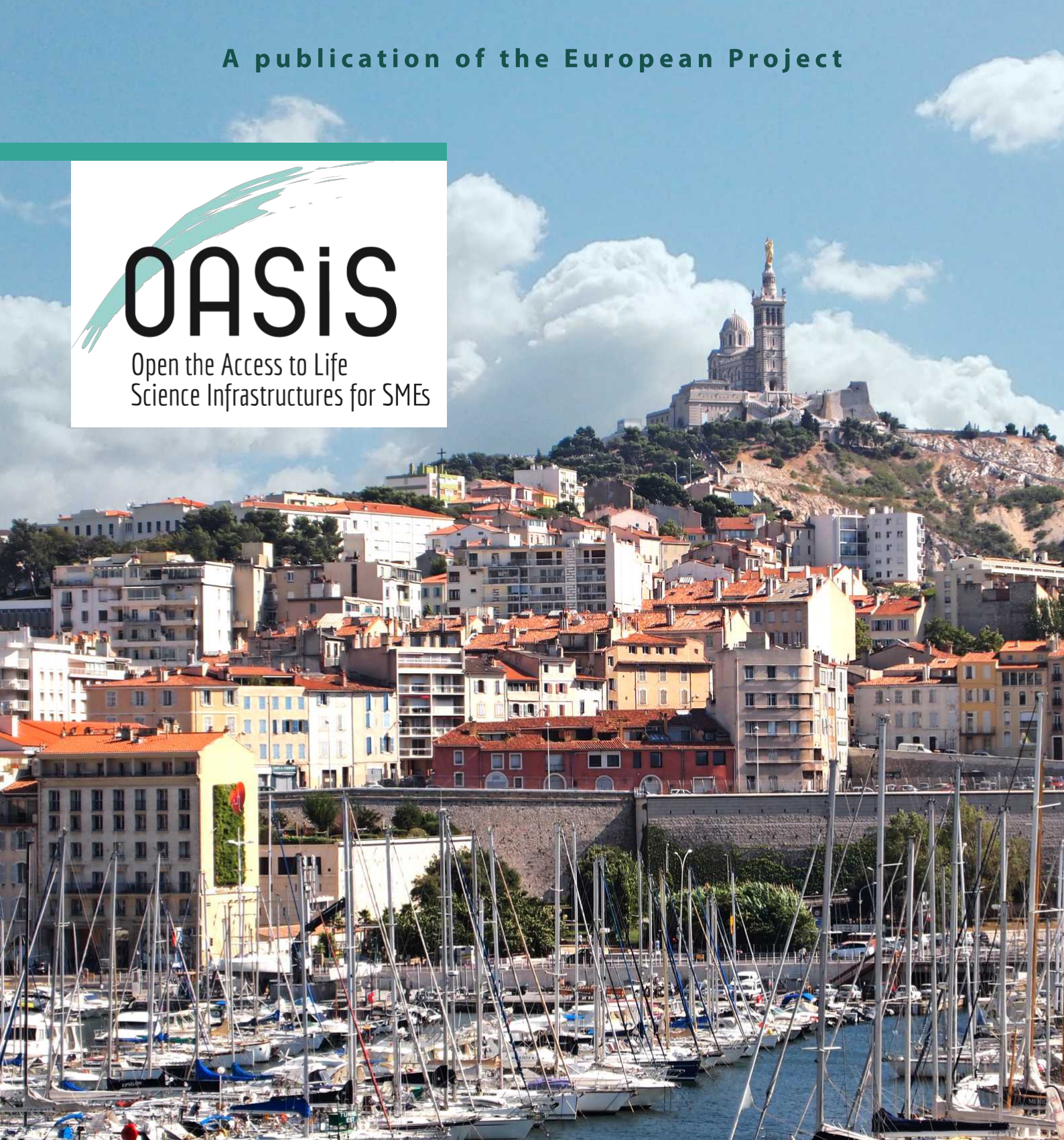


A publication of the European Project



OASiS

Open the Access to Life
Science Infrastructures for SMEs



FRENCH BIOPHOTONICS



PHOTONICS PUBLIC PRIVATE PARTNERSHIP



This brochure has been elaborated in the framework of the European project OASIS. We acknowledge the financial support and the continuous support of the European Commission and more specifically of the Photonics Unit of DG Connect. This document does not represent the opinion of the European Union, and the latter is not responsible for any use that might be made of its content.

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The OASIS project

OASIS – Open the Access to Life Science Infrastructures for SMEs

The OASIS project aims to improve the links between life science facilities, research projects and product development. The previous large investments in biophotonics are made more accessible to SMEs to allow a competitive advantage in new product development and validation.

Large scale research facilities and technology platforms are usually sets of laboratory equipment that are mainly available to academia and to a certain extent to industry. It can be very large-scale equipment, unique to a country or a continent as well as technological halls shared by a wide scientific and technological community, which develops competencies in a specific area.

In the field of the life sciences, the management of open access for researchers and world-class research programmes between these facilities is under consolidation through existing programmes like Instruct, EuroBioimaging, Biophotonics Plus and the network of excellence Photonics4Life.

Large companies have established strong collaborations with these facilities. However, there is still room for improving the economic outputs and the involvement of SMEs in order to create more value and jobs from early scientific results.

By February 2015, the OASIS consortium has inventoried and analysed about 120 companies, unmet needs from 14 hospitals and 14 agrifood companies and more than 70 Life Science facilities. Nine workshops are organised at each partners' premise during the life time of the project to promote exchanges and spread the information and results from the project.

Website: <http://www.fp7-oasis.eu>

Coordination and Support Action (CSA) project from FP7-ICT-2013-11 objective 3.2 Photonics.

Grant agreement no: 619230

9 Photonics clusters involved in the project:

Optitec (Marseille, France); CNR – Optoscana (Florence, Italy); PhotonicSweden; OptecBB (Berlin-Brandenburg, Germany); Politecnico di Milano (Italy); SECPHO (Southern European Cluster in Photonics & Optics Association, Barcelona, Spain); Photonics NL (The Netherlands); Photonics Bretagne (Lannion, France) and Swansea University (UK).

Duration : 30 Months (Dec. 2013 to May 2016)

Coordination: Katia Mirochnitchenko, OPTITEC, Marseille.



Application areas addressed



Introduction - French Biophotonics

Overview: Our society is facing various societal challenges such as population aging and growth, environment pollution and food quality and security, among others. The way we address these challenges will become even more critical in the upcoming years. In the last 10 years biophotonics has provided many answers and possible solutions and has been recognized as a field of science and innovation that will play an ever increasingly important role in the future.

With 700 French industrial companies, over 200 system integrators and a turnover of 10,8€ billion, French photonics sector is one of the leaders of the European photonics industry. National research institution such as CEA, INSERM, INRA, INRIA, ONERA, CNRS and engineering schools, recognized at the highest level, play an essential role in the field of research and education.

At a national level biophotonics represents 12 % (1, 3€ billion) of turnover generated in the photonics sector, which is under the European average with 20%. However, it is important to underline that French biophotonics sector is constantly growing thanks to a leading edge research, high level technical skills and a large number of possible niche applications. As a result, a lot of start-ups developing advanced imaging or sensing technologies are being set-up (LLTECH, ImXPAD, Fluoptics, Prestodiag, First Light Imaging, Envolution...).

