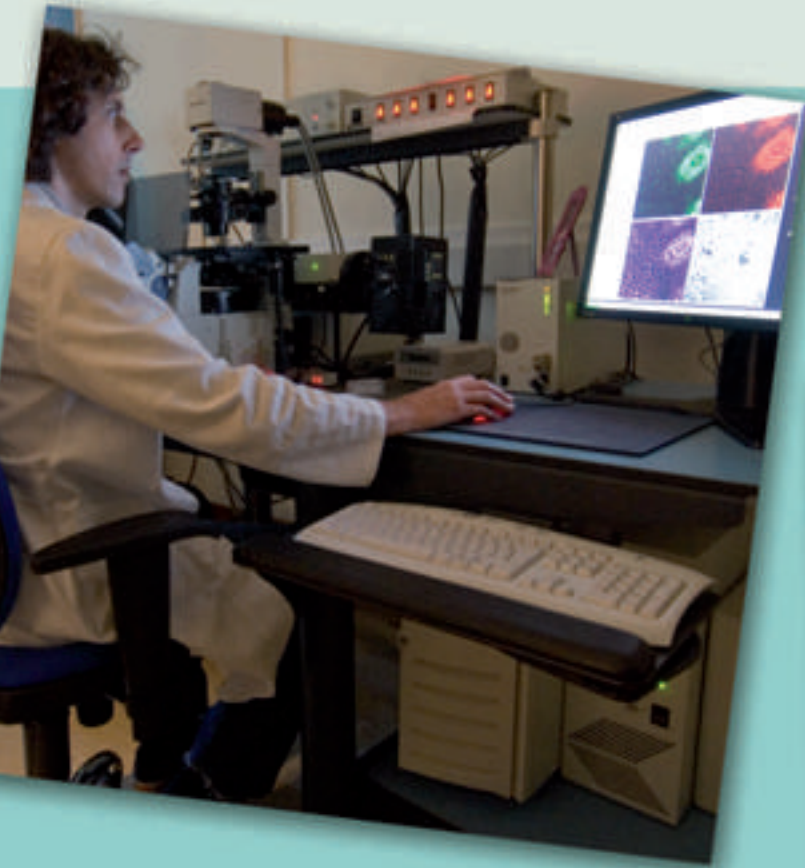
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■ Biotechnology and Biomedicine

- High Resolution Analytic Microscopy in Biomedicine General Service



HIGH RESOLUTION ANALYTIC MICROSCOPY IN BIOMEDICINE GENERAL SERVICE



The High Resolution Analytic Microscopy in Biomedicine Service provides the technical assistance, equipment and the necessary specialised training to analyse the microscopic structure of biological samples visually. The Service is organised in three operating units:

High Resolution Analytic Microscopy in Biomedicina General Service

Optical and Digital Microscopy Laboratory

Confocal microscopy, digitalised image analysis, video-microscopy, fluorescence microscopy and interferential contrast.

Electronic Microscopy Laboratory

TEM, SEM, STEM, EELS, ultramicrotomy, metal coatings, critical point drying, inclusion in resins and extensions.

Cytometry Laboratory

Flow cytometry.



Relevant equipment

- Scanning transmission electron transmission (STEM) and EELS filtered image and elemental mapping.
- Field emission and variable pressure scanning electron microscopy.
- Conventional and spectral confocal laser microscopy.
- Microscopes and fluorescence microscopes.
- Flow cytometry.
- Ultramicrotome, cryostat, vibratome.
- Gel documenter.
- Sample metal thermal evaporator.
- Critical point drying.



Range of services

- Observation and analysis of biological samples by optic microscopy.
- Observation and analysis of biological samples by electronic microscopy.
- Flow cytometry.
- Advisory services for preparing samples by the users. The techniques include: embryonic, organotypic and cell cultures, histochemical techniques, fixing, inclusion, microtomy, marking using fluorescent anti-bodies and with colloidal gold, critical point drying, negative tinction, metal coatings (gold and platinum-carbon), etc.
- Photo laboratory and computerised analysis of images.
- Micro-injection and micro-handling techniques.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

HIGH RESOLUTION ANALYTIC MICROSCOPY IN BIOMEDICINE GENERAL SERVICE



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■ Technological Support

- Servicio Central de Análisis



The use of analytical techniques by numerous research groups from the University of the Basque Country UPV/EHU and by different companies and technology centres, y from the region is becoming increasingly common, with growing requirements in terms of precision, accuracy and sensitivity, etc. There is a need on the part of numerous areas of industry, services and institutions to carry out analytical determinations with totally different objectives and purposes and in accordance with ISO quality control standards. To this end, these companies and institutions are investing heavily in the outsourcing of the relevant chemical analyses.

