FINDING YOUR RESEARCH PARTNER AT THE VUB

Excellent applied research and state-of-the-art facilities at your service

VRIJE
UNIVERSITEIT
BRUSSEL

ADVANCE IMAGING

INNOVATION IN FLUORESCENT IMAGING TECHNOLOGIES

Surpassing the human capability of vision by aiding it with high-tech sensors, biological contrast enhancement and computer processing offers immense innovation potential. Our aim is to advance innovative imaging technologies like e.g. fluorescence lifetime imaging and single-domain antibodies (sdAb) tracers, and their practical applications in life sciences, healthcare, medical research and beyond.

The 'Advance Imaging' consortium fosters innovation-driven collaboration among (bio) medical scientists, engineers, and medical doctors from VUB MITH, ETRO and UZ Brussel (Department of Surgery).

25+ researchers

5 patent applications

Horizon Europe Pathfinder project

GMP compliant production of lead sdAb in progress

Proof of concepts study of medical fluorescence lifetime imaging in progress

Clinical phase I study for lead fluorescent sdAb in preparation

CONTACT

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VUB - MITH,
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UZ Brussel, Dept. of Surgery,
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VUB ETRO ELECTRONICS & INFORMATICS

VUB IN VIVO CELLULAR & MOLECULAR IMAGING CORE FACILITY

VUB MOLECULAR IMAGING & THERAPY RESEARCH GROUP

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

- SdAb-based fluorescent tracers – Expertise to deploy sdAbs as effective molecular agents into the field of image-guided surgery and interventions.
- Fluorescence Lifetime (FLT) Imaging - Expertise in CAPS and SPAD sensor development, picosecond timing circuits, high-speed data platforms, proper sensor packaging and cooling to build cameras, as well as the object illumination to complete the instruments.
- Biomedical applications of FLT imaging – Deploying the technology to better delineate tumor margins during surgery and the use of endogenous and tissue specimen with FLT in medical applications.
- Multiscale in vivo imaging to understand drug biodistribution. - Intravital imaging and related expertise on animal manipulation, microscopy imaging and processing.
- In vivo imaging core facility- The MITH / ICMI core facility has a long track record to perform small animal imaging experiments to study the pharmacokinetics of novel drugs or non-invasively follow-up therapeutic treatments.

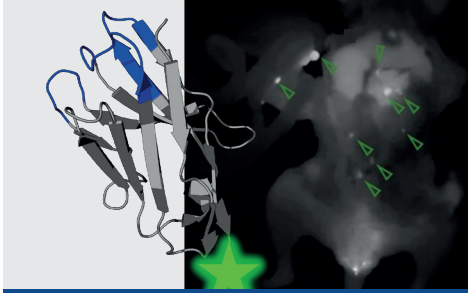
SERVICES OFFERED

- Tracer design, optimization, labeling, validation, and quality control.
- Preclinical validation, biodistribution and pharmacokinetics studies.
- Multiscale in vivo imaging to understand drug biodistribution (Intravital microscopy).
- Specialized preclinical research - FLT imaging.
- High-tech sensor and camera development.

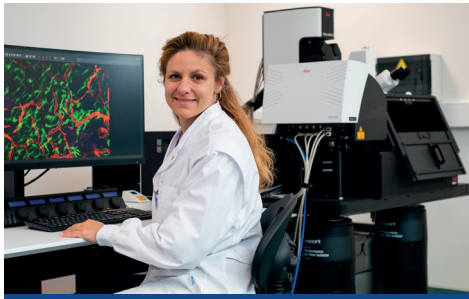
WHY CALL UPON US

- Extensive expertise and track record in tracers design and associated processes.
- Dedicated team for third party contracted preclinical research projects.
- State-of-the-art research laboratory with direct access to the animal facility.
- Extensive successful track record with Belgium and international pharma companies.
- Extensive knowledge of the time-of-arrival detection of (single) photons (FLT and ToF).
- Proven track record in sensor, picosecond timing circuits, and high-speed data platforms.
- Extend teams for complex problem solving and scientific support.

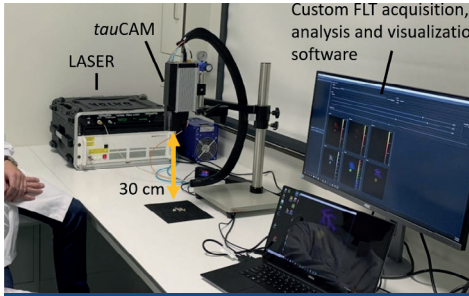
ADVANCEIMAGING.RESEARCH.VUB.BE



Sub-milimeter-sized tumor lesions highlighted in real-time during surgery.



Real-time imaging of biological processes within living organisms.



TauVivoTM – Preclinical Fluorescence Lifetime Instrument.

ARTIFICIAL INTELLIGENCE LAB

YOUR PARTNER FOR INNOVATIVE AI SOLUTIONS

The AI Lab GEAR is a consortium of 3 research groups, combining *complementary expertise in AI*. With expertise in computer science, economics, linguistics, physics, psychology, philosophy and mathematics, the consortium stands as one of the few truly interdisciplinary AI labs in Europe. Founded in 1983 as the first AI Lab on the European mainland, the lab is now globally recognized for groundbreaking research on *Reinforcement Learning and Multi-Agent Systems, Computational Creativity* and the continued work on *Agent-based Language Models*, building on the legacy of founder Luc Steels.

CONTACT

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12 Professors

87+ Researchers

1000+ Publications

5 Spin-offs

VUB ARTIFICIAL INTELLIGENCE RESEARCH GROUP

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

The AI Lab explores AI challenges to advance technology and tackle real-world issues. The key areas of expertise include: **Multi-Agent Systems**. Imagine a scenario where multiple agents, like virtual assistants or autonomous vehicles, interact and collaborate to achieve common goals. **Reinforcement Learning** enables agents to learn to take decisions through trial and evaluation, aiming to maximize rewards. **Cognitive AI** mimics human cognition, integrating neural networks and deep learning. **Knowledge Representation and Reasoning** focuses on how to represent and manipulate knowledge in AI systems effectively. **Emergent communication and language** investigate ways in which artificial agents can self-organize languages with natural language-like properties and how meaning can co-evolve with language. The AI Lab founded the VUB AI Experience Centre, promoting an open innovation ecosystem with over 20 demonstrators and prototypes on display. It also co-founded the AI for the Common Good Institute (FARI) for interdisciplinary AI projects with researchers and policymakers.

WE OFFER

- Bilateral and collaborative research projects at the Flemish (VLAIO), Brussels (Innoviris) and European (Horizon Europe) level.
- AI strategy workshops: To define AI strategies that create value for a business. Based on our experience from hundreds of interactions with businesses and organisations.
- AI missions: Bootcamps to introduce state-of-the-art cutting-edge AI technologies to specialized technical teams.
- Consulting activities: Tailormade services for PoCs, short-term assignments, and advisory roles as a neutral third party.
- Lifelong learning & training:
  - Educational talks to introduce the topic of AI to a wider audience
  - Postgraduate “AI for the Common Good”, organised by FARI, Brussels
  - “S.HE goes digital”, Executive Master in Digital and IT essentials, offered jointly by Université Libre de Bruxelles (ULB)

https://ai.vub.ac.be/

WHY CALL UPON US

The Artificial Intelligence Lab provides professional services to industrial partners:

- Joint Research & Development projects
- Trainings
- Short-term consultancy (make things happen at your company)
- Use case identification
- Inspirational sessions
- Recruitment screening

B-LIVER

THE BRUSSELS LIVER RESEARCH TO VALORISATION CONSORTIUM

The Brussels Liver Research to Valorisation Consortium unites the liver cell biology, pathology and toxicology expertise of Vrije Universiteit Brussels' IVTD and LIVR research groups. B-Liver's mission is primarily grounded in established models and technology, but also extends into higher-risk emerging innovations towards liver modelling, toxicity prediction and therapeutic strategies in liver disease. An key goal is developing in vitro liver models, adhering to the 3Rs principle (Reduction, Replacement, Refinement) to minimize animal use in research and testing.

EXPERTISE

The B-LIVER Consortium consolidates 30+ years of expertise in liver cell biology, pathology and toxicology. In addition to maintaining a robust network of scientific connections within academic institutions and regulatory bodies, B-LIVER team members are also actively engaged in multiple valorisation trajectories covering their various research projects through partnerships with key industrial partners.

Ongoing activities are grouped into 3 strategic clusters:

- **Innovative Therapeutics** (fatty liver disease, fibrosis, inflammatory diseases, inherited metabolic disorders).
- **Next Generation Risk Assessment** (Drug-Induced Liver Injury, Hazard-to-Risk Translation, conventional and advanced in vitro liver models).
- **Stakeholder Engagement** (dissemination, education, partnership building).

CONTACT

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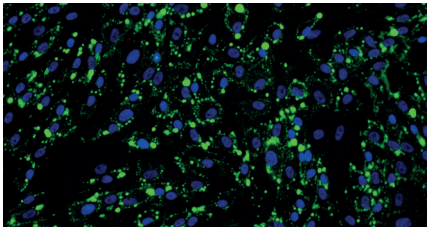


human skin stem cell-derived hepatic cells

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

SERVICES OFFERED

- Possibility to collaborate on innovative liver-based research projects.
- *In vitro* toxicity testing applying conventional and advanced liver models.
- Genetic reprogramming of somatic cells in induced hepatocytes (iHeps).
- *In vitro* disease modelling (fatty liver, metabolic dysfunction-associated steatohepatitis, fibrosis).
- Liver biology and toxicology consultancy.
- Public health and consumer safety consultancy.
- 3R alternative technologies and dissemination platforms.

WHY CALL UPON US

- Comprehensive knowledge portfolio was built over several decades regarding the development and optimization of liver-based in vitro systems.
- Expert advice & consultancy on in vitro experimental toxicology, stem cell technologies and animal-free chemical safety assessment.
- Scientific collaboration in the field of toxicology, liver cell biology and pathology research.

