Centre de Nanosciences & de Nanotechnologies

RECENT BIOMEDICAL ACTIVITIES AT C2N

The GLUCOPASS project is selected by the “Poc-In-Labs 2023” project call at Université Paris-Saclay

The project aims at assessing the relevance of a recently patented, original passive inductive sensor for low cost, non-contact, non-invasive measurement of blood glucose. A demonstration prototype will be developed and implemented in vitro to ascertain the ability of this sensor to track changes in glucose concentration in a blood solution, circulating in a biomimetic phantom, in the presence of environmental and physiological perturbations. This project will be carried out by Microsystems and NanoBioFluidiques Department at C2N, together with collaborators from SATIE, CYU Paris Cergy Université.

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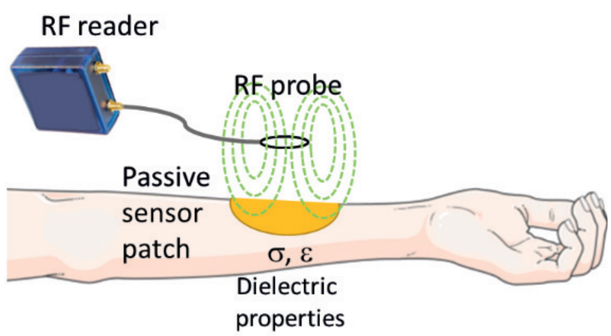