Within the university, the use of analytical techniques is required by numerous research groups from all areas of knowledge. The infrastructure at the Service's disposal enables a wide variety of problems to be dealt with in the field of research and technological development.



Relevant equipment

- ICP: LA-ICP-MS, HPLC-ICP-MS and ICP-AES.
- HPLC: HPLC/DAD and HPLC/FD.
- HPLC/MSD: HPLC/ITMS, HPLC/QQQ and UPLC/Q-TOF.
- GC: GC/MS, GC/QQQ, GC/NPD and GC/ECD.
- GC: ATD-GC/MS, HS-GC/MS, SPME-GC/MS and LVI-GC/MS.
- GC: GC-TOF.
- AAS: FI-AAS, GF-ZAAS and HG-AAS.
- EC: LIF-EC.
- CHNSO elemental analyzer (AE).
- IRMS.
- UV-vis-NIR: DRA.

Range of services

- Analysis of majority and minority metal ions in different matrixes: water, soils, sediments, sludge, plants, animals, urine, plasma, food, rocks, minerals, metal ores and works of art.
- Quantitative determination of anions in different matrixes: water, leaches, cement and industrial products, among others.
- Quantitative analysis of organic compounds, drugs, metabolites, natural products, fragrances, pesticides, pigments, and lipid and protein agglutinants in complex samples.
- Structural determination of organic compounds and determination of exact mass.
Identification of organic compounds via their mass spectrum and comparison with libraries.
- Training via specific courses. Educational support for different degrees and MAs.

Fields of application

Bioanalytical Area

- Analysis of drugs in pharmaceutical formulations.
- Analysis of drugs in biological fluids (plasma, urine, faeces, etc.).
- Pharmacokinetic studies.
- Metabolism of drugs.

Food Area

- Determination of metal ions in food.
- Analysis of toxic substances in foods.
- Insecticides and metabolites in fruit and vegetable products.
- Wine quality.
- Pollutants in processed foods.
- Characterization of food and agriculture products.

Geological Area

- Analysis of layout in underground water.
- Analysis of rocks, minerals and metal ores.
- Determination of metal ions.

Environmental Area

- Analysis of urban and industrial atmospheres.
- Persistence of insecticides.
- Analysis of organic compounds in contaminated soils.
- Analysis of organic compounds in sentry organisms.
- Biodegradation.

Artistic Heritage

- Determination of pigments in works of art.
- Determination of lipid and protein agglutinants.

Industrial Production

- Characterization of new materials.
- Monitoring of industrial processes which, according to the type of industry, will require the use of different analytical methodologies.
- Organic synthesis.
- Analytical chemistry.
- Chemical resistance tests.
- Studies on maintenance of industrial equipment.

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■ Technological Support

- Coupled Multispectroscopy Laboratory (Raman-LASPEA)





The analytical techniques implemented in the Raman-LASPEA laboratory are applied for the analysis of Earth Sciences, Environment, Pre-history, Fine Arts and Sciences of the Materials studies among others. The laboratory currently has a Raman confocal microscopy, SEM and FTIR microscopy, along with FTIR spectroscopy.

Molecular microscopy and spectroscopy analysis is a process that requires expensive measurement instruments. The great handicap of molecular techniques lies in the complexity of analysing the data obtained, which are not immediate and require a certain endeavour and time, but in general, they provide great analytical input and very good results.

The Coupled Multispectroscopy Laboratory provides service to a widest range of researchers, both internal and external. In addition, develops all kinds of applications and due to the existing infrastructure, automated analysis can be designed.



Relevant equipment

The Coupled Multispectroscopy Laboratory (RAMAN – LASPEA) has the following equipment:

- Raman confocal Microscopy.
- Optical Microscopy.
- FTIR spectrometry.
- FTIR Microscopy.
- SEM Electronic Microscope.
- EDS energy dispersion microanalysis equipment.
- Structural Chemical Analyser (SCA).