IVTD.RESEARCH.VUB.BE
LIVR.RESEARCH.VUB.BE

STAFF

11 academic staff

1 Valorisation Manager

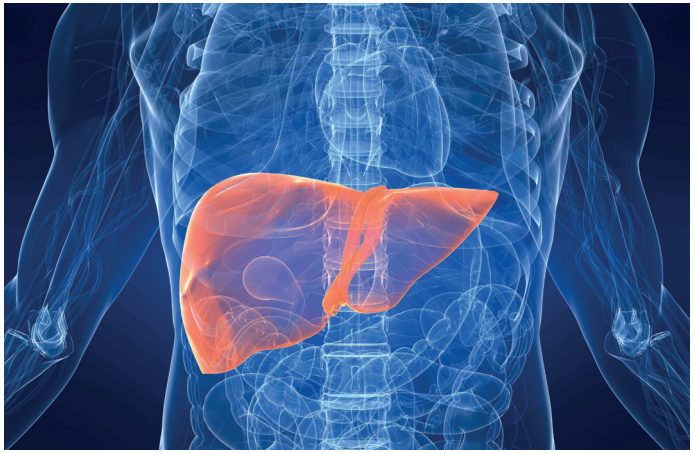
14 post-docs

31 PhD students

7 lab techs

2 admin

2 patent applications



BRUSSELS PHOTONICS - B-PHOT VUB

PHOTONICS INNOVATION POWERHOUSE FOR INDUSTRY

Photonics, the science and technology of light, is a key driver for the development of innovative products across diverse sectors, including Health, Digital Infrastructure, Manufacturing, Safety & Security, Space & Defense, Agro-Food, Mobility, and Energy. Since 1985, *B-PHOT VUB* has been at the forefront of photonics research and innovation. Equipped with state-of-the-art high-tech facilities for the design, prototyping, quality control, and pilot production of extreme optics, photonic components, and systems B-PHOT provides innovation support to companies worldwide.

75 photonics experts

4 business developers

100+ industry support cases

coordination of Europe's photonics innovation hub PhotonHub

in-house pilot line for extreme optics

supporting all industry sectors in need of photonics innovation

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VUB B-PHOT BRUSSELS PHOTONICS

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

B-PHOT researchers and technology experts push the boundaries of photonics beyond the state of the art, transforming breakthrough innovations into real-world applications. By collaborating with industry, they drive the development of next-generation products. B-PHOT is structured into six specialized research and innovation teams, focusing on Extreme and Freeform Optics, Photonics for Space, Optical Fiber Sensors, Biophotonics and Spectroscopy, Photonic Integrated Circuits, and Semiconductor Lasers.
These teams are supported by an in-house, state-of-the-art pilot line for optics and photonics manufacturing, integrating advanced technology platforms for 1) Optical Modeling & Design, 2) Prototyping & Upscaling of Optical Components, 3) Metrology & Quality Control, 4) Proof-of-Concept Demonstrators. Together, these platforms form a unique, world-class one-stop-shop for extreme optics and photonics manufacturing, accessible to start-ups, SMEs, and large-scale enterprises.

WE OFFER

- Orienteering and innovation support for photonics and non-photonics companies
- Modelling and design of optical systems
- Measurement and characterization of optical components in clean room conditions
- Prototyping of highly advanced optical components such as lenses, mirrors, gratings, free forms, micro- and nanostructures in various materials such as optical polymers, optical glasses, semiconductors, and metals
- Upscaling and small-volume replication of high-quality optical components
- Building and testing of optical system demonstrators
- Hands-on training in photonics technologies in our photonics experience center

WHY CALL UPON US

- We focus on the challenges and innovation support needs of companies
- We have a strong track record in supporting companies from various industry sectors
- We have a critical mass of technology experts ready to engage in industry projects
- We operate as a one-stop-shop for photonics innovation support
- We financially derisk our innovation support services for SMEs through co-financing from the “PhotonHub Europe” or “Digitalis” European Digital Innovation Hubs
- We have a global network of trustworthy technology partners who can complement our innovation services in case the requested support cannot be delivered by B-PHOT

www.b-phot.org

BRUBOTICS

SUSTAINABLE HUMANITY-CENTERED ROBOTICS

Brubotics, a consortium of ten research labs grouping 20+ professors and 150+ researchers from the VUB, is dedicated to advancing sustainable, humanity-centered robotics. Our mission is to lead innovation in robotics and AI that contribute to the SDGs, enhancing human quality of life and European productivity while balancing ecological, social, and economic impacts. Through interdisciplinary collaboration, Brubotics tackles critical challenges in healthcare, workforce dynamics, and industrial efficiency. Its focus areas include developing new core robotic technologies that push further the limits of robotics and enable new solutions to improve health outcomes through accessible health and care robotics, and driving sustainable practices in industries such production, logistics and manufacturing.

3 EIC projects and 1 ERC

30+ EU projetcs

50+ national projects

+20 patents

8 spinoffs

200+ scientific papers

BRUBOTICS
HUMAN ROBOTICS
RESEARCH CENTER

CONTACT

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Research & Innovation Manager
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GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

Brubotics connects academia, industry, and society to drive advancements in sustainable robotics. Robots combine advanced technologies - materials, sensing and perception, computing, and actuation - enabling them to address challenges in application areas such as manufacturing, logistics, healthcare, and more. Our expertise spans these domains, with a focus on wearable devices, multi-agent collaborative robots, AI-driven robotics algorithms, real-time control systems, and advanced sensing technologies. These innovations address pressing societal challenges, including an aging workforce, rising healthcare costs, and the need for industrial resilience.
By integrating diverse technologies, Brubotics ensures that progress promotes responsible growth and delivers lasting societal impact. We collaborate with companies across the robotics value chain to develop intellectual property, facilitate technology transfer, and create spin-offs. As a key partner of Flanders Make and imec, Brubotics offers tailored solutions, cutting-edge research programs, and state-of-the-art infrastructure to foster impactful innovation.

WE OFFER

- **Research & Development:** Specializing in robotics & mechanics, digital health, AI & multi-sensor software, biomechanics, and more.
- **Technology Application & Implementation:** Assisting in identifying real-world applications for hardware research.
- **Scientific Dissemination:** Providing evidence through scientific papers and research to support development.
- **Industry Partnerships:** Building long-term collaborative relationships and co-development projects with industry.
- **Consulting Services:** Offering precise, topic-specific expertise and advisory.
- **Workshops and Training:** Delivering specialized training sessions for industry professionals on cobots, exoskeletons, and more.
- **Lab Infrastructure:** Offering access to advanced state-of-the-art facilities in biomechanics, rehabilitation, motion capture, sport performance, and human-hardware testing.

WHY CALL UPON US

- **Excellence in Early-Stage Research:** Focused on groundbreaking innovations.
- **Highly Skilled Team:** 10 research labs and more than 20 professors and 150 researchers.
- **Advanced Technology and Equipment:** Cutting-edge resources for research.
- **Interdisciplinary Approach:** Leveraging knowledge from various fields.
- **Collaborative Experience:** Extensive experience with academic and industrial partners (over €15M in funding from 2020-2024).
- **Successful Stories:** Proven track record of launching tech spinoffs.

www.brubotics.eu

BRUBOTICS REHABILITATION RESEARCH CENTER

PATIENT-CENTERED ROBOTICS AND TECH-SUPPORTED REHABILITATION

The BruBotics Rehabilitation Research Center (BRRC) is an interdisciplinary innovation hub for human movement analysis and tech-supported rehabilitation at VUB Health Campus, near UZ Brussel. Focusing on patient-centered technology, robotics, and rehabilitation, BRRC connects with the Brussels' society and collaborates closely with local rehabilitation centers. BRRC opened in 2022, featuring cutting-edge equipment like the Vicon motion capture system, force plates, EKSONR exoskeleton, and a state-of-the-art treadmill for comprehensive research and rehabilitation.

CONTACT

VUB Health Campus,
Laarbeeklaan 121, 1090 Brussel.

The BruBotics Rehabilitation Research Center is located on the groundfloor of the Erasmus Hogeschool (EhB) building. You can reach the lab through entering the main entrance and following the blue signs, or alternatively you can follow the pathway from the parking leading to the back of the building for direct access to the BRRC.

Prof. Dr. Eva Swinnen
Director BRRC
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BRRC@vub.be

VUB BRRC BRUBOTICS REHABILITATION RESEARCH CENTER

CORE FACILITY

WHAT CAN OUR TECHNOLOGY DO FOR YOU

BRRC offers extensive support for health tech companies, making it an ideal partner for collaboration. Rent state-of-the-art rehabilitation materials, including exoskeletons, to enhance your product development. Our facilities are perfect for testing technology in early TRL stages, ensuring your innovations are robust and effective. You can also access our advanced motion capture system with expert support from our dedicated lab manager, ensuring precise data collection and analysis.

BRRC excels in research, hosting projects like SAIRE (smart rehab devices), TARGET (virtual twins), and REVALEXO (dual function lower-limb exoskeleton). We support clinical innovation and already collaborate with UZ Brussel to leverage our technology for treating patients with gait problems. Ready to expand clinical partnerships, BRRC also provides education on biomechanical analysis and technological devices for clinicians, students and researchers.

Our resources foster innovation and collaboration, helping you bring cutting-edge rehabilitation technology to the market.

To request a reservation of the lab and/or its equipment, we invite you to visit the reservation section of the website, or to contact us to learn more about the possibilities.

SERVICES OFFERED

- Advanced movement analyses (VICON, IMU, force plates,…) and physiological assessments.
- Education and training programs.
- Expert advice and support for clinical trials on rehabilitation technologies.
- State-of-the-art rehabilitation equipment rental (e.g., exoskeletons).
- Facilities for early-stage technology testing.
- Access to our advanced motion capture system with lab manager support.
- Collaboration opportunities for research and development projects.

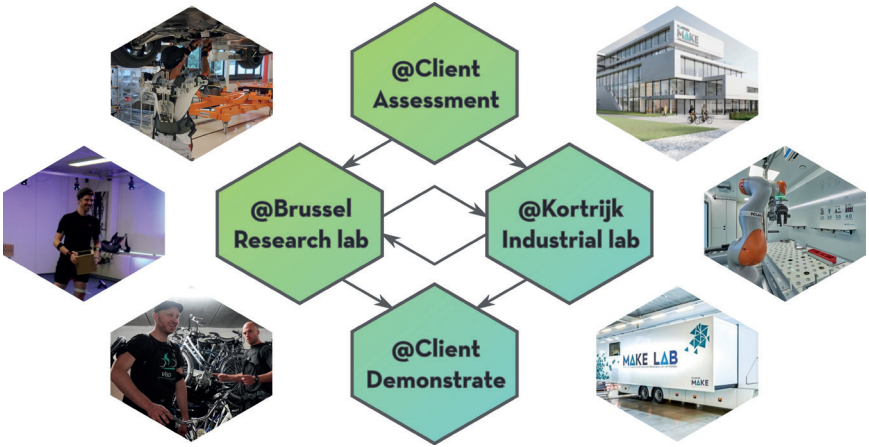
INFRASTRUCTURE

- 14 Vicon mocap cameras
- 3 build-in AMTI force plates
- 1 GAITRite system
- 16-channel Cometa EMG device
- MetaMax 3B gas analysis system
- EKSO NR gait rehabilitation exoskeleton
- Microsoft Hololenses
- VR devices
- Self-paced treadmill

ROBOTICS & MULTIBODY MECHANICS - R&MM

AUGMENTX REIMAGINES ERGONOMIC ASSESSMENT.