Biophotonics: This brochure intends to provide a non-exhaustive inventory of the French biophotonics stakeholders, located in some of the French regions: Provence Alpes Côte d'Azur (PACA), Rhône-Alpes, Limousin, Bretagne and Ile-de-France.

Most of French biophotonics companies, are micro and small companies with less than 100 employees 10 years of existence and a turnover between 0,5 to 2 € million. However, larger companies and groups are also actively present in the sector: Biomérieux, Horiba Jobin-Yvon, Horiba Medical, Quantel, Eurofins and Super Sonic Imaging.

10 networks & organisations conclude the portfolio of French photonics, with 8 national platforms and 3 regional networks, dedicated to life science, health, biomedical imaging, microscopy, laser and environment.

Main assets of French biophotonics:

Photonics technologies are related to two fields:

- Detection techniques, monitoring diseases and minimally or non-invasive treatments.
- Innovations in instrumentation and ophthalmology.

The most advanced research in France includes:

- Instrumentation for medical imaging: endoscopy, nonlinear microscopy, Optical Coherence Tomography (OCT), Raman spectroscopy, linear and nonlinear spectroscopy, adaptive optics applied to the vision and in-vivo microscopy, vision support tools (spectacle lenses and contact lenses).
- No conventional & multimodal imaging: advanced medical imaging system (fluorescence imaging, X imaging, confocal imaging...), Coherence Tomography (CT), Positron Emission Tomography (PET), opto-acoustic, TeraHertz, nuclear imaging,
- Lasers: therapeutic lasers, femtosecond lasers for X-ray imaging, fibered lasers, laser systems Surgical, lasers treatment for eye surgery
- Biosensors, point of care (POC): in situ diagnostics (biosensor, POC), biosensors for diagnosis in vivo-in vitro

Main disruptive technologies:

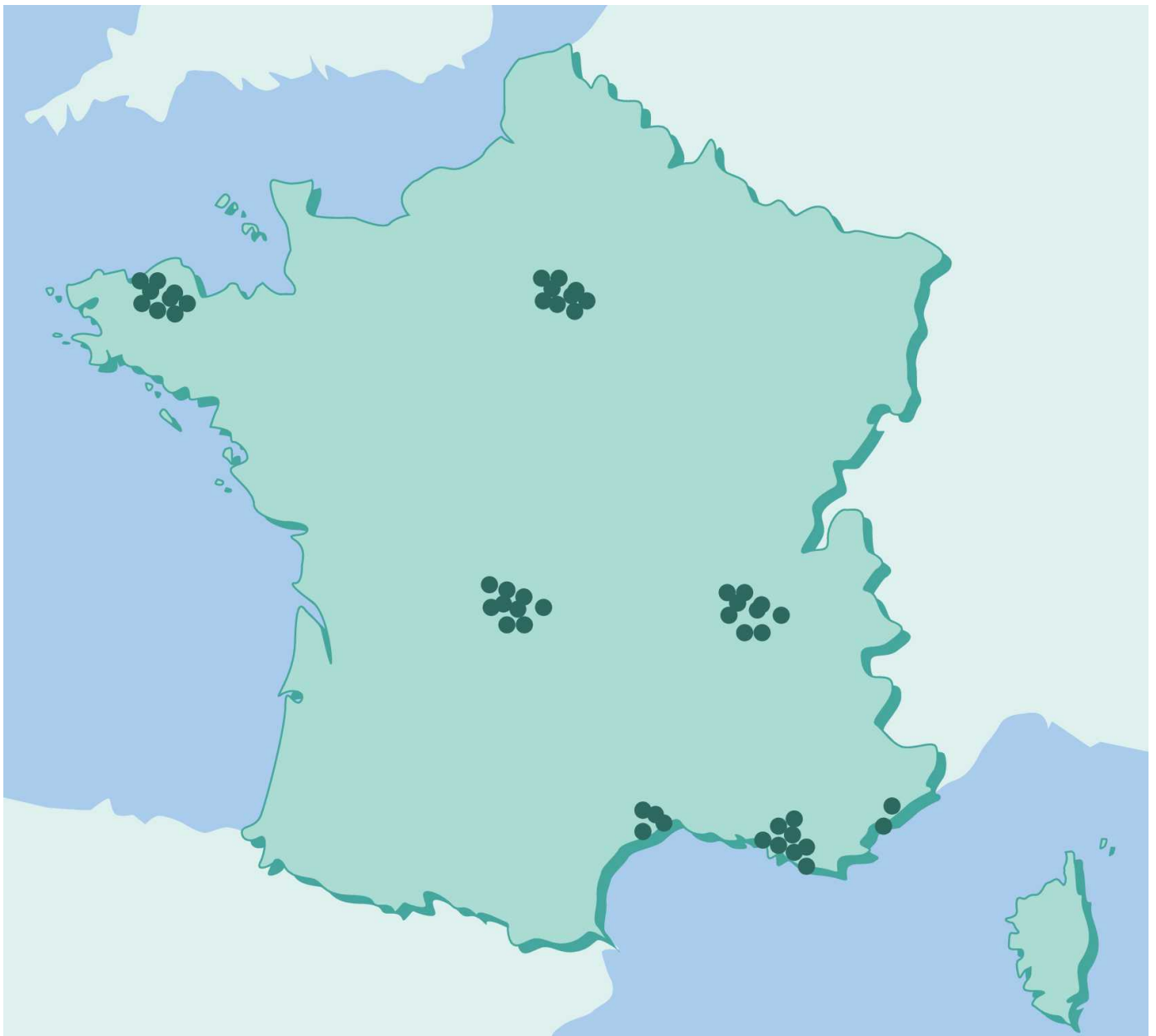
The technologies developed by the French companies in the field of biophotonics, which were interviewed in the framework of OASIS project, are mostly focused on 4 topics:

- Laser and systems, non-laser light (LED/OLED);
- Detector, sensors,
- Camera, data processing and imaging systems;
- Optical fabrication equipment and fibers optics.

The technology large parts of life science infrastructure are related to:

- Medicine and Healthcare,
- Biology
- Agrifood & Agriculture.

French biophotonics public research involves the national research institution (CNRS, CEA, INSERM, INRA, INRIA, and ONERA) as well as the regional and national platform (Cérimed, PEMOA, BNIF, Institut de la vision, Perfos, APEX, PRISM, Microscopy Rennes Imaging Center...).



Description of 54 French Biophotonics Companies



Based on laser stereolithography, ceramic 3D printing technology is used for rapid production (FCP on demand production services and CERAMAKER 3D printers). It enables layer-by-layer processing to produce ceramic components. The UV laser beam polymerizes the paste made of photosensitive resin and ceramic. The resin is removed by heat treatment and ceramic is densified to 100%. This process doesn't break the digital chain.

<http://3dceram.com/en>



AiryLab

AiryLab provides industry and research with optical metrology services and imaging solutions.