Range of services

The infrastructure available at the Coupled Multispectroscopy Laboratory (RAMAN-LASPEA) enables analysis to be carried out in different technical-scientific areas. Any material with covalent links can be analysed using Raman and FRIT techniques. Some of the areas of application are listed below:

Earth Sciences (Geochemistry)

- Mineral phase and rock characterisation.
- Identifying precious stones.
- Sludge study.

Fine Arts and Humanities

- Paints.
- Agglutinants.
- Sculptures.
- Strategic cuts.

Sciences of the Materials

- Studying new polymers.
- Inorganic compounds with special properties.
- Nanoparticles.

Engineering and the Environment

- Pollution mechanisms and sources.

- Monitoring chemical reactions and processes.
- Catalyser characterisation and development.

Pre-history and Ancient History

- Studying supports.
- Studying techniques to prepare archaeological materials.
- Fossils.

Biomedicine

- Studying cancer cells.

Training by means of specific courses. Educational support for various degrees and Master's degrees.



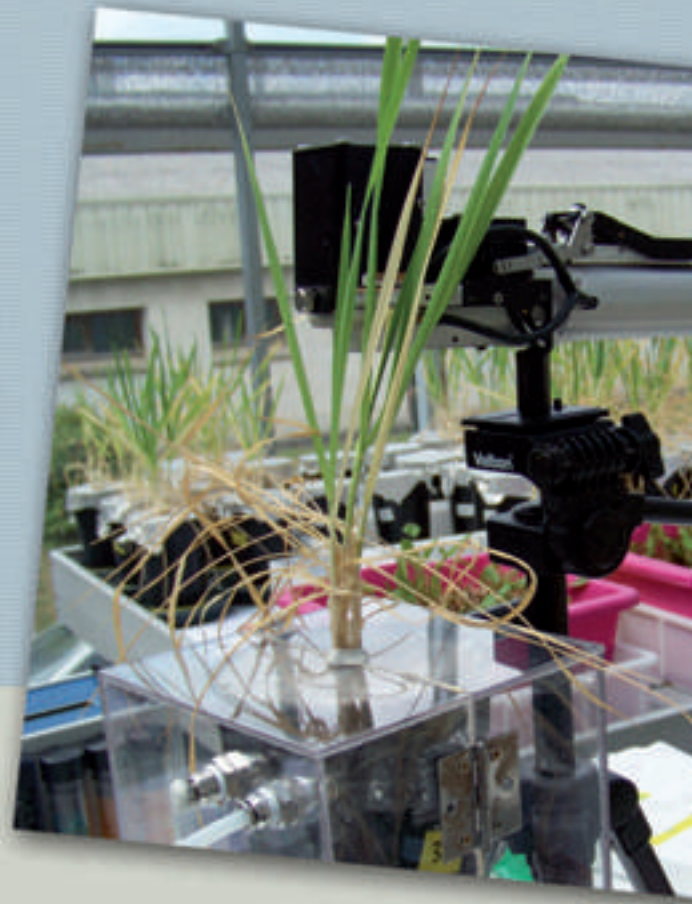
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■ Environment

- Phytotron and Greenhouse



The priority objective of the “Plant Cultivation under Controlled Conditions: Phytotron and Greenhouse” service coming under the General Research Services (SGIker) of the University of the Basque Country UPV/EHU is the plant cultivation with scientific and technological purposes under controlled conditions.

The objectives of the Service are the small-scale plant supply for research, scientific and educational purposes, together with maintaining and propagating native species. It likewise seeks to provide a scientific-technical advisory service to the university community and to researchers and technologists of other private or public entities.



Relevant equipment

The facilities are divided into 3 different areas: growing areas, plant material handling area and ionic chromatography area.