The Robotics and Multibody Mechanics, in short R&MM, research group was created by Professor Dirk Lefebre. He devoted his long career, to human robot interaction. Ankle prosthetics, rehabilitation robots and exoskeletons have all passed the revue. In 2021 he was awarded the "Hilde Bruersprijs voor Geneeskunde" which is quite a fee for a prof in robotics. At the same time, the first brick of the Flanders Make AugmentX infrastructure was placed. In 2024 the AugmentX Research lab in Brussel, and the AugmentX Validation and Demonstration lab in Kortrijk opened the doors. These environments, dedicated to human robot interaction is the foundation for contemporary and future research.



BRUBOTICS
HUMAN ROBOTICS RESEARCH CENTER

FLANDERS MAKE | AUGMENTX

CONTACT

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CORE FACILITY

WHAT CAN OUR TECHNOLOGY DO FOR YOU

Through measurements of forces, motion, physiological metrics and other signals, we are able to provide insights into the biomechanical condition. We dispose of an extensive array of measurement instruments which trade accuracy, intrusiveness and mobility. This allows us to nearly always find a sensor that fits the usecase. To handle the synchronization of data streams, custom software was developed. This results in a modular framework, where seamless integration of measurement devices is a given. The synergy between engineering, AI and high quality instruments allows, us to help shape the future of biomechanical assessment.

Today, we can assess the effectiveness of augmentation technologies and gauge for applicability to specific use cases. We can model the human machine interaction allowing us to optimize settings of augmentation equipment. We can help compagnies assess challenging work posts and offer diverse possibilities to find suitable solutions reducing fall out. We can provide real time ergonomic feedback which can be used for training, gamification and cobot control.

SERVICES OFFERED

We offer a vast range of services that gravitate around three topics:

- A holistic ergonomic assessment of work in the lab or anywhere else.
- Exploring the possibilities exoskeletons.
- Development and testing of collaborative (human - robot) environments.

Our standard services come in the form of a workshop, quick Ergonomic assessment or the rental of equipment. For pilot projects, cobot demonstrators, mechatronic demonstrators, or a specialised assessment, a personalised approach is needed.

CREDENTIALS

The AugmentX initiative opened its doors in Januari 2024. We work as an independent facility within VUB, Brubotics and R&MM. Till this day we have provided support to several research projects and performed dozens of exoskeleton workshops. When a project is too large for AugmentX, we can rely on our vast network of researchers part of our R&MM, Brubotics, VUB and Flanders Make networks to provide the necessary support.

All the prices are available on the website. And quotes are free of charge.

WWW.AUGMENTX.BE

FERMENTED FOOD PILOT PLANT

BREWERY – BAKERY – CHOCOLATE FACTORY

The Fermented Food Pilot Plant (FFPP) is part of the Research Group of Industrial Microbiology and Food Biotechnology (IMDO), whose research focusses on food fermentation processes and functional starter cultures. Unexplored/poorly explored fermented foods of animal and plant origin are studied, as well as the functional role of the microorganisms involved (lactic acid bacteria, acetic acid bacteria, catalase-positive cocci, and yeasts), to understand these fermentation processes and their impact on the end-products (yoghurt and cheese; fermented meat products; sourdough and borş; cocoa, coffee, and exotic fruits; lambic beer and sour ales; vinegar; water kefir; and kombucha).

25 researchers

400 peer-reviewed publications

50 defended PhDs

pilot plant facility

CONTACT

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VUB INDUSTRIAL MICROBIOLOGY & FOOD BIOTECHNOLOGY RESEARCH GROUP

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

The FFPP was established to valorize 30 years of IMDO's microbiology and food biotechnology research in and expertise on sourdough and bread production, cocoa fermentation and chocolate production, and spontaneous beer fermentation and sour beer production. A deep understanding of these fermentation and production processes through microbiological, metabolomic, (meta)genomic/transcriptomic, and technological analyses (including inline and online monitoring), allows not only their optimization but also the development of new and innovative fermentation and production processes. The application of innovative functional starter cultures can steer these fermentation processes to produce (new) fermented foods and beverages with enhanced food safety, organoleptic and artisan quality, nutritional value, and authenticity.

WE OFFER

- Multiphasic research in a well-equipped laboratory with a distinct state-of-the-art infrastructure, supervised by an experienced academic staff
- Two brewery lines with three fermentors of 600 L and six fermentors of 60 L, respectively
- Two bakery lines with a capacity of 20 yeast-leavened breads and 20 sourdough breads
- One bean-to-bar chocolate production line with a capacity of 60 kg
- Online and inline monitoring of various process parameters during beer, bread, and chocolate production
- A specific analytical laboratory for the analysis of cereals, flours, breads, malts, and beers

https://imdo.research.vub.be/

WHY CALL UPON US

- Support from idea generation up to pilot-scale testing
- Working with a professional baker and brewer
- Unique and key player in food fermentation research for more than 30 years
- Unique research chain and extended state-of-the-art research infrastructure
- Ready-to-use portfolio of functional starter cultures
- Extensive industrial network and research collaborations

HOUSE OF SUSTAINABLE TRANSITIONS - HOST

ANALYSING SUSTAINABILITY, MOBILISING PEOPLE, TRANSFORMATIVE LEARNING

House of Sustainable Transitions (HOST) is a transdisciplinary research platform consisting of more than 200 researchers and 44 professors from 19 different VUB research groups all united around the mission to accelerate the transition to a more sustainable society. The expertise in HOST is clustered in 5 interdisciplinary domains (energy, mobility, economy, food and building) and 3 main drivers (climate, biodiversity and well-being). This interdisciplinary approach is complemented by 3 transversal axes focusing on methods and tools for analysing sustainability, mobilising people, and transformative learning.

EXPERTISE

With an inter- and transdisciplinary approach for a systemic view, a wide range of expertise is combined in HOST. In the **energy** sector, expertise spans multi-energy systems, positive energy districts, biomass, hydrogen and energy communities, covering feasibility and design studies, governance aspects and participatory approaches. In the field of **mobility**, HOST brings together expertise in urban mobility challenges, sustainable logistics and active mobility. In the **building** sector circular building practices, eco-design, and sustainable structural design and construction are combined. For the **food** sector, expertise from agriwilding and agroecology, the intersections of sustainable and healthy food consumption to marketing and communication around food is brought together. In the domain of **economy**, the expertise ranges from the circular economy, labour economics, just transitions to marketing and consumer behaviour. Next to domain specific expertise, HOST brings together expertise transversally on climate, biodiversity and well-being.

VUB HOST HOUSE OF SUSTAINABLE TRANSITIONS

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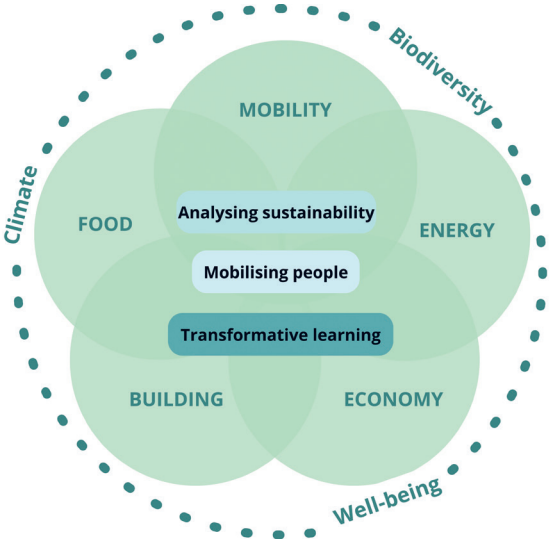
GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

SERVICES OFFERED

- Systematic and comprehensive life cycle assessments for evaluating the environmental impacts of a product, process, or service.
- Nuanced and differentiated external cost calculations with the External cost Calculator (ECC).
- Labelling designed to provide consumers with information about the environmental and ethical aspects of a product.
- Collection and analysis of data related to individuals' actions and choices, with the goal of enhancing data-driven, environmentally friendly behaviour change.
- Extensive support for the initiation and execution of participatory planning activities.
- Decision-making methodologies for evaluating and selecting sustainable solutions in complex, multi-stakeholder environments (e.g. MAMCA and SIS).
- Participatory scenario planning merging system dynamics and forecasting techniques.



WHY CALL UPON US

- One stop shop for sustainability.
- Inter- and transdisciplinary approach for a systemic view.
- Objective academic partner for analysis of sustainability and mobilisation of people.
- Integration of different sectors with high impact on climate, biodiversity and well-being.
- Organisers of transitions bootcamps to empower stakeholders to tackle the sustainability transitions.
- Factor 8 process as a holistic guide for catalysing transformative change.
- Strong network of partners, coming together regularly during Open House events.

19 departments

41 professors

200+ researchers

WWW.HOUSE-OF-SUSTAINABLE-TRANSITIONS.BE/

WWW.LINKEDIN.COM/COMPANY/HOST-VUB/MYCOMPANY/

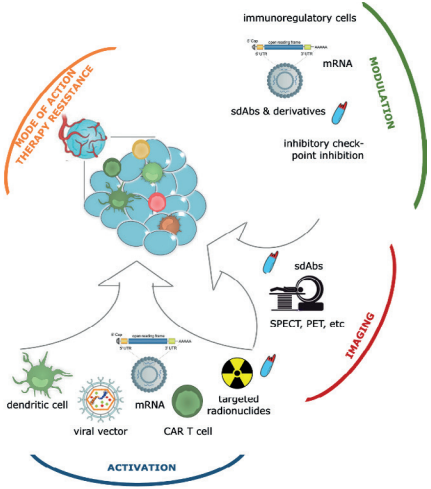
INTEGRAL

INTEGRATING A MULTIMODAL APPROACH TO ADDRESS CURRENT CHALLENGES IN IMMUNOTHERAPY

Utilizing the immune system or components thereof has grown to be a powerful therapeutic option in cancer and other diseases. However, not all patients respond equally well to immune-based therapies, highlighting the need for improving immunotherapy outcome. The INTEGRAL IOF program aims to address this issue, by offering services and tools for immune stimulation (ACTIVATION), negating immunosuppressive cues (MODULATION), steering drug development (analysis of MODE OF ACTION and THERAPY RESISTANCE MECHANISMS) and driving patient selection and monitoring of therapy response (via in vivo IMAGING).