- Available as a service, the optical AiryLab platform can measure almost any optical system at several wavelengths. AiryLab can also perform on site analysis as well as optical system alignment. The real time wave front analyzer delivers dynamic measurement for moving components such as liquid lenses.
- AiryLab develops the Genika imaging software for science, life science and industry. A dedicated application exists also for astronomy. Genika can handle high throughput from multiple camera for stereoscopic and multi angle captures. On the fly image analysis can trigger the acquisitions only when needed.

<http://www.airylab.com>



ALPAO

ALPAO is a leading provider of adaptive optics solutions. Our customers are using ALPAO deformable mirrors, sub-systems and software to build innovative products for ophthalmology microscopy and astrophysics.

ALPAO provides support from the earliest stage of R&D up to the manufacturing of customized OEM products.

<http://www.alpao.com>



Medical biology (red biotechs), industrial biotechnologies (white biotechs), plant and agrifood biology (green biotechs), environmental technologies (yellow biotechs) and marine biotechnologies (blue biotechs).

<http://www.amarokbiotech.com>



Founded in 2012 by a team of five young entrepreneurs, Archimej Technology has been recognised as an innovative breakthrough technology company in France.

The start-up is dedicated to the development and promotion of its disruptive proprietary technology SPECTROSCOPY 2.0®, the only existing technology to produce miniaturized and low-cost spectrometers with unprecedented measurement



performance. Archimej is now applying SPECTROSCOPY 2.0® in the biomedical industry with the development of Beta-Bioled, the very first mobile and personal blood analyzer aimed at the mass market. The Beta-Bioled project is developing a complete and integrated platform that will allow everyone (patients and healthcare professionals) to screen, diagnose and monitor their general health condition, easily, from their home or anywhere they want. It will measure a range of diagnostic markers, including but not limited to cardiac markers, renal function, liver function and lipid profile.

<http://www.betabioled.com>



Based on the combination of nano, biotech, IT and cognitive sciences, Aryballe will develop innovative technologies databases, software and devices applied to the identification, measurement and representation of smells and tastes. The company's main product, Neose, will be launched in 2016 and should be the first Universal Portable Odor detector (e-nose) on the market.

<http://aryballe-technologies.com>



Specialized in Engineering Secure Traceability Solutions. Athéor provides the cosmetic, pharmaceutical and food industry with the means to fight against counterfeiting.

<http://www.athéor.com>



Headquartered in Grenoble, Avalun is a young spin-out from the French research institute CEA-Leti. Avalun develops the LabPad system, a mobile point of care device able to perform different medical tests from capillary blood, using a unique instrument associated with a large range of consumable microcuvettes.

<http://www.avalun.com/en>



Bertin Technologies delivers a complete innovation offer, from development to delivery of high tech and tailor-made products: Optical sensors for metrology; Laser and Xray systems; Design and development of opto-mechanical and optoelectronic systems, Optronics and image processing; Instrumentation for chemical and biological analysis.

<http://www.bertin.fr>



Inspection of individual packaging quality for food and health.

<http://www.luceo-inspection.com>



Brochier® technologies

Brochier Technologies develops optical fibre weaving solutions for light applications in lighting, communications, safety, pollution control, and medical fields. Lightex® technology consists in the weaving of optical fibres with lateral lighting, connected to electroluminescent diodes that makes possible to create flexible or rigid illuminated surfaces, very thin, requiring low power consumption and providing long life span. The Lightex® lighting solutions are protected by several international patents.

<http://www.brochiertechnologies.com>



Claranor was set up in 2004 with the aim of developing industrial applications for pulsed light as a surface decontamination technology. In-line sterilization of packaging rapidly emerged as an obvious application, offering reliable, sustainable and cost efficient alternative to chemicals or irradiation technologies. Referenced by the main equipment manufacturers in the dairy and drinks sectors, Claranor pulsed light is currently used in the largest industrial groups, headed by Nestlé Waters, which was one of the pioneers, and the first to adopt Claranor solutions on its bottling lines. Already recognized as a global leader for decontamination of caps, cups, and preform's neck with pulsed light technology, Claranor's priority is to provide its customers with faultless service, and to continue improving the performance of its equipment in order to open up new markets.

<http://www.claranor.com>



Development of innovative systems based on chalcogenide fiberglass for routine biological diagnosis.

<http://www.diafir.com>



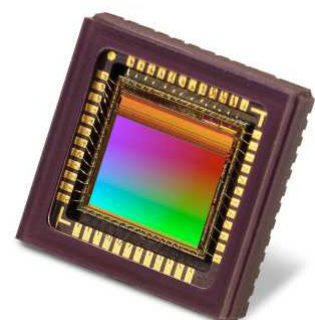
DiaSys Technologies in Montpellier, France, are the centre of excellence for the development of automated clinical chemistry analyzers and appropriate software.

<http://www.diasys.fr/compagnie/diasys-international/>



e2v's objective is to be a global leader in the design and supply of specialized components and sub-systems that enable the world's leading systems companies to deliver innovative solutions for medical and science, aerospace, defence and commercial and industrial markets.

<http://www.e2v.com>





3D printing and scanning for industry (plastic industry; engineering, healthcare and building sectors).

<http://www.emagein-3d.com>



Envolure develops and commercialize a set of 96-well plate analytical kits, coupling biochemical or chemical reactions with fluorescence detection, for accurate, rapid and economic on site diagnostics in the environmental field. Envolure also focuses on the development of portable equipments based on fluorescence microscopy.

<http://www.envolure.com>



ETHERA develops diagnostic kits for indoor air quality, for professional or private use. Our portable solutions are based on innovative technology and a unique experience in materials engineering. They distinguish themselves through performance and usability. Our products are ideal for detecting very low concentrations of dangerous indoor air pollutants such as Volatile Organic Compounds: formaldehyde, benzene, toluene, etc.

<http://www.etheralabs.com>



Optical engineering. Optical systems for corporate and government laboratories in the areas of industry, research, environmental or medical.

<http://www.evosens.fr>



First Light Imaging builds scientific cameras that combine extreme sensitivity and high speed for visible and infrared spectra (SWIR). Usually, very low light cameras (<math><1e</math> RON) have a limited speed up to 100 fps. With their breakthrough technology coming from major European academic research institutes, OCAM² for Visible and C-RED for Infrared can capture up to 2000 images per second for the same sensitivity. Dedicated to Astronomy as well as Biology and Industry, First Light Imaging works with famous research institutes and manufacturers all over the world.

<http://www.firstlight.fr/?lang=en>





Fluoptics develops innovative fluorescence imaging solutions for real time guided surgery. Our goal is to provide surgeons with real time information to precisely locate a fluorescent marker during surgery. This added value should drastically secure the procedures and improve patient outcome.

<http://www.fluoptics.com>



GLOphotonics

The Photonic Microcell Company™

GLOphotonics SAS (or 'GLO' for short) is a French start-up based in Limoges. GLO is set up to commercialize hollow-core photonic crystal fiber (HC-PCF) and their functionalized form Photonic Microcells™ (PMC). GLO products are built upon its proprietary and disruptive specialty fiber technology and gas photonics.