1.- Growing area

- Greenhouse The wall-glass greenhouse, with a surface area of 66 m² and 4.5 m high, is equipped with 4 moveable tables for crops, fogsystem, heating-ventilation-air conditioning, shading system by means of aluminium filter screens with automating folding and unfolding mechanism and lighting. It is also fitted with a weather station consisting of temperature, relative humidity and solar radiation sensors to control environmental conditions.
- Phytotrons There are two independent phytotron chambers, each measuring 15.4 m² x 2 m high, which are used to raise and cultivate plants under closely controlled environmental conditions. The phytotron chamber options include supplying a high light intensity (0-1000 mol photons m⁻² s⁻¹), enriching the atmosphere with CO₂, to carry out experiments at external temperatures, as well as to adjust the HR and photo-period. The phytotrons have an asepsis system that combines induced overpressures and HEPA filters.
- Crop condition management programme: The system to manage and control the climate of the greenhouse and the phytotron chambers is centralised from a PC with the CLIMAGRO specific management programmed, designed for research centres, that register all the environmental conditions for cultivating plants.

2.- Plant Material handling area

The facilities have 2 small attached yet perfectly differentiated small laboratories, that are fully fitted out with scientific equipment.

- The prep room is used to prepare crops, substrates and irrigation and nutrition solutions. It has precision scales, water deionisation equipment pH-metre, pipettes and stirrers.
- The analysis room is a small laboratory that has all the necessary material to handle, harvest, conserve and process the experimental material, as well as to take certain physiological measures. It is equipped with precision scales, pH-meter, pipettes, stirrers, liquid nitrogen containers, fridge and freezer (-20 °C)

3.- Ionic Chromatography

The analytical determination of cations, inorganic anions and organic acids of any type of plant material is performed using a DIONEX DX600 ionic chromatograph. The chromatograph is controlled using the Chromeleon 6.40 program and is fitted with an anionic exchange analytical column (AS11-HC 4x250 mm), an cationic exchange analytical column (CS 16 5x250 mm), with its suppressor and protector columns and a conductivity electrochemical detector (ED 50).

Range of services

Cultivating plant species and analytical determinations

- The Service will provide and manage the acquisition of any type of fungible material (substrates, containers, mineral elements, phytosanitary treatments, etc.) to set up and care for the crops, together with the necessary equipment to manage and harvest them.
- Management and maintenance of the premises and of the crop environmental conditions.
- Sowing plant species and growing plants for experiments and other scientific purposes, along with looking after crops, irrigation, application of experimental treatments and harvesting plants.
- Issuing a final report describing the cultivation conditions.
- The analytical determination is offered of cations, inorganic anions and organic acids by means of ionic chromatography both of samples cultivated at the UPV/EHU facilities and external samples of any type of plant tissues.
- Photo-documentation service.

Advisory service for the users

- Advisory service for the users about the most appropriate growing conditions (substrates to use, nutritional system, environmental conditions, etc.), technical help and availability of the technical staff for a successful outcome of the research underway.
- Advisory services about the planning and experimental design of cultivating the plant species.
- Advisory services about the “in situ” determination of possible physiological measurements indicative of nutritional status or the photosynthetic capacity of the plant during the experiment and biological cycle.
- Advisory service for the users about harvesting and storing the plant material according to the purpose of the study.
- The Service will periodically hold training courses for the interested users.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