WHY CALL UPON US

- Preclinical mouse models for cancer, brain diseases and infectious diseases
- IP-backed sdAb and cell-based therapies from bench to bedside
- Molecular Biology Core Facility, featuring viral vector and mRNA platforms
- In vivo Cellular and Molecular Imaging Core Facility
- GMP Vector Development Unit



IOF-GEAR
INTEGRAL

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GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

Our consortium offers complementary expertise, know-how, infrastructure and technologies originating from 3 VUB laboratories (Brussel Center for Immunology; Molecular Imaging and Therapy; Translational Oncology Research Center) in the following focus fields:

- Preclinical and translational research in cancer (including lung, breast, ovarian, colorectal and melanoma), in brain disease. (including glioblastoma tumors and neurodegenerative disorders like Alzheimer's disease, frontotemporal dementia) and infectious disease (including trypanosomosis).
- Multi-omics, phenotypic and functional immunobiology and heterogeneity analysis of immunostimulatory and immunoregulatory cells (macrophages, dendritic cells, regulatory and effector T-cells).
- Development and validation of single domain antibodies (sdAbs) for immune checkpoint blockade, immunoregulatory cell targeting, targeted drug delivery, targeted radionuclide therapy and molecular imaging.
- Development and validation of cell therapies based on dendritic cells, CAR-T cells and macrophage engineering and replacement.
- Clinical translation of single domain antibodies, mRNA and dendritic cell therapies.

BCIM.RESEARCH.VUB.BE

MITH.RESEARCH.VUB.BE/en

LMCT.RESEARCH.VUB.BE/KARINE-BRECKPOT-0

SERVICES OFFERED

- In vitro, in vivo and ex vivo analysis of therapeutic mode-of-action and mechanisms of therapy resistance.
- Preclinical molecular imaging for biodistribution and pharmacokinetic studies.
- mRNA platform for personalized vaccines and to engineer immune cells in vivo or ex vivo.
- Lentiviral and retroviral vector platform for genetic manipulation of human and mouse cell lines and primary cells such as T-cells.
- Small-scale GMP production of sdAbs and other biomolecules.
- Clinical validation of radiolabeled ssdAbs and other biomolecules.

PATENTS

Patents and patent applications available for licensing from the consortium include among others patent families related to sdAbs for molecular imaging and therapeutic targeting of immune checkpoint inhibitors (2), of tumor-associated macrophages (2), of tumor-infiltrating regulatory T cells (2) and of effector CD8b-positive T cells (1), as well as patent families related to mRNA expression platforms (2), to therapy using tumor-derived dendritic cells (1) and to vaccine compositions for Trypanosomatids (1).

MOBI – ELECTROMOBILITY RESEARCH CENTRE

EUROPE'S LEADING ELECTROMOBILITY RESEARCH HUB

MOBI is a European leader in electric and autonomous vehicle technologies, grid integration, and socio-economic impact analysis. With 50 years of pioneering research, MOBI has cemented its position as a key reference centre, supported by an interdisciplinary research hub of over 120 experts delivering insights and transformative innovation.

WE OFFER

We offer specialised services designed to support and analyse companies in advancing sustainable mobility solutions, including:

- Battery prototyping, from powder to coin and pouch cells, tailored to your specific requirements.
- Advanced electrical, thermal, and electrochemical characterisation of batteries to optimise performance.
- Advanced lighting, optical and visual communication solutions that integrate with sustainable mobility.
- Comprehensive performance assessments of power electronics (Reliability and lifetime testing), electric machines, drivetrains, co-design optimisation of power electronics systems, hybrid multi-energy sources and vehicle drivetrains.
- Development and testing of energy management and smart charging systems
- Design of sustainable local energy and mobility hubs.
- Strategic planning and management of EV fleets and charging infrastructure to maximise efficiency and accessibility.
- Multi-criteria impact analysis, TCO, LCA and user acceptance studies for electric and autonomous vehicles.

VUB mobi ELECTROMOBILITY RESEARCH CENTRE

CONTACT

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Prof. Joeri Van Mierlo
Head of MOBI – Electromobility Research centre

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35 running EU projects

120 experts – multidisciplinary team

250 research projects last 5 years

50 years pioneer in Electric Vehicle research

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

Our expertise spans several key research areas, allowing us to address challenges across within the field of electric and autonomous mobility:

Battery Technology

- Next-generation battery prototyping, manufacturing, testing, and modelling.
- Optimisation of battery performance.
- Development of smart batteries, including sensors, self-healing and advanced battery management system.

Energy Management and Grid Integration

- Smart and bidirectional charging solutions for enhanced energy flexibility and grid integration.
- Multi-energy software platform for Sustainable Local Energy Systems design and optimised management.

Vehicle Technology Innovation

- Efficient Power Electronics with emerging wide bandgap (SiC & GaN) for next generation powertrains.
- Digital twin for design (DT4D) and Digital twin for reliability (DT4R).
- Co-design optimization of next generation drivetrains with ECO-energy strategies.
- Lighting communication technology for autonomous and connected vehicles.

Socio-Economic and Market Analysis

- Socio-economic evaluations tools, including Total Cost of Ownership (TCO) and Life Cycle Assessment (LCA).
- Consumer behaviour studies and electromobility market analysis to guide policy and strategy.
- Simulation and optimisation of EV fleet management and charging infrastructure location.
- Public lighting, vehicle lighting and light pollution.

WHY CALL UPON US

- Comprehensive Battery Testing Facilities.
- Advanced light technology solutions.
- Advanced Power Electronics and Automotive Testing Labs.
- Electric and Autonomous Vehicle Testing Infrastructure.
- Living Lab for Multi-Energy Systems.
- Expert Team of Researchers.
- Proven Track Record in Industry Collaboration.

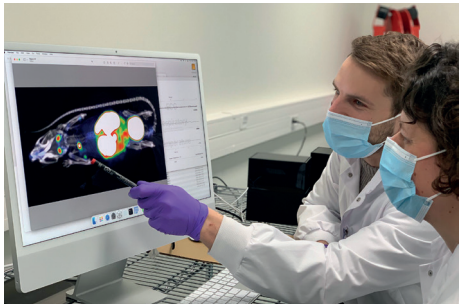
MOBI.RESEARCH.VUB.BE

MOLECULAR IMAGING AND THERAPY CENTER OF EXCELLENCE - MITH

PROTEIN-BASED TRACERS FROM BENCH TO BEDSIDE

We are specialized in protein-based nuclear/optical imaging and targeted radionuclide therapy, with focus on single-domain antibody (SdAb).

Our mission is to facilitate and promote the use and development of protein-based tracers in translational research. We operate various core facilities on the VUB Health Campus including dedicated cleanrooms at UZ Brussel, all working in unison to bring tracers from bench to bedside. All facilities are open for collaboration with industrial and academic partners. Various SdAb tracers are available for partnering or licensing, incl. tracers targeting immune cells and immune checkpoint inhibitors.



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Brussels Imaging Pharmacy

VUB IN VIVO CELLULAR & MOLECULAR IMAGING CORE FACILITY

VUB MOLECULAR IMAGING & THERAPY RESEARCH GROUP

CORE FACILITY

WHAT CAN OUR TECHNOLOGY DO FOR YOU

Do you wish to design/ optimize a radiotracer or fluorescent tracer, acquire deeper insights into fundamental research questions, better understand drug targeting and pharmacokinetics in order to accelerate drug development and/ or produce or radiolabel a small GMP batch of a biomolecule?

We provide you with the necessary expertise and infrastructure:

- The ***In Vivo* Cellular and Molecular Imaging (ICMI) core is** equipped with a myriad of high-end in vivo and ex vivo imaging instruments for small animals to study tracer biodistribution, PK, dosimetry, and efficacy of (radio)pharmaceuticals, and with a vivarium for the housing of animals.
- The Pichia-based **Vector Development Unit (VDU)** provides a 'one-stop-shop' service from the design of the protein-based tracer up to delivery of small-scale GMP grade modified and derivatized tracers to support small-scale toxicity and clinical studies.
- Our **radiochemistry production facility** develops, manufactures and distributes novel radiotracers.

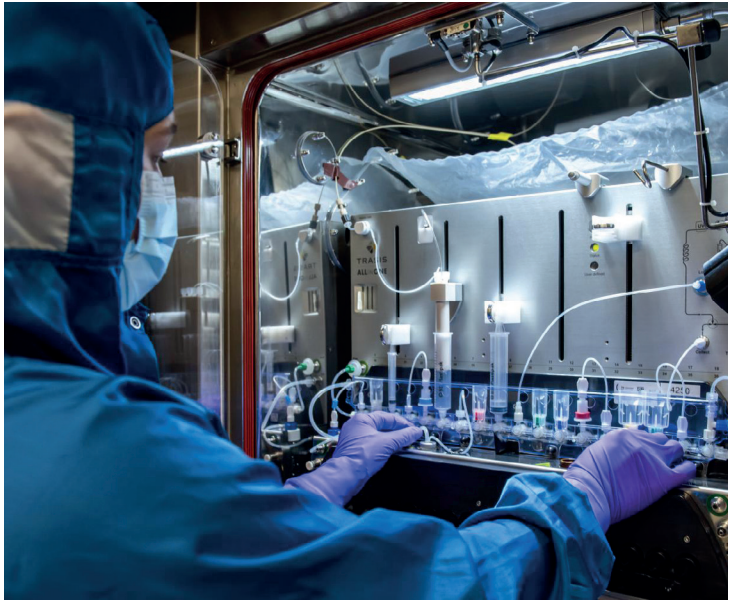
SERVICES OFFERED

- tracer design and optimization services.
- preclinical molecular imaging using a myriad of state-of-the art multi-modality cameras and ex vivo analysis techniques.
- intravital microscopy for microscopic imaging of living cells.
- small-scale Pichia-based GMP grade modified and derivatized tracers to support small-scale toxicity and clinical studies.
- GMP-compliant radiopharmacy for custom labelling of radiopharmaceuticals.

MITH.RESEARCH.VUB.BE/en

CREDENTIALS

- extensive track record on modified and derivatized SdAb who emerged as excellent tools for therapy, non-invasive imaging and other types of diagnosis.
- successful track record with (inter)national pharma and biotech companies.
- partner in IMI project network on 'Immune-Image: specific Imaging of Immune Cell Dynamics Using Novel Tracer Strategies".
- team members of MITH have been instrumental in spinning out Precirix and Abscint.



NEUR-O-AIMS

ALZHEIMER - DEMENTIA - MULTIPLE SCLEROSIS - ELECTROPHYSIOLOGY - NEUROCHEMISTRY - AI - MODELLING

NEUR, led by Sebastiaan Engelborghs, unifies all clinical researchers from the UZ Brussel departments Neurology, Neurosurgery and Psychiatry. NEUR is a part of the Center for Neurosciences of the VUB, of which Sebastiaan Engelborghs is co-director. He has interdisciplinary expertise in clinical neurology and neurosciences, including electrophysiology, neuro-imaging, biochemistry and neuropathology.
AIMS is an interdisciplinary research group that builds upon expertise in AI and clinical modelling, with extensive experience in the collection and advanced processing of large datasets. The interdisciplinary character is exemplified by the background of the two main PIs: Guy Nagels is a neurologist specializing in multiple sclerosis with a master's degree in computer engineering and is pursuing a DPhil at the University of Oxford. Jeroen Van Schependom is a Physics Engineer with a PhD and postdoc within medical sciences.