<http://www.glophotonics.fr>



HORIBA

Medical

HORIBA ABX SAS (<http://www.horiba.com/fr/medical/>)

In Montpellier, Horiba Medical designs, develops and distributes worldwide, automated in vitro diagnostic in the field of Hematology and Clinical Chemistry. These instruments contribute today to prepare tomorrow's health.

<http://www.horiba.com/fr/medical>

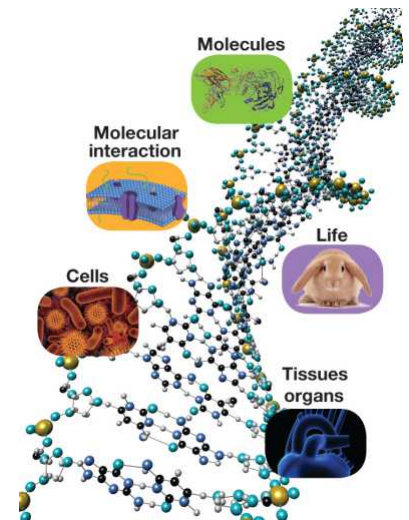


HORIBA

Scientific

HORIBA Scientific provides an extensive array of instruments and solutions for applications across a broad range of scientific R&D and QC measurements. HORIBA Scientific is a world leader in diffraction gratings, elemental analysis, fluorescence, forensics, ICP, optical spectroscopy, particle characterization, Raman, spectroscopic ellipsometry, Surface Plasmon Resonance Imaging and water quality. Proven quality and trusted performance have established widespread confidence in the HORIBA Brand. Thanks to our long-standing expertise in advanced materials, HORIBA Scientific has developed a full range of instruments to improve our understanding of life, from the molecular to the organism level. For example, fluorescence and Raman spectrometers are provided for chemical identification, SPRI has been specially designed for biomolecular interaction detection. A particle size analyzer has also been optimized for biological particles.

<http://www.horiba.com/fr>



Horus Laser offers microchip laser solutions for industry and science. The company supplies 1064nm, 532nm, 355nm and 266nm and customized solutions (ex: robust and stable output single mode pigtailed laser) to fit customer's requests.

<http://www.horuslaser.com>





Fiber optics systems and components for science and industry. Development of laser systems for research centers (energy, health...).

<http://www.idil-fibres-optiques.com>



World leading providers of Shack-Hartmann wave front, sensing hardware and software, adaptive optics technologies and professional services in applied optics. Industrial quality control...

<http://www.imagine-optic.com>



The XPAD detector is based on the photon counting technology providing a quasi noiseless imaging as well as a very high dynamic range and a fast frame rate (500 images). These qualities are fundamental for X-ray imaging, especially for synchrotrons beam light where the progress of the detectors did not follow that of the second generation machines.

<http://www.imxpad.com>



INDATECH innovates in Process Analytical Technologies. We assist process development teams in implementing inline measurements of physical and chemical parameters with spectroscopy. Inline qualification of 100% of the production for real time release is no more a dream.

<http://www.indatech.eu>



IRLYNX develops and sales low cost thermal infrared array sensors to equipment manufacturers on the following markets: smart-building, smart-cities assisted living, retail, security and smart objects. With our device, it has never been so easy to detect true people presence (including absence), count people, recognize animal from human and detect elderly falls.

<http://www.irlynx.com>



ISORG, high performance and large area organic photo detectors and image sensors. ISORG is the new start-up spin off of the Printed Components Laboratory of the CEA-LITEN Grenoble (Nanomaterials Department). The organic electronics is a breakthrough technology based on new conductor and semi-conductor materials of organic chemistry combined with the latest generation large area printing techniques. This technology transforms glass and plastic surfaces into smart surfaces able to sense and communicate. The sensors printed on plastic



substrates are thin, light, and flexible, and enable real innovative mechanical integration and 3D product design. They offer high performances with large spectrum operation (visible and near infra-red) or selective spectral response, low current consumption, high EQE (photon to electron conversion ratio). Target applications: industry (photometry, colorimetry, image capture, industrial control, object and shape recognition), smart lighting, industrial display (user interface), medical equipment (digital imaging, diagnostic and monitoring devices), environment (fluid and gas monitoring), security (access control, fire detection), consumer electronics (scanners, user interface)

<http://www.isorg.fr>



KAMAX Innovative System is an innovative company that designs and manufactures a polar metric imaging device with remote optical fiber (called K-PROBE) for medical diagnosis.

Combining technological developments, speed and ease of use, this device will enable practitioners to improve, secure and facilitate their decision making during their interventions (biopsies analyzes, especially those in surgery).

<http://www.kamax-innovative.com>



Fiber amplifiers and fiber lasers solutions. Medicine: modular fiber laser product series for minimal invasive surgery. Environmental monitoring: laser remote sensing of gases.

<http://www.keopsys.com>



Development of fluoride glass technologies for aerospace, astronomy, defense, medical...

<http://www.leverrefluore.com>



Development of fiber lasers and amplifiers. Fiber lasers for medical and cosmetic applications.

<http://www.lea-photonics.com>



LEAS (a KEAS group company) is an electronic company specializing in research, industrial design and production management of electronic equipment since 1980. Through its strategy of innovation, LEAS designs high-performance industrial devices, giving you a clear competitive advantage in domestic and



international markets. Its adaptability and its professionalism make it a key player in the fields of research, security, defence, industry and health. LEAS designs and manufactures electronic solutions in the following fields:

- Seismology (security),
- Detection & Jamming
- Olfactory (military and civil security),
- Military and civil maritime security
- Automatons

<http://www.leas.fr>



LEUKOS offers solutions to universities, industrials and institutes worldwide for test, measurement, research and development fields.

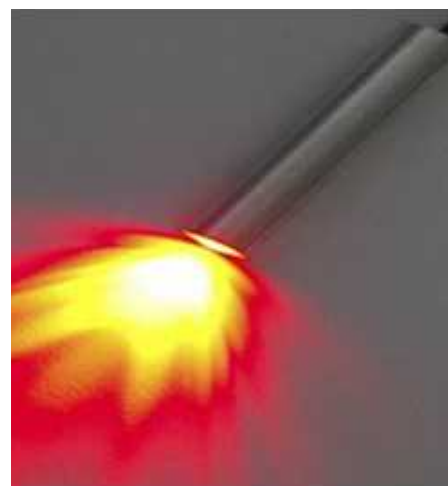
<http://www.leukos-systems.com>



LIGHT Technologies designs and manufactures Light Emitting Diode (LED) devices for industrial and scientific purposes. The main application areas are:

- The oil industry: measuring systems intended to identify products characteristics in a pipeline
- LED Navigation lights for boats from medium to large dimensions
- Lighting for automatic vision
- Biotechnology and Health:
 - Fluorescence-based cells analysers
 - LED based systems for dental operating lights

<http://www.light-technologies.fr>



Light For Life Technologies (LLTech) has developed an accurate, fast, easy-to-use, high-margin digital optical imaging system to disruptively improve the diagnosis and treatment of cancer. LLTech develops and sells easy-to-use high-resolution automated optical-biopsy system as an intra-operative and diagnostic tool for surgeons and pathologists to increase the standard of care for cancer surgeries and biopsies. LLTech aim is to allow decision-making in the operating room. By having real-time tissue information doctors shall be able a direct primary evaluation (presence of cancer or abnormality) and guide the biopsies or surgical procedures. LLTech currently sells a unit for research applications with over €2M revenues from customers in USA, Canada, France, Belgium, Switzerland, Saudi Arabia and Japan. LLTech has done 19 studies on 12 anatomical sites that prove the potential.

<http://www.lltechimaging.com>





Meodex is a French company with a deep expertise and know-how in innovative technologies and industry and specializes in LED light technologies. Main activities: Design office (electronic CAD, optics, thermal management, mechanics); Express prototyping; Mass production; online store for LED engineering products: www.led-mounting-bases.com.

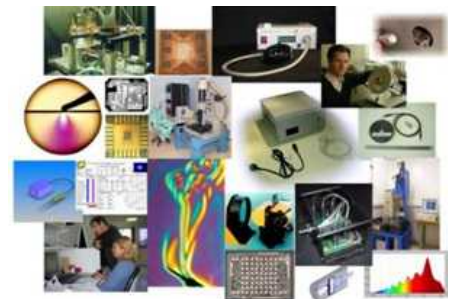
Meodex provides medical market in lighting of surgical block and surgery rooms; lighting of instruments; sterilization; therapeutic light.

<http://www.fr.meodex.com>



Research and development in the field of optical instrumentation.

<http://www.micromodule.fr>



Created in March 2007 by a team of industry leading researchers and senior management, Movea SA was a spin out of the French research institute CEA-Léti that specialized in the research and development of advanced motion sensing and processing technologies.

<http://www.movea.com>



NO E has focused in industrialization and commercial development of a new generation advanced ultrafast pulsed lasers emitting in the region of 2 μm (2 micron) for scientific applications in the mid infrared such as supercontinuum generation and spectroscopy, material processing and the near future for plastic polymers and advanced material processing and medical applications.

<http://www.no-e-laser.com/fr>



Oncomedics is a biotechnology company specializing in individualized therapy for the treatment of cancer. Oncomedics has established a network of clinicians needed to supply tumor samples with the addition of new tumor types. Surgeons advise patients, evidence of their consent for the use of their surgical residues and perform biopsies or complete resection of the affected organ. Pathologists, after making their diagnosis, extract a dedicated Oncomedics tumor fragment and send it to Oncomedics by specialized carrier.

<http://www.oncomedics.com>





Development of advanced continuous-wave laser modules targeting applications in biophotonics, metrology, spectroscopy and other analytics and instrumentation applications, for both research and industry customers.

<http://www.oxxius.com>



Prestodiag develops, manufactures and sells innovative solutions for rapid detection of multiple bacteria in complex samples. Our patented approach allows same day microbiological results compared to one to several days with current techniques. Prestodiag's main sectors of application are food safety, medicine and environment. Our proprietary technology is based on a cost-effective label-free optical reader based on Surface Plasmon Resonance imaging (SPRI), and uses dedicated single-use kits to monitor up to 100 different micro-organisms' growth in real-time, in any type of sample.

<http://www.prestodiag.com>



Quantel, founded in 1970, is a global leader in the design and manufacture of high-power, solid-state lasers: pulsed Nd:YAG lasers (FPSS, DPSS), fiber lasers (CW visible or IR), tunable laser systems (dye and OPOs) and laser diodes (CW/QCW). With design centers in Paris, France and the USA (Bozeman, MT), Quantel lasers are used in applications ranging from spectroscopy to biophotonics; LIDAR to combustion research. Uniquely, Quantel offers customers highly flexible scientific lasers with user-configurable wavelengths and performance parameters as well as "designed for purpose" ruggedized lasers for industrial and harsh-environment applications.

<http://www.quantel-laser.com>



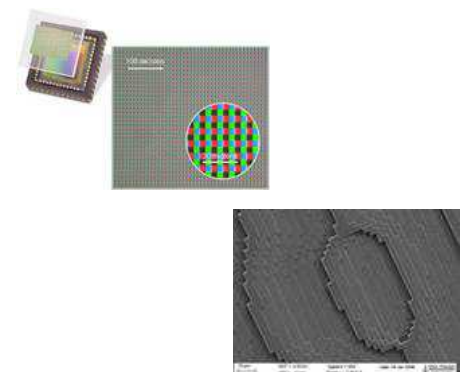
RMS (Réalizations Méditerranéennes du signal) is an expert in image processing, signal processing and statistics. We help our customers in the interpretation and exploitation of their vibration, acoustic and video data. Main activity in Image processing: Dynamic tracking of deformable objects; Odometry, trajectory estimation; 3D reconstruction; Image Stabilization; Industrial image analysis.

<http://www.rms-signal.com>



SILIOS designs and manufactures micro-optics such as diffractive optics (laser beam shaping) and variable filters (Visible/NIR spectrometry and multi-spectral imaging). SILIOS takes benefit from the microelectronic technologies, tools and methods to manufacture these optical components. The company is engaged in many research fields through micro-optics developments and manufacture for semiconductor, bio-medical, nuclear physics, astronomy, defence and environment sectors.

<http://www.silios.com>





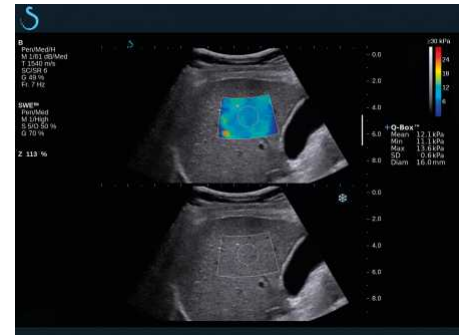
Sopro specializes in offering a wide range of electronics products focused on dental imaging (intra-oral cameras and digital radiology systems) in order to meet the dental surgeons' needs no matter what the operatory layout may be.

<http://www.acteongroup.com>



The Aixplorer® ultrasound system provides exceptional image quality and is unique with its software platform that acquires images 200 times faster than conventional ultrasound. SuperSonic Imagine's proprietary ShearWave™ Elastography permits the visualization and measurement of tissue stiffness in real time. By providing real-time quantitative information, this technology helps physicians quickly identify potentially malignant and other diseased tissue.

<http://www.supersonicimagine.com>



Synapsys develops and manufactures non intrusive medical devices for balance disorders diagnosis and rehabilitation. At the forefront of innovation in inner ear and vestibular fields , Synapsys uses computer vision and signal processing core skills to bring to the market unique efficient clinical solutions.

<http://www.synapsys.fr>



Thomas Sinclair Laboratoires is specialized in Human Vision research and assistive technology. Technical fields include Physiological optics, Visual training, Connected Objects.

<http://www.thomassinclairlabs.com>



To ensure the best optimization of continuous quality, XT-VISION has two types of expertise: packaging and engineering.

XT-VISION designs quality control solutions on production lines and packaging:

- Inspection machines as "TUNNEL" type integrating directly the existing conveyor.
- Vision systems integrated directly into packaging machines (cappers, labelers, etc ...)
- Inspection Machines "customized" packages

XT-VISION also offers engineering control solutions for any type of project: online inspection machines, support machine operator and test benches, realization of R&D work (feasibility studies, demonstrator, and prototypes).

<http://www.xt-vision.com>



Description of 23 Life Science Infrastructures



Core Business

Private research laboratories specialized in medical biology (red biotechs), industrial biotechnologies (white biotechs), plant and agro-food biology (green biotechs), environmental technologies (yellow biotechs) and marine biotechnologies (blue biotechs)



Services offered to companies

Tests laboratory; flow Cytometry facility; biological analysis; contract R&D; training and consulting. Pooling of equipment, expertise : Clinical applications of Biophotonics and applications in doctors' practices, endogenous chromophores, photosensitisers, Photonics for cancer diagnosis and therapy, Photonics for non - and minimally- invasive diagnosis, Photonics for point-of-care diagnosis, Photonics for preventive medicine, advanced and early diagnosis / Control of food processing, Control of product quality parameters, Detection of contaminants/allergens/toxic agents, Prevention of contaminants / allergens / toxic agents, Quality certification



Core Business

APEX is an analytical platform created in 2006 and dedicated to veterinary pathology. APEX brings its high-skilled expertise in animal tissue phenotyping to the scientific community. This expertise relies on three veterinary pathologists holding the European diploma in this discipline, as well as on two research engineers specialized in fluorescence bio-imaging and molecular biology on slides.

APEX is part of the "Biotherapy and Animal Pathophysiology" platform certified by the French national Scientific Interest Group IBiSA and that brings together the Boisbonne Centre (Oniris, Nantes) and the Vector Production Core (INSERM U1089, Nantes). This integrated platform enables preclinical efficacy and safety assessment of innovative therapeutic strategies on large animal models.

Services offered to companies

Pooling of equipment, Training, Expertise, Preclinical trials: In-vivo cellular diagnostics, in-vivo histology, pathology, Expertise in animal tissue phenotyping.



Core Business

Platform dedicated to structural characterization and localization of biopolymers on a range of scale from nanometer to millimeter. The BIBS platform is a set of powerful scientific analytical equipment in four areas: mass spectrometry, microscopy, NMR and phenotyping / Chemotyping.

These powerful technologies are served by scientific and technical expertise of a dedicated staff.

Services offered to companies

Pooling of equipment, Training, Expertise: In-vivo cellular diagnostics, in-vivo histology, pathology, Nanomedicine Control of food processing, Control of product quality parameters, Detection of contaminants/allergens/toxic agents, Industrial product inspection, Product characterization, Powerful scientific analytical equipment in four areas: mass spectrometry, microscopy, NMR and phenotyping / Chemotyping. Scientific and technical expertise.



Core Business

Private biomedical research center specialized in pharmacology services. Biotrial ensures the implementation of research contracts with laboratories of the French and international pharmaceutical and biotechnology industries, in order to evaluate the drug molecules they develop. We have it for our own internal medical teams or occasionally cooperate with hospital staff.

As part of our Phase I studies, we have in France a clinical unit located in Rennes in Brittany and Pays de Loire a reception center in Nantes.

We are also present in the UK, Belgium, the USA and Canada.

Beyond these studies on healthy volunteers, Biotrial offers a wide range of service delivery including among others.

Services offered to companies

Evaluation of medicinal molecules thanks to the study of healthy volunteers.

Non clinical services: Safety pharmacology studies with research and development of therapeutic efficacy of experimental models to demand - Oncology Management Phase II studies - Biometrics, data management, biostatistics and medical writing - Core Lab, ECG and imaging - Bioanalysis - Monitoring.





Core Business

Contract Research Organization (CRO) specialized in in vitro and in vivo preclinical development of new active molecules, especially in the fields of Cancer, neurodegenerative, metabolic and genetic diseases, but also in agrifood and cosmetic area

Services offered to companies

Services for pharmaceutical and biotechnology companies: outsourcing of R&D, expertise, training for FDA. Services for chemicals synthesis firms who wish to control the biological activity of their molecules and their therapeutical potential. Services for agrifood and cosmetics firms



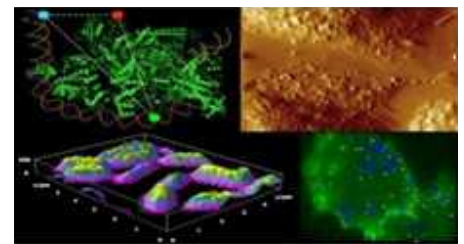
Core Business

Research Institute: Medecine / Healthcare, Biology

Services offered to companies

Pooling of equipment, Preclinical trials : Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for cancer diagnosis and therapy, Photonics for preventive medicine, advanced and early diagnosis

<http://www.cbs.cnrs.fr/index.php/en>



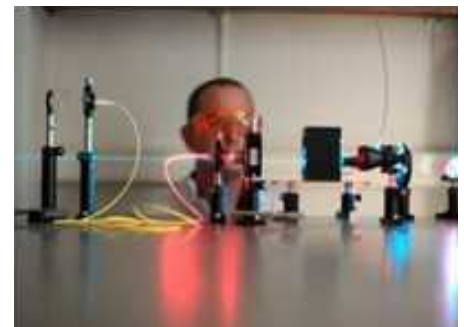
Core Business

Research Institute: Medecine / Healthcare, Biology

Services offered to companies

Pooling of equipment, Preclinical trials : Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for preventive medicine, advanced and early diagnosis

<http://www.ciml.univ-mrs.fr/about-us>



Core Business

Research Institute: Medecine / Healthcare

Services offered to companies

Translational bio-imaging research platforms, imaging agents, instrumentation (PET/CT, SPECT/CT, optical imaging, US, angiography)

<http://www.cerimed-web.eu>





Core Business

Technical platform specialized in flow cytometry and cell sorting.

Services offered to companies

Services for multiparametric flow cytometry, cell sorting and image cytometry allowing characterization and separation of cell populations, prokaryotes and eukaryotes, and particles for fundamental and/or clinical research. Theoretical and practical training for independent use of cytometer analyzers of the platform.



Core Business

Research laboratory specialized in histopathology including specific immunochemistry staining systems for assessing the expression of proteins of interest.

Services offered to companies

Standard histology lab services and tools: freezing, fixation, tissue embedding, microtome and cryostat sectioning, staining, immunohistochemistry, in situ hybridization, as well as more advanced technology, such as laser capture microdissection, and tissue Micro-Array (TMA).



Plateforme de diagnostic à l'échelle tissulaire au service de l'innovation et de la recherche publique et privée, dans les domaines de la biologie, de la santé, des matériaux...



Core Business

Research Institute: Biology

Services offered to companies

Pooling of equipment, Training, Expertise: In-vivo cellular diagnostics, in-vivo histology, pathology, Photonic for cell and tissue manipulation

<http://www.ibdm.univ-mrs.fr/fr>



Core Business

Research Institute: Medicine / Healthcare, Biology

Services offered to companies

Training, demonstration, dissemination activities: Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for preventive medicine, advanced and early diagnosis.

<http://www.inmed.fr>



Chercheur en santé depuis 1964
Health research since 1964





Core Business

Research Institute: Medicine / Healthcare

Services offered to companies

Neurosciences, Photonic imaging, fMRI, image processing

<http://www.inmed.fr>



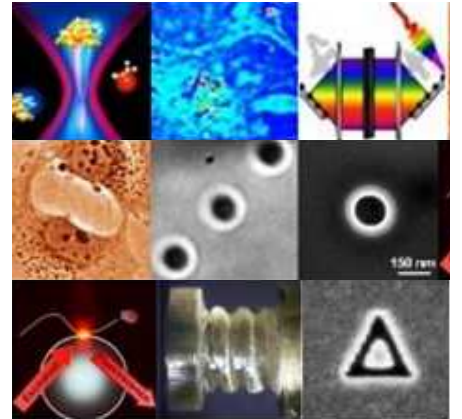
Core Business

Research Institute: Medicine / Healthcare, Pharmaceuticals, Biology, Cosmetics

Services offered to companies

Pooling of equipment, Training, Expertise : Clinical applications of Biophotonics and applications in doctors' practices, Endoscopes, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for cancer diagnosis and therapy, Photonics for non - and minimally- invasive diagnosis

<http://www.fresnel.fr/spip/spip.php?rubrique28&lang=en>



Core Business

Research Institute: Biology

Services offered to companies

Pooling of equipment, Training, Expertise : In-vivo cellular diagnostics, in-vivo histology, pathology, Flow cytometry analysis

<http://www.mica-bio.fr>



Core Business

Research platform specialized in microscopy imaging.

Services offered to companies

Regulated access to imaging system. Scientific and technical assistance in the design of projects and experiments. R&D activity dedicated to the design of prototype microscopes. Training in microscopy techniques.



Core Business

Technology center specialized in the development of custom microstructured fibers and fiber-based components.

Services offered to companies

Development of custom microstructured fibers (silica and chalcogenide), from conception to integration within Biophotonics application fields. Services including scientific studies, consulting in photonics and modelling.



Core Business

Research Institute: Medecine / Healthcare, Agriculture / Agrifood, Biology, Veterinary medicine

Services offered to companies

Training, demonstration, dissemination activities: Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for preventive medicine, advanced and early diagnosis.

<http://bionanonmri.univ-montp2.fr>



Core Business

Technology Center: Medecine / Healthcare

Services offered to companies

Pooling of equipment, Training, Expertise : Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Ophthalmic instruments, Photonics for preventive medicine, advanced and early diagnosis, surgical laser systems, assistance on using data and interpretation of results

<http://www.pole-optitec.com/node/112>



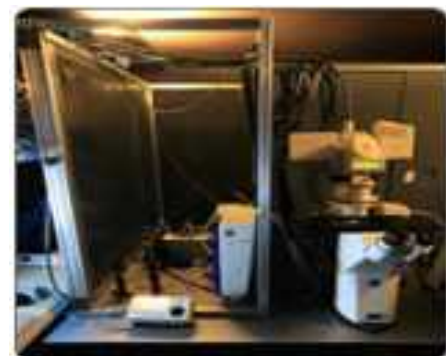
Core Business

Research Institute: Medecine / Healthcare, Biology

Services offered to companies

Pooling of equipment, Training : Clinical applications of Biophotonics and applications in doctors' practices, In-vivo cellular diagnostics, in-vivo histology, pathology, Photonics for preventive medicine, advanced and early diagnosis

<http://ibv.unice.fr/EN/institute/microscopie.php>



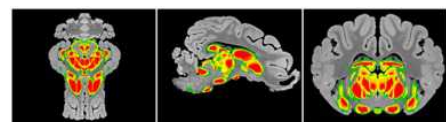
Core Business

Imaging and multi-modal spectroscopy core facility:

- Ani-Scans - Multi-Modality Imaging applied to a pig model
- Agro-Scans - Multi-Scale MRI and NMR imaging applied to agronomy and food science
- Bio-Scans - MRI and MRS imaging applied to small animal models and clinical applications
- Bio-NMR – Structural and Biological NMR Spectroscopy

Services offered to companies

Complementary imaging and spectroscopy techniques for multi-scale investigation of biological material at molecular, cellular and tissue scales. Investigations in vivo for small animals (mice, fishes, bivalves), large animals (pigs...) and on bio-products.





Core Business

Platform for technology transfer: biomass utilization, food engineering, chemistry, biochemistry, microbiology, maintenance and robotics for industry.

Services offered to companies

Support for R&D and innovative projects; access to technology, equipment and skill of several technical facilities.



Core Business

Technology center specialized in biotechnology, pathology, sensory and nutritional assays to serve the plant industry.

Services offered to companies

Biotechnological tools for breeding; plant health; identification and traceability; quality plantlets; taste and health. Project assistance: expertise and monitoring, studies and consulting, training.



Network and Organisations

Companies offering photonics related to Biophotonics

Network	Geographical coverage	Core expertise	Short description
AllEnvi	National	Environment	AllEnvi is a French Alliance for Environmental Research. AllEnvi pools the expertise of research organizations, universities and colleges in the field of environmental science, with a community of almost 20 000 scientists.
Aviesan	National	Life Sciences & Health	Set up in April 2009, the French National Alliance for Life Sciences and Health (Aviesan) groups together the main stakeholders of life and health sciences in France.
Biogenouest	Bretagne & Pays de Loire	Life Sciences & Environment	Biogenouest is Western France life science and environment core facility network. Research programmes are undertaken in the fields of Marine biology, Agriculture/Food-processing, Human health and Bioinformatics.
EuroBioMed	PACA	Health	Eurobiomed is a non-for-profit organisation which has been accredited by the French government as a "competitive cluster". It federates healthcare stakeholders in both "Provence-Alpes-Côte d'Azur" and "Languedoc-Roussillon" counties of South East of France. Eurobiomed provides resources and offers solutions for businesses and research organisations in the health sector to help them to innovate, finance, develop and achieve their strategic and business objectives.
FLI	National	Biomedical imaging	France Life Imaging (FLI) is a proposed large-scale research infrastructure project aimed at establishing a coordinated and harmonized network of biomedical imaging in France.
FranceBioImaging	National	Biomedical imaging	France-BioImaging is a large-scale national research infrastructure. At the frontier between molecular and cell biology, biophysics and engineering, mathematics and bioinformatics, France-BioImaging gathers several outstanding biological imaging centers supported by state of the art R&D teams with the aim of covering recent advances in microscopy, spectroscopy, probe engineering and signal processing.
IBiSA	National	Life Sciences	The GIS IBiSA (Infrastructures in the fields of Biology, Health and Agronomics) was created in May 2007. Its main mission is to support and to approve platforms and infrastructures working in the field of Life Science
MFV	National	Life Sciences	The Group of Research "Functional Microscopy of Living" includes experts team in biology, physics, chemistry, image processing, computer science and applied mathematics with the mission: <ul style="list-style-type: none"> - to promote the sharing of resources and skills in order to develop new strategies in microscopy of living, - to give access to technology platforms, - to develop communication tools and training, - to participate in the establishment of a European Network of Excellence in Microscopy of Living.

Network	Geographical coverage	Core expertise	Short description
NAIVI	PACA	Life Sciences	The node NAIVI-Marseille is the "Network for Advanced In Vivo Imaging Marseille ». It gathers all modern bioimaging techniques, including advanced innovations in MR (IBISA MR platform of UMR 6612 CRMBM/CEMEREM), nuclear medicine and nuclear physics (CERIMED, CPPM, APHM, IPC), optics/biophotonics (Institut Fresnel, INT, INMED), MEG (BDI) and many areas of image-guided therapy (e.g. gamma knife).
RAMAN FOR CLINICS	International	Raman spectroscopies	Raman4Clinics pools European expertise to step forward in the field of novel, label-free and rapid technologies based on a wide variety of Raman spectroscopies for the clinical diagnostics of body fluids, bacteria, cells and tissues. International interdisciplinary networking opportunities are offered between scientists within biophotonics, chemometricians and physicians/clinicians.
RCCM	National	Microscopy	The RCCM (Network of common centers in microscopy) was created in 2000. It gathers common centers and laboratories specialized in scientific and technical development of electronic microscopy for biology.
RTMFM	National	Photonics Microscopy	The RTMFM (Photonics microscopy of multidimensional fluorescence) is a network that gathers French individuals and platforms working for the development of photonics microscopy (researchers, engineers...).
SFLM (Société Francophone des Lasers Médicaux)	National	Health	The SFLM (Francophone society of medical lasers) is a medical society that aims at developing the diffusion of lasers in medicine).

Other French Companies

Company	Websites	Locations
AKEO PLUS	www.akeoplus.com	CHATEAU GAILLARD
AMPLITUDE SYSTEMES	www.amplitude-systemes.com	PESSAC
AP2E	www.ap2e.com	AIX EN PROVENCE
CERSA	www.cersa-mci.com/en	CABRIES
DELEO	www.deleo.fr	SAINT RAPHAEL
DMS	www.dms.com	MAUGIO
ECOLOGIC SENSE	www.ecologicsense.fr	ROUSSET
EXPER OPTIC	www.lunettes-experoptic.fr	LA SEYNE-SUR-MER
GINGKO SFERE	www.gingkosfere.com	MONTPELLIER
HAMAMATSU	www.hamamatsu.fr	MASSY
IDMED	www.idmed.fr	MARSEILLE
INTRASENSE	www.intrasense.fr	MONTPELLIER
KLOE	www.kloe.fr	MONTPELLIER
LIGHTNICS	www.lightnics.com	LUNEL
MAUNA KEA TECHNOLOGIES	www.maunakeatech.com	PARIS
MICROBS	j.develon@microbs.fr	RENNES
NEXVISION	www.nexvision.fr	MARSEILLE
OLEA MEDICAL	www.olea-medical.com/fr	LA CIOTAT
OPTIS	www.optis-world.com	TOULON
ORSAY PHYSICS	www.orsayphysics.com	ORSAY
PHASICS	www.phasicscorp.com	SAINT AUBIN
PROLEXIA	www.prolexia.fr	LA SEYNE-SUR-MER
RESOLUTION SPECTRA SYSTEMS	www.resolutionspectra.com	MEYLAN
SAVIMEX	www.savimex.fr	GRASSE
SEDI-ATI FIBRES OPTIQUES	www.sedi-fibres.com	COURCOURONNES
SELENOPTICS	www.selenoptics.com	BRUZ
STIL	www.stilsa.com	AIX EN PROVENCE
TCM (Tooth Color Map)	www.ester-technopole.org	LIMOGES

Other Life Science Infrastructures

Facility	Websites	Locations
ADRIA Développement	www.adria.tm.fr	Quimper
Biotech Nîmes	www.nimes-metropole.fr	Nîmes
CBB Capbiotek	www.cbb-developpement.com	Rennes
CNRS-FOTON	foton.cnrs.fr	Lannion
Critt Agroalimentaire	critt-iaa-paca.com/accueil	Avignon
CTCPA	www.ctcpa.org	Avignon
CTIFL	www.ctifl.fr	Avignon
Eco-technologies pour les Agro-bioprocédés	www.ecotech-lr.eu	narbonne
ENSTA-ParisTech - LOA	loa.ensta-paristech.fr/?lang=EN	Palaiseau
HCP EA3842/GEIST	www.avrul.fr/spip.php?rubrique150	Limoges
ID2Santé	www.id2sante.fr	Rennes
Ifremer	wwz.ifremer.fr/brest	Brest
INRA	www.inra.fr/	Avignon
INRA-STLO	www6.rennes.inra.fr/stlo	Rennes
INS/BDI MEG Laboratory	ins.univ-amu.fr/fr/in stools/meg-laboratory	Marseille
Institut Cochin-INSERM U1016	cochin.inserm.fr	Paris
Institut Curie - PICT	pict-ibisa.curie.fr/	Paris
Institut d'Optique	www.lcf.institutoptique.fr	Palaiseau
Institut de Physique de Rennes	ipr.univ-rennes1.fr	Rennes
Institut Langevin – ESPCI ParisTech	www.institut-langevin.espci.fr/home?lang=en	Paris
Labex SigmaLIM - Chaire BioIngénierie	www.bioelectrophotonics.org/about-us	Limoges
LEA EBAM	www.lea-ebam.cnrs.fr	Limoges
Montpellier RIO Imaging	www.mri.cnrs.fr	Montpellier
Polytechnique - LOB	www.lob.polytechnique.fr	Palaiseau
SPCTS/IPAM	www.unilim.fr/spcts	Limoges
Spectroscopie optique des vibrations du GHz aux THz	www.omega.univ-montp2.fr	montpellier
UBO-LSOL	www.univ-brest.fr/LSOL	Brest
UNIVERSITE D'AVIGNON	agrosociences.univ-avignon.fr	avignon
XLIM	www.xlim.fr	Limoges
Zoopole Développement	www.zoopole.com	Saint-Brieuc

Conclusions

The aim of this booklet is to promote the industrial and academic excellence of French biophotonics in order to improve its visibility at the European level. In France the sectors of “Future medicine” and “Individualised medicine” were selected as priority sectors and were allocated financial means available through two dedicated calls for proposals (Nouvelle France Industrielle & Concours Mondial de l’Innovation). French photonics and imagery sector should therefore be positioned as a key sector and providing technology solutions for these societal challenges by benefiting from the scientific and technological excellence and aiming at emerging applications (adaptive optics and Raman spectroscopy) and future technologies (multimodal imagery).

The portfolio of French biophotonics stakeholders presented in this booklet will also facilitate the envisaged future collaboration with existing platforms and networks such as Raman for clinics and Eurobiolmaging which are also one of the main ambitions of the OASIS project.

Expected achievements of OASIS project in France:

Three important challenges in Europe and in France are drawn in the OASIS project roadmap

- Improve the process of technology transfer from the phase of clinical and medical research to the development and market introduction phase;
- Foster involvement of big industrial companies and consolidate collaboration with SMEs in order to facilitate their access to a highly regulated medical market which demands important financial investments;
- Help SMEs to position themselves in the sector

This booklet can serve as a tool box for SMEs in the field of biophotonics or new-comers.