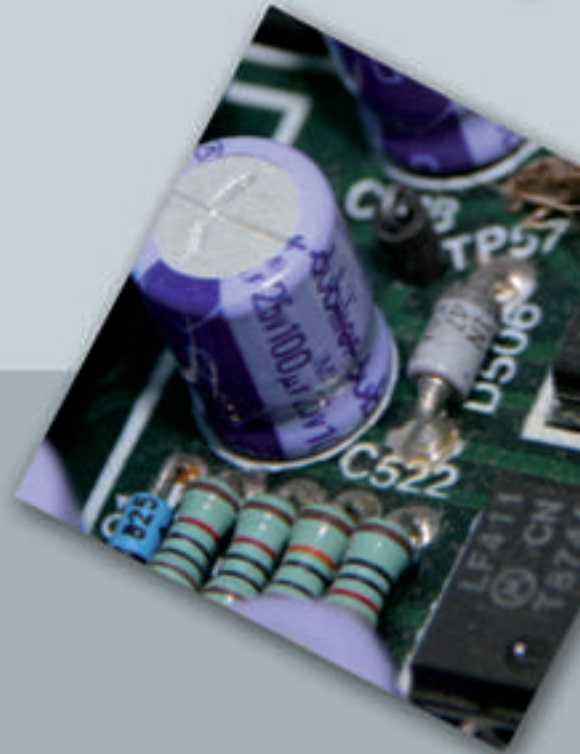
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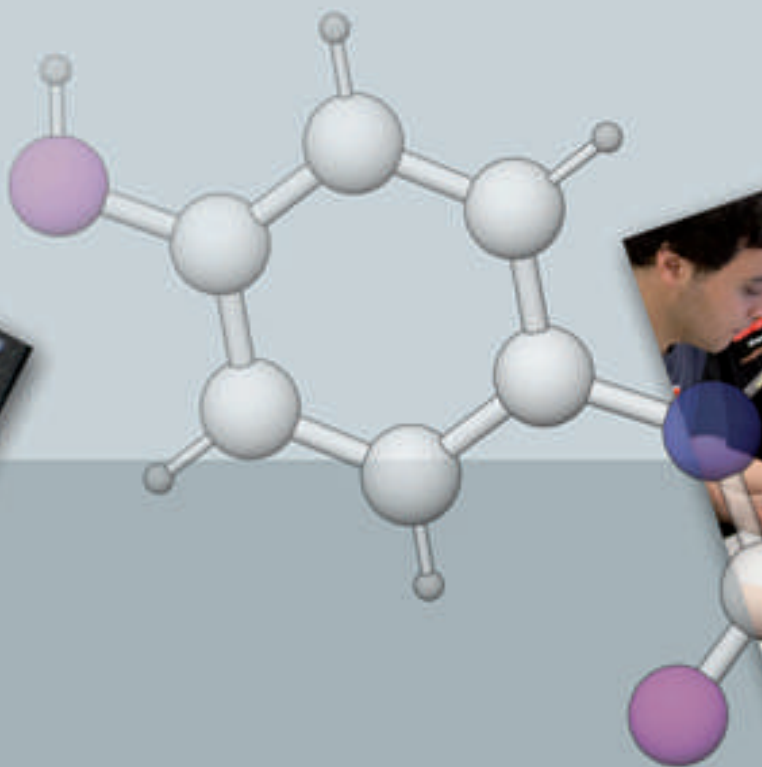
■ Common Services

- Computing Applied to Research



The Computing Applied to Research Unit helps researchers and technologists to use the most appropriate computing strategies for their needs and, in general, advise them on how to use computers, programs and data bases in their research.

The Scientific Computing Service provides its own computing resources with update policies and it is involved in assessing the advances in IT applied to research and in its implementation.



Relevant equipment

Arina Cluster

Arina consists of 728 cores for calculation arranged in nodes of 8 cores: 432 state-of-the-art Xeon cores, 32 Xeon cores in nodes with Tesla GPGPUs for calculation, 224 Itanium2 cores, and 40 Opteron cores. The nodes have between 16 and 128 GB of RAM memory and are inter-connected via a high-bandwidth and low-latency InfiniBand. It is also equipped with two high-performance disk reading/writing systems in parallel for calculating 4.7 and 7.1 TeraBytes of capacity.

GRID Péndulo

Péndulo is a scientific computing grid that uses the UPV/EHU IT room computers as hubs during the time slots when those computers are inactive. A highly-scalable project of our own design. This grid has been built using the Bizkaia CIDIR (Network, Research and Educational Computer Centres) resources, in order to provide a useful tool to the research community.

The project began in the Campus Room, located in the Library building, with 60 dual core computers. The Course Room in the same building, with a further 20 units which meant a total of 140 cores were subsequently included. The grid characteristics enable it to be expanded via the incorporation of other computer rooms.

Range of services

Consultancy and training

- Gathering and disseminating the “best practices” in scientific computing, by means of courses, seminars and other appropriate mechanisms.
- Help with designing or improving codes, advising users on the use of libraries and programming languages, etc.
- Help with the efficient use of applications, including, where applicable, advice on parallelisation and data handling strategies.
- Advisory services on optimising resources.
- Help with identifying software/hardware needs to solve specific scientific problems.

Strategic support

- Monitoring the most relevant developments in the field of scientific computing, in order to enhance the Service.
- Advice on acquiring new scientific computing equipment for researchers or research groups of the institution that so request it.
- Managing software acquisition.
- Rationalising existing software.

Resources administration

- Administering computing resources (accounts, queuing, security, ...).
- Controlling and optimising the performance of the physical resources.
- Training users in the efficient handling of the resources.