EXPERTISE

NEUR has built up expertise in clinical trials for neurological and psychiatric brain disorders for more than 20 years, taking up roles as PI and national or global coordinating physicians for several clinical trials, as well as being involved in the design of some of these clinical trials. Based on license agreements of **Sebastiaan Engelborghs** as a promoter with ADx Neurosciences (2012) and Epilog (2017), these companies became UAntwerp spin-off companies. Sebastiaan Engelborghs is inventor of a patent on an assay for the diagnosis of a neurological disease.

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VUB AIMS AI-SUPPORTED MODELLING IN CLINICAL SCIENCES RESEARCH GROUP

VUB C4N CENTER FOR NEUROSCIENCES RESEARCH CLUSTER

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

Guy Nagels a minority shareholder of **Icometrix**, and was involved with this biomarker spinoff company from the beginning. Before icometrix was founded, he published on the use of DTI in MS with Prof. Dr. ir. Wim Van Hecke, who is CEO and one of the two main co-founders of the company. DTI analysis is one of the services that is now commercialized in icometrix. Guy Nagels recruited the first person that was hired by icometrix, worked with the icometrix CBO to raise awareness for structural MRI biomarkers at several international events (for example ECTRIMS Barcelona 2015), was consulted by icometrix to determine the main focus for the extension of the company's activities into the clinical MS field, joined the icometrix CBO in successfully completed meetings to propose the biomarker services of icometrix to several pharmaceutical companies at their international management level, and joined the icometrix CBO in preliminary but high level talks on potential future reimbursement at the RIZIV.

SERVICES OFFERED

- Patient recruitment for studies.
- Brain image recording in patients and healthy controls.
- Neuropsychological testing in patients and healthy controls.
- Data analysis with classical statistics: correlation, difference testing.
- Data analysis with machine learning: classification, deep learning.

PATENT

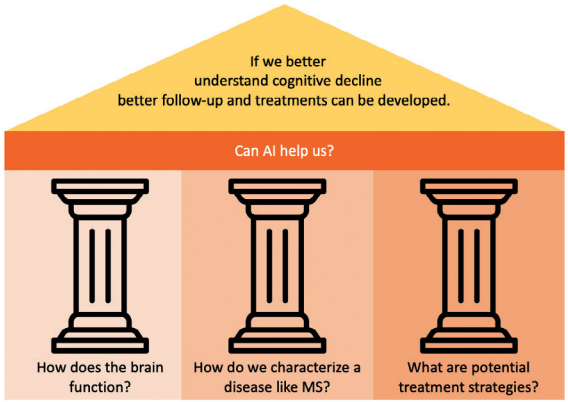
Sebastiaan Engelborghs is inventor of a patent on an assay for the diagnosis of a neurological disease.

PATENTS.JUSTIA.COM/patent/20190113527

WHY CALL UPON US

- Experience with collecting neurochemical markers: Aβ1-42, T-tau, P-tau181 and Nf-L.
- Experience with recording neuroimaging methods: fMRI, sMRI, DTI, MEG, EEG.
- Experience with processing each of these imaging methods.
- Sebastiaan Engelborghs is an authority on Alzheimer's disease in Belgium.
- Guy Nagels is an authority on multiple sclerosis in Belgium.

c4n.research.vub.be/
aims.research.vub.be/en
gf.vub.ac.be/neurowetenschappen.php



OPTIMISING LEGAL AND ETHICAL USE OF TECHNOLOGIES FOR CYBERSECURITY AND HEALTH - OCH

NAVIGATING COMPLEX REGULATORY LANDSCAPES FOR TECHNOLOGICAL INNOVATION

Established in 2003, the interdisciplinary Large Research Group on Law, Science, Technology and Society (LSTS) of VUB's Faculty of Law and Criminology, has earned international recognition as a centre of excellence, focusing upon the articulations of law, science, technology, ethics and society. LSTS comprises, amongst others, two distinct research groups: the Health & Ageing Law Lab (HALL) and the Cyber & Data Security Lab (CDSL).

HALL focuses on the interplay between EU laws and regulations on protection of personal data and the rights of data subjects in clinical research, analysing current trends in health data governance, and exploring legal and ethical dimensions of AI, Io(M)T, and digital technologies in healthcare contexts.

CDSL investigates the legal dimensions of cybersecurity and information security, regularly monitoring and assessing actual regulatory responses and policy-making options to address legal and ethical issues raised by new and emerging technologies in various domains of research.

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VUB CYBER & DATA SECURITY LAB

VUB HALL HEALTH & AGEING LAW LAB

VUB LSTS LAW, SCIENCE, TECHNOLOGY & SOCIETY RESEARCH GROUP

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

HALL and CDSL are uniquely positioned to collaborate with innovators for the development of digital health technologies, tools or systems in the field of health care and medical research. Both research groups bring extensive experience and expertise in supporting technological and industry partners to gain insights into the evolving regulatory environment and navigate complex legal and ethics compliance procedures. This is a result of the wide participation in EU-funded research projects and the cooperation with experts from various disciplines, contributing to the development of cutting-edge technological solutions in the domains of health, security, and environment, to name a few. In such context, HALL and CDSL are entrusted with the responsibility of ensuring that specific legal and ethical requirements are embedded as integral parts in the process of development of digital technologies, focusing on issues of privacy and data protection, data governance, and ethically-designed AI.

SERVICES OFFERED

Targeted research involving identification and analysis of legal and ethical implications in the development of digital health technologies, or systems collecting, processing and analysing any type of personal data.

ADVANTAGE

Drive innovation with legal and ethical considerations built-in as integral part of the process, in line with the 'by-design' and 'by-default' principles, ensuring that citizens have confidence that technology not only achieves required security objectives, but doesn't undermine fundamental rights, societal values, or legal protections of privacy.

SOME FIGURES

The CDSL team, led by Prof. Vagelis Papakonstantinou is composed of 7 senior researchers and 15 PhD researchers.

The HALL team, led by Prof. Paul Quinn is composed of 5 senior researchers and 10 PhD researchers.

Since 2018, HALL and CDSL have contributed to the successful implementation of more than 40 EU-funded research projects. 6 new EU research projects won in 2024.

HALL.RESEARCH.VUB.BE/

CDSL.RESEARCH.VUB.BE/

WWW.VUBTECHTRANSFER.BE/legal-and-ethical-use-of-technologies-and-health

SMIT – STUDIES IN MEDIA, INNOVATION AND TECHNOLOGY

MAKING TECHNOLOGY SOCIETY PROOF

The research group SMIT at the Vrije Universiteit Brussel & IMEC is a leading Social Science & Humanities Research Centre. We focus on digital media, innovation, and technology, with over 150 researchers. It explores themes like the digital society, media economics, and policy studies, providing insights into technology's impact on society and business. Our research covers digital inclusion, ethics, trustworthiness, user experience, and data-economics. Businesses collaborating with SMIT gain strategic foresight, actionable intelligence, and tools to navigate market and regulatory challenges, fostering innovation and leadership in a digital world.

EXPERTISE

SMIT excels in state-of-the-art digital innovation research, offering insights into the digital transformation in all the domains within society. Our expertise includes digital inclusion, ethics, user experience and human-computer interaction, aiding businesses in understanding consumer behavior. Our projects within the health domain explores the development and use of sustainable solutions for health care using different technologies (such as the use of AI, robot-surgery, home-assistence...) . Our work on Human-Robot Interaction provides insights into human-machine collaboration, driving innovation in digital transformation and automation. Collaborating with SMIT equips businesses with strategic foresight, actionable intelligence, and tools to navigate market and regulatory challenges, fostering leadership in a digital landscape.

SMIT.RESEARCH.VUB.BE

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VUB SMIT STUDIES IN MEDIA, INNOVATION & TECHNOLOGY | imec

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

SERVICES OFFERED

- User experience & user acceptance measurements.
- Developing guidelines & design roadmaps for trustworthy AI.
- Co-create Human-Machine, Human-AI & Human-Robot Interaction.
- Blueprint for data-governance & data-sharing.
- Real-life Living Lab multi-stakeholder testing & validation.

WHY CALL UPON US

- To develop trustworthy AI solutions (explainability, transparency,...).
- To set-up a multi-stakeholder co-creation R&D process.
- To perform user-centered design and evaluation.
- To test & validate new service and innovations in real-life settings.
- For AI Data-Act operationalization & compliance.

ADVANTAGE

Drive innovation to match people's interests, expectations and rights, by-design, by-default, and from the outset.

SOME FIGURES

SMIT is one of the largest Social Science and Humanities research groups in Europe with over 150 FTE interdisciplinary researchers

Strong track record in both EU and national R&D innovation research projects. Currently involved in over 20 EU projects

Core research partner within IMEC

Large partner network through memberships in a.o. ENoLL, BDVA, FARI.Brussels, Claire

Coordinator of the knowledge centers Mediawijs & Data & Maatschappij

SOFTWARE INNOVATION CLUSTER – SIC

ADVANCED SOFTWARE TECHNOLOGIES FOR DEVELOPING SMART, SUSTAINABLE AND SECURE SYSTEMS

The *Software Innovation Cluster* is an industry-focused consortium led by three professors from the Software Languages Lab (SOFT) at the Vrije Universiteit Brussel. Dedicated to bridging the gap between cutting-edge research and real-world applications, the consortium develops innovative technology that addresses the evolving needs of the software industry. Their expertise lies in *programing languages, frameworks, and tools* for developing *secure, smart,* and *sustainable software systems*.

3 Professors

20+ researchers

1 spin-off

VUB SOFTWARE LANGUAGES LAB

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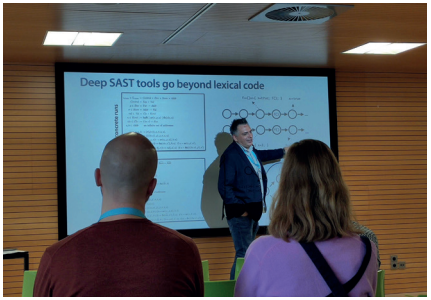

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

The **Software Innovation Cluster** has extensive expertise **in programming languages, frameworks, and tools** for developing **secure, smart,** and **sustainable software systems:**

- **Secure**: processes and tools required to implement DevSecOps, such as secure coding practices, tools for automated security testing, Infrastructure as Code, and software supply chain management.
- **Smart:** development practices and frameworks for AI-intensive systems (SE4AI), such as the scalable integration and deployment of models in existing software or the configuration of MLOps pipelines. Conversely, the consortium has expertise applying AI to software engineering artefacts (AI4SE), resulting in defect prediction models and business insights gained through software repository analytics.
- **Sustainable:** evaluating and improving the energy consumption of software systems, such as re-architecting IoT backends into energy-efficient event-driven, reactive, and streaming architectures.

WE OFFER

- **Bilateral and collaborative research projects** at the Flemish (VLAIO), Brussels (Innoviris) and European (Horizon Europe) level.
- **Consulting** activities: Services for PoC, short-term assignments, and advisory roles as a neutral third party.
- **Trainings** to introduce state-of-the-art advanced software technologies to specialised technical teams.
- **Workshops** and **seminars**

https://soft.vub.ac.be/industry/

WHY CALL UPON US

- Access cutting-edge software technologies developed by leading academic experts
- Benefit from expertise in secure, smart, and sustainable software systems development
- Engage in applied R&D projects to address specific industry challenges
- Receive tailored training and workshops for your technical teams
- Obtain expert consultancy for proof-of-concept projects and short-term assignments
- Gain insights from inspirational seminars on advanced software topics
- Collaborate with a network of researchers and industry partners

SUSTAINABLE CHEMICAL SEPARATIONS

INNOVATION IN TECHNOLOGY AND TRANSITION ROADMAPS

STEP-Chem develops feasible solutions for 'clean, green and lean' processing of chemical product and energy streams, accelerating industrial transitions to climate-neutral operations and circular economies. We combine :

- **technological expertise from the Chemical Engineering Department (CHIS), focused on Adsorption Science for separation materials, technology and process intensification.**
- **know-how of the Centre for Environment, Economy and Energy (C3E), focused on economic modelling, technology roadmaps and climate & energy policies.**

EXPERTISE

STEP-Chem's adsorption expertise targets to **ensure reliable, high-purity gas supplies for therapeutic and operational purposes.** Economic viability, life cycles, context-integration and regulatory roadmaps **enable companies to decide on short- and long-term investments.** Porous adsorption materials with large surface areas, tunable pore sizes, and selective adsorption capacities are exploited in advanced **Swing Adsorption** processes to maintain high standards. Applications relevant for the medical sector:

- **Production of medical-grade O2, He, N2 blends,** for respiratory treatments.
- **Purification of Air,** for sterile, healthy and dry environments.
- **Recycling of (anesthetic) gases,** for surgeries, but **potent GHG.**
- Removal of **hazardous and sterilization chemicals.**
- Recovery of **pharmaceutical ingredients**, like anti-cancer flavonoids from apple waste.
- Supply of renewable **biomethane energy**, as replacement for fossil-based natural gas.
- **Waste Heat** reuse for TSA-based technology can reduce a site's **energy-footprint**.

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VUB SUSTAINABLE CHEMICALS PRODUCTION RESEARCH GROUP

VUB CHEMICAL ENGINEERING RESEARCH GROUP

VUB BRUSSELS SCHOOL OF GOVERNANCE

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

SERVICES OFFERED

- Screening of adsorbents to capture target chemicals.
- Design of structured hybrid porous materials, improving capacities, functionalities and energy-efficiency.
- Modeling and Design of advanced Swing Adsorption processes, intensification and electrification studies.
- Experimental assessment in custom-build test setups, lab and pilot scale units.
- Techno-economics and (waste) energy integration studies.
- Product-related legal, economic and policy issues (e.g. environmental impacts, trading).

WHY CALL UPON US

- Expert track record in separation, purification and storage of chemicals. We can **benchmark, optimize and innovat**e your situation, including economic and life cycle aspects.
- State-of-the-art research lab, custom-build characterization devices, modeling tools and lab-to-pilot scale experimental setups. We can **predict, test and demonstrate** the solutions you need.
- Renowned position in policy networks, we can tell you why **regulations** are there and **what they mean (and will mean)** for your sector and business.

CREDENTIALS

30+ researchers

350+ publications

>€8,000,000€ research projects

3 patents
co-founder PharmaFluidics (2010)

3-floor lab infrastructure
2 pilot units (air, biogas)

field expert leads
Prof. Joeri Denayer
Prof. Sebastian Oberthür

WWW.LINKEDIN.COM/COMPANY/STEPCHEM
WWW.VUBTECHTRANSFER.BE/STEPCHEM

SUSTAINABLE MATERIALS TECHNOLOGY - SUMAT

ADVANCED CHARACTERIZATION AND PREDICTIVE MODELLING FOR NEW HYBRID SUSTAINABLE MATERIALS

CONTACT

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0473/26 27 50

The consortium exists of 2 main research groups: **Sustainable Materials Engineering** (SUME) and **General Chemistry** (ALGC). SUME is part of the engineering faculty and includes the lab of Electrochemical and Surface Engineering (SURF) and the lab of Physical Chemistry and Polymer Science (FYSC). ALGC is part of the faculty of Science.

The SuMaT project on **Sustainable Materials Technology** focuses on developing a research platform for advanced characterization and predictive modelling for new hybrid sustainable materials. As materials are fundamental to all technological products, choosing the best material requires innovative strategies, especially in line with the Green Deal policy. Material design impacts its entire lifecycle - from production to recycling - while fast-tracking sustainable materials to market offers economic advantages. Being able to simulate and predict the long-term behaviour is essential for the successful introduction of new materials to the market.

To address present-day challenges, SUME adopts a cross-disciplinary approach to material development, leveraging expertise in metals, polymers, and ceramics. This approach supports predictive modeling based on deep insights into material behavior and properties. The group is creating a platform for the virtual design of sustainable hybrid materials across diverse applications, including construction, robotics, and energy storage.

The group is setting up a platform for the (virtual) design of sustainable hybrid materials in diverse application domains (textile reinforced cements for light weight (fire-proof) constructions, geopolymers for civil structures, robotics for manufacturing and personal assistance, smart materials for industrial applications, batteries and capacitors for e-mobility,...).

By collaborating with ALGC, the group has expanded its capabilities from continuous modeling to multiscale modeling (e.g., DFT for molecular interfaces) and has integrated AI into corrosion research, aiming to apply it across other material domains.

VUB SUMAT SUSTAINABLE MATERIALS TECHNOLOGY RESEARCH CONSORTIUM

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

Our priority research:

- We aim at studying materials ranging from metals, over inorganic materials, to (bio)polymers and biomaterials, including their combinations and interphases, as well as the physicochemical processes underlying their formation mechanisms.
- Expanding our pursuit of state-of-the-art analytical techniques for fundamental studies of the structure of (hybrid) materials and their transformations.
- Developing multiscale modelling and artificial intelligence approaches to support the design of material from the atomistic and molecular levels to the macroscopic level, by accounting at all levels and interfaces for the fundamental structure formation mechanisms.

SERVICES OFFERED

We have a long history of collaboration with industry across various expertise areas, through bilateral agreements or externally funded projects at regional, federal, or European levels. These projects may involve individual companies or consortia with multiple partners.

- We develop novel sustainable materials by carefully selecting compositions and controlling the physicochemical processes of their formation.
- We enable the purposeful design of more sustainable materials by enhancing fundamental understanding of the relationships between molecular structure, processing, properties, and performance.
- Predictive multi-scale modeling is key to understanding and designing complex materials. Given the importance of sustainability, life cycle assessments of new materials are conducted in collaboration with internal and external groups.
- Our advanced characterization infrastructure, unique worldwide, allows comprehensive analysis of both organic and inorganic materials, from macro to nanoscale.

SUME - Sustainable Materials Engineering: 6 full-time professors/4 part-time professors/over 60 researchers (predoc and postdoc), including technical support, business development and administrative support.

MATERIALS CHARACTERIZATION - MATCHAR

UNRIVALED MATERIALS CHARACTERIZATION FROM ORGANIC TO INORGANIC, FROM MACRO TO NANOSCALE

The Materials Characterization Core Facility involves 2 VUB research groups: Sustainable Materials Engineering (SUME) - part of the engineering faculty, including the lab of Electrochemical and Surface Engineering (SURF) and the lab of Physical Chemistry and Polymer Science (FYSC) – and the group Analytical, Environmental and Geo-Chemistry (AMGC).

EXPERTISE

This core facility unites the extended and internationally unique position of VUB in terms of materials characterization techniques. The facility provides a collection of analytical tools, backed by long standing expertise of the participating research groups, that makes the characterization possible of all types of materials, going from organic (such as polymers, biological tissue, bones-teeth) to inorganic materials (metals, ceramics, rocks, water...). These techniques provide insights from the macro- to the nanoscale, focusing on bulk and individual phases as well as surface properties and compositional mapping at high-resolution.

The analytical equipment, in-house expertise and variety of materials covered is worldwide unique. The groups SUME and AMGC are internationally recognized for their state-of- the-art knowledge and developments in material characterization.

The research equipment is not only used by over 130 researchers from both groups mentioned, but also by a lot of other VUB departments. And there are structural agreements with several other Belgian and European universities, a.o. ULB, UAntwerpen, KULeuven, TU Delft, Oxford University,...

VUB MATERIALS CHARACTERISATION CORE FACILITY

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CORE FACILITY

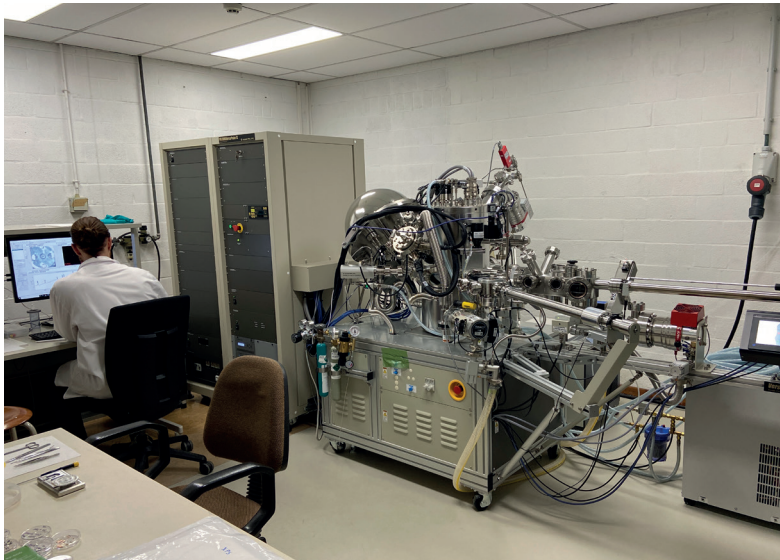
SERVICES OFFERED

MatChar offers an extended platform with state-of-the-art complementary techniques focusing on full materials characterization. A strong collaboration with industry already exists for many years.

- The entire spectrum of materials is covered, organic and inorganic, in- and ex-situ, on macro- and nanoscale.
- We have in-house expertise to do characterization of morphology, chemistry and functionality. Our in depth expertise is thé added value that makes the difference.
- We offer full material characterization, with different techniques:
  - o **Spectroscopical techniques**, amongst others X-ray Photo-electron Spectroscopy, Field Emission Auger Electron Spectroscopy, Raman,...
  - o **Microscopy techniques**, a.o. Atomic Force Microscopy, SEM, ...
  - o **Electrochemical equipment**
  - o **Thermal Analysis techniques**, a.o. TGA, TAM,...

CUSTOMIZED PROPOSAL

We work in bilateral agreement with industrial partners and make you a customized proposal related to your problem statement.



TECH4HEALTH

PIONEERING SMART TECH TOWARDS A HEALTHIER WORLD

Healthy living and a sustainable future of health and care delivery is undoubtedly embedded in technology and linked to interdisciplinary innovations.
The TECH4HEALTH consortium is determined to contribute to this (r)evolution. Two departments of the faculty of Engineering Sciences - Electronics and Informatics (ETRO) and Industrial Engineering Technology (INDI)- join forces to build a healthier society in a sustainable way. Our consortium builds on 50+ years of multidisciplinary engineering experience, grounded in fundamental & strategic basic research. We excel in translating findings into applied research and innovative products co-created with industry partners, societal organisations, government, academic hospitals and other health actors.
Over the last 20 years, 8 deep-tech spin-offs were successfully created, leading to more than 200 additional jobs.

EXPERTISE

Our team is committed **to challenge the state-of-the-art** by thinking outside the HealthTech box. We cover **skills** ranging from medical device and sensor design, multi-physics simulations, digital health, computer-aided diagnosis and therapy, surgical navigation, embedded system electronics, multi-modal low-level signal processing, medical image analysis, multi-modal and foundation models, computational imaging, secure communication, edge computing, machine learning, augmented and virtual reality, explainable and federated AI, trustworthy and transparent AI, … .
We offer our **expertise** in blending hardware, firmware, software and physical models ranging from rehabilitation engineering, improved preoperative planning, intra-operative visualization of functional regions, neurosurgical navigation, 4D perfusion and angiography, biomarkers for cognitive impairment assessment, surgical skill assessment, intra-abdominal pressure monitoring, indirect calorimetry, multimodal wearables, markerless motion capturing, pathology

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VUB ETRO ELECTRONICS & INFORMATICS

VUB INDI INDUSTRIËLE INGENIEURSWETENSCHAPPEN

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

computational microscopy, holographic head-mounted displays, secure medical data compression, explainable deep-learning for computer-aided diagnosis, multi-modal prediction models for diagnosis and prognosis, automated clinical coding, digital twins, etc.
We work closely together with external stakeholders, both at local and international level **towards a health(ier) society for all of us**.

SERVICES OFFERED

- Multi-modal biomedical signal and data acquisition systems.
- Medical image analysis.
- Biomedical engineering, including micro and opto-electronics.
- Multidimensional signal processing and communication.
- Seamless integration of hardware, physics-based models, and AI models.
- Multi-modal, explainable and federated AI.
- Computational Photonics.

WHY CALL UPON US

- Unique blending of hardware, software and physics-based model approach.
- Inter-disciplinary engineering approach.
- Successful industry research track record.
- Fostering innovation and entrepreneurship beyond the academic realm.
- Broad national and international network.
- Educational responsibility in three master programs, including the Master of Science in Biomedical Engineering.

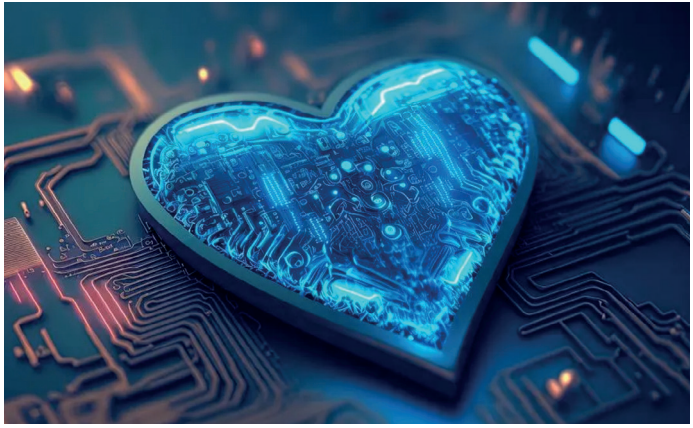
150+ international researchers

8 spin-off companies

30+ industry collaborations

25+ active granted patents (US and EU)

30+ collaborations with hospitals at national and international level



WWW.ETROVUB.BE

TOPGUN

PEPTIDOMIMETIC THERANOSTIC DEVELOPMENT AND GMP PRODUCTION PLATFORM

The TOPGUN Program, a platform for peptidomimetic theranostic development and GMP production, presents a two-fold opportunity: (1) the development of a platform for the systematic downsizing of nanobodies into peptides that can maintain or improve the functional activity and, where possible, eliminate or reduce their limitations; (2) centralized GMP production facility for radiopharmaceuticals, the 'Brussels Imaging Pharmacy' (BIP). This latter opportunity also includes a cyclotron and a quality control lab. BIP is also a center of expertise in clinical trials and regulatory processes.

EXPERTISE

We aim to use and valorize the facilities at the BIP to be used by third-party research groups and/or companies in Flanders and beyond for radiopharmacy that would not be possible in their own facilities. The BIP offers a number of advantages to these third-party users. Firstly, the centralized production site, in the heart of Belgium just outside Brussels, is close to patient centers for clinical trials and other radiomedicinal procedures. Secondly, there are technical advantages held in the cutting-edge equipment in place at the BIP facilities. Finally, there are significant administrative advantages such as the center of regulatory knowledge required for clinical trials and expertise in the development of new technical processes (e.g., with the cyclotron). We also possess significant expertise in the development of therapeutic peptides against various physiological targets including those for use in biomedical imaging applications and those derived from specific Nanobody-derived sequences.

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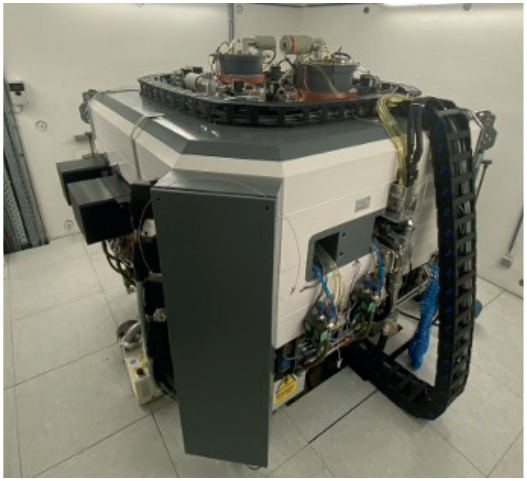

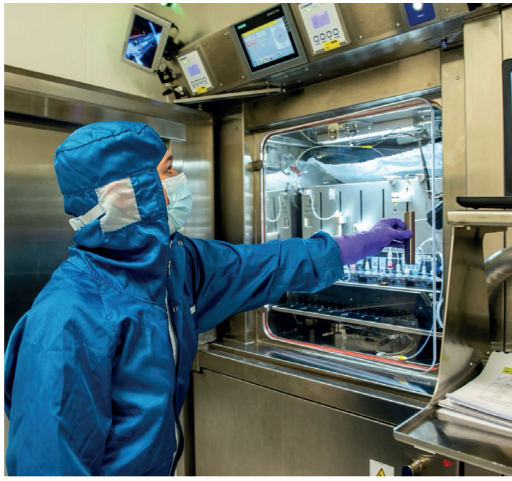

SERVICES OFFERED

- GMP-certified production of radiopharmaceuticals.
- High-capacity production (up to 20 Ci/700 GBq of 18F).
- On-site cyclotron and 6 hotcels.
- Regulatory know-how/IMPD input and services.
- Other services e.g., quality control equipment / analysis and technical development.
- Synthesis and development of peptides for use in diagnosis and/or therapy.

WHY CALL UPON US

- Quality and high-production infrastructure.
- Brings together know-how from four medical and academic centers.
- Optimises production capacity by sharing costs of investments and personnel.
- Allows contracts with the pharma industry with continuing expansion.
- Possibilities for contract research and (academic) clinical trials.

MITH.RESEARCH.VUB.BE/EN/BRUSSELS-IMAGING-PHARMACY

ORGC.RESEARCH.VUB.BE

µFLOW CELL

SCALING MICROFLUIDICS TO INDUSTRIAL APPLICATIONS

The **µFlow Cell** brings together four research teams of Vrije Universiteit Brussel (VUB) and Erasmus Hogeschool Brussel (EhB) in Belgium, with complementary expertise and infrastructure and a dedicated valorization manager, with the vision to become a world-leading research and innovation group in microfluidics.

"µFlow" refers to the microfluidics technologies of the team of Prof. De Malsche of the **µFlow Group**, which are at the core of this consortium. "Cell" refers to the medical applications as well as non-medical applications that are targeted. Medical applications rely on the team of Prof. Karine Hellemans of **Diabetes Pathology and Therapy** (DIAB), while the expertise in biotech for non-medical applications is contributed by the teams of Prof. Eveline Peeters of the **Research Group of Microbiology** (MICR) and Dr. Tom Peeters of the **Open BioLab Brussels**.

4 research groups

45 researchers

14 patent applications

2 spin-offs

MICROFLOWCELL.VUB.BE

VUB µFLOW CELL Scaling Microfluidics to Industrial Applications

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GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

EXPERTISE

The expertise of the µFlow Cell is focused on the following research lines:

- Single IMage PArasite Quantification in stool (SIMPAQ),
- engineering and production of microparticles,
- microdevices for advanced separations,
- biosensors,
- organ-on-chip,
- microbial cell factories,
- mycelium materials.

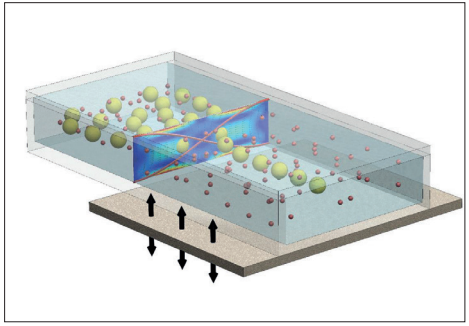
Research is performed by a dedicated team of experts and technicians with access to a microfluidics lab and workshop, cleanroom facilities equipped for advanced micro- and nanofabrication (core facility **MICROLAB**), microbiology lab (BSL-2), OpenBioLab Brussels, diabetes lab, animal testing (core facility **ANIM**).

SERVICES OFFERED

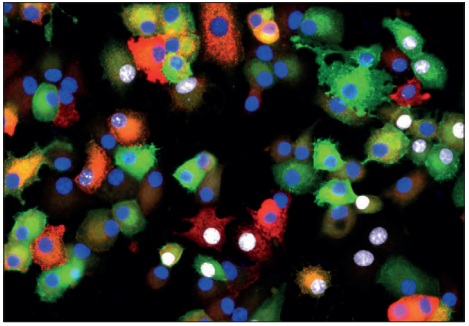
The **mission** of µFlow Cell is to enable with microfluidics new processes and products that are more performant, have a lower environmental footprint, and can improve the health of all.

The µFlow Cell aspires to cooperation with industry along three routes:

- design and modeling of innovative **microfluidic solutions** within the core research lines of the consortium,
- fabrication of **microfluidic devices and systems**, from prototype to small industrial series,
- engineering and production of **novel materials**, from **microparticles** for drug delivery to **mycelium-based materials** to replace leather, in lab to small industrial quantities.



ACOUSTIC MIXING AND SEPARATION



EFFECT OF DRUG CARRIED BY MICROPARTICLE ON PHENOTYPE OF BETA CELL

MYCELIUM HANDBAG BY ANOUK VERSTUYFT

MICROLAB

OPEN ACCESS CLEANROOM FOR GLASS & SILICON ETCHING OF MICROSTRUCTURED DEVICES

CLEANROOM

- All technology available for entire process flows, incl. patterning, etching, bonding and dicing.
- Wafer size of 100 mm.
- Feature size < 1 µm.
- Foster multidisciplinary research.
- Intensify cooperation with industry.
- Focus on microfluidic solutions for medical, pharma and biotech applications.

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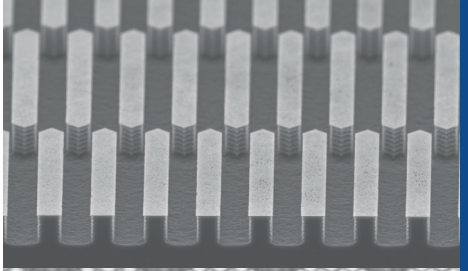

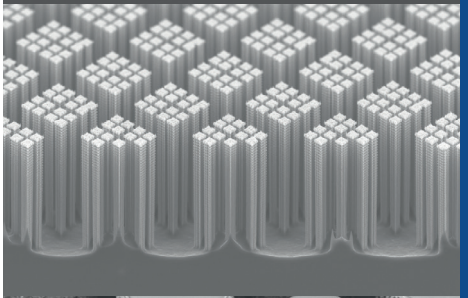

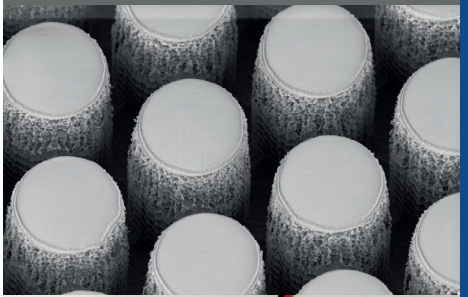

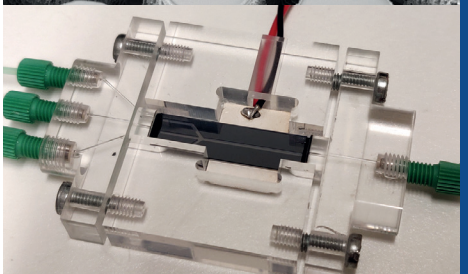

VUB MICROLAB CORE FACILITY

CORE FACILITY

WE OFFER

- Deep reactive ion etching (DRIE) of glass
- DRIE of Si
- Lithography
- Thermal evaporation
- LPCVD furnace
- Plasma cleaning
- Wafer bonding
- Wafer dicing
- Wet benches
- Characterization (SEM, optical microscopes, profilometer, …)

WWW.MICROLAB.RESEARCH.VUB.BE

300 m^2 class 100 area

250 m^2 technical area

Capacity of 5-8 FTE

Flexible office for users

Accessible with wheelchair

Located at Etterbeek Campus, Centre of Brussels

VIB-VUB CENTER FOR STRUCTURAL BIOLOGY

NANOBODIES FOR BIOTECHNOLOGY AND HEALTH

At the VIB-VUB Center for Structural Biology, we study the structure and dynamics of macromolecular complexes in health and disease to explain their mode of action. We integrate our structural biology work with genetic and cellular studies, aiming to bridge molecular and cellular resolution. We excel in translating our discoveries into biotechnological and medical applications.

EXPERTISE

Bridging molecular and cellular resolution

We envision a structural biology that is increasingly closer to the cellular context, working on in situ or ex vivo samples, with minimal manipulation and as close as possible to the physiological processes under study. We aspire a further integration of time as an integral dimension of the structural biology principles we study. We envision a structural biology that transcends the explanatory power of the technique, into an exploratory instrument that leads to the discovery of novel biological pathways.

We answer key questions on biological systems, primarily located in the field of protein signaling cascades and host-pathogen interaction. Atomic level structural and biophysical insights are challenged and validated in their biological context through prediction and in vivo and in vitro experimentation, generating integrated models of the mode of action and regulation of the molecular processes and pathways involved.

VIB-VUB CENTER FOR STRUCTURAL BIOLOGY

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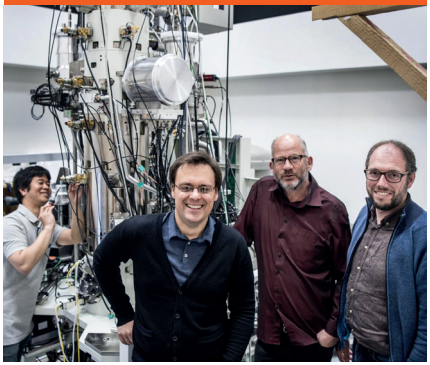

GROUP OF EXCELLENCE IN APPLIED RESEARCH - GEAR

CREDENTIALS

The prime example is the development of our Nanobody® technology, which gave rise to established spin-off companies. The center's expertise in nanopore technology has also led to a collaboration between CSB and Oxford Nanopore Technologies leading to the development of a new key element of state-of-the art sequencing tools.

PATENTS

We have a remarkable track record in turning excellent fundamental research into value for society. Since 2010, our center filed more than 20 patent applications in 9 different application areas.

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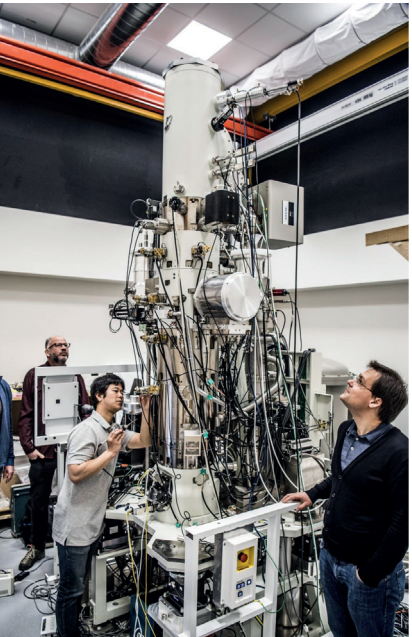
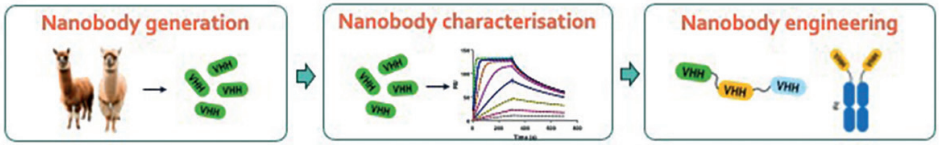


VIB NANOBODY CORE FACILITY

YOUR ONE STOP NANOBODY SHOP

Nanobodies are a unique form of Mabs derived from camelid heavy-chain antibodies, characterized by a single antigen binding domain. Nbs are small, stable and easy to produce in various host cells. Nbs bind their targets with nM affinities and often interact with epitopes that are less accessible to/or less immunogenic for classical Mabs. These characteristics make Nbs ideal for a wide range of applications: immunotherapeutics for both human and animal diseases, molecular imaging, crystallization aids, biosensor applications or as companion diagnostics. Founded in 2005 by a team of VIB scientists based at VUB, the Nanobody Core is internationally recognized as a reference center in Nb technology.



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VIB NANOBODY CORE

CORE FACILITY

WHAT CAN OUR TECHNOLOGY DO FOR YOU

VIB Nanobody Core provides expertise on various aspects of Nanobody technology and makes Nbs available as a service to all scientists in both academia and pharma/biotech companies. Our basic service package covers the immunization of a camelid, VHH library generation and the generation of a set of Nbs from this library. Our second platform covers the characterization of Nbs, from off-rate screening on crude extracts to in depth affinity and stability determination on pure Nbs. The last platform we offer consists of Nb engineering and formatting, covering sequence optimization, humanization, manifold constructs and fusions to Fc domains and half-life extensions modules. We offer advice every step of the way and our services are fully customized to our client's needs.

Our internal research activities are geared towards generation of new universal tools for antibody constructs. A case in point is the generation and optimization of serum half-life extension Nanobodies binding to serum albumins of humans and different experimental animal species. Our humanized anti-HSA Nb cross-reacts to cyno, mouse and rat albumin and shows superior (thermo-) stability and solubility.

SERVICES OFFERED

- Camelid immunization and Nanobody library generation.
- Panning and screening of Nanobody libraries.
- Initial off-rate and epitope binning characterization.
- Affinity & stability determinations (kon, koff, Tm, etc…).
- Nanobody engineering: multiples, Fc and other fusions.
- Nb sequence optimization & humanization.
- Fully customized services based on client needs.

COST

- All of our services and costs are customized.
- Quotes are made based on the project that the client is interested in.

NANOBODYCORE.SITES.VIB.BE/en

EXPLORE VUB'S CUTTING-EDGE RESEARCH AND INNOVATION **ALSO ONLINE!**

Stay up to date with our Groups of Excellence in Applied Research (GEAR) and discover the advanced Core Facilities on our webpages:

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Pioneering Applied Research
Scan the QR code to learn more!

CORE FACILITIES
Top-tier Research Infrastructure
Scan the QR code to discover!

TOGETHER,
WE CONNECT SCIENCE & SOCIETY

At **VUB TechTransfer**, we bridge the gap between research and real-world impact. Whether through strategic **partnerships, cutting-edge collaborations, licensing, spin-offs, or expert consulting**, we help turn innovation into action.

Looking to collaborate? Get in touch with our researchers today!

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VUB TECHTRANSFER