- Installing and updating system software, other tools and applications.
- Training by means of specific courses. Educational support for various degrees and Master's degrees.

Service providers are also provided for the connection, compiling and analysis of results, and the relevant equipment is to be found at the Data Center of the UPV/EHU with UPS services, electrogenous group, control of accesses, extinction system using nebulized water and monitoring, etc.

Fields of Application

- Simulation.
 - Simulating materials and molecules at atomic level with molecular dynamics, quantum Monte Carlo, electronic structure methods in general, bio-polymer modelling (proteins, DNA) at structural and/or molecular dynamic level.
 - Simulating materials at macroscopic level, heat diffusions, yield strength.
 - Fluid and meteorological simulations.
- Biocomputer applications.
- Rendering images.
- Database processing.
- Calculations that due to their characteristics need a computer with higher power or that, even if not necessary, should be kept on the servers.
- Company management, stock exchange market simulating,...
- Parallel calculations.
- Bioinformatics and genetic applications.

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■ Common Services

■ Quality and Innovation / Scientometrics

The SGiker Quality and Innovation and Scientometric-Monitoring of Scientific-Technological Results Units work very closely with the leading agents in the research process in order to extract indicators regarding their evolution via the detailed analysis of their processes. These indicators can be used to develop innovative lines of research, among other areas, and disregard those others that are deemed to be of limited scope for the future. Using this approach, it is also possible to generate innovative and fruitful interconnection channels within the Vice-Rectorate for Research by relating the information gathered on all level.

Range of services

The activities carried out by these units focus on support for the generation and interpretation of data and results, for decision-making and on lending support to the creation and management of tools that facilitate the management and governance of R&D activities.

- Support for Management:

- Availability of relevant data and indicators for decision-making.
- Centralization of measurement activities for carrying out new development plans in order to encourage strategic reflections.
- Identification of management processes and standardization of protocols and acting and operational procedures.
- Exploitation of scientific production repositories.
- Implementation of quality control procedures and processes in accordance with standards that can be certified and assessed externally, such as the ISO 9001 standard or the EFQM model.

- Support for technological problems and research groups:

- Value generation via management tools pertaining to research quality.
- Establishment of general lines of collaboration and relations with business centres in order to provide back-up and support for their activities.

- Support for R&D units from the business fabric:

- Advice in the area of product and process innovation, in addition to the viability of projects during their germination, development and exploitation phases.
- Contribution of ideas and analysis of variables in interpreting the different R&D indicators.
- Extraction of new technological transfer indicators.

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The SGIker Units that are currently active are the ones that have been described in this catalogue. The full organisation chart, which includes areas that are expected to be set up, would be as follows:

SCIENTIFIC PARK

Material and Biomaterial Characterization Platform
Biomedicine and Biotechnology Platform
Environment and Sustainable Development Platform

BIOMEDICINE AND BIOTECHNOLOGY

Animal Husbandry Building
DNA Bank
Genomics
Proteomics
Radioisotopes
Analytical and High-resolution Microscopy in Biomedicine
Sensory Analysis Laboratory

ENVIRONMENT

Phytotron and Greenhouse
Marine Biology
Climatology

SOCIAL SCIENCE

Social Innovation
Economic Research
Sociological Research

TECHNOLOGICAL SUPPORT

Analysis Centre
Scientific Instrumentation
Cryogenic Liquids
Raman-LASPEA

MATERIALS AND SURFACES

Polymer Microscopy
Mass Spectrometry
Laser Facility
Geochronology and Isotope Geochemistry
Macrobehaviour, Mesostructure, Nanotechnology
Magnetic Measurements
Thermo-analytical Measurements
Electronic Microscopy and Microanalysis of Materials
X-rays
Nuclear Magnetic Resonance (NMR)

GENERAL SERVICES

Statistics and Image Treatment
I.T. applied to Research
Quality and Innovation
Scientometrics

HISTORICAL-GEOGRAPHIC SCIENCE

Geoarchaeology
Topography
Cartography and Geographic Information Systems



The SGIker General Research Services, involved as they are in a constant improvement process in terms of the range of services being offered, are currently immersed in a certification programme for their different units. The international standard of reference is the UNE-EN ISO 9001:2008, and this has already been introduced in the units that make up the Central Analysis Service.

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del País Vasco

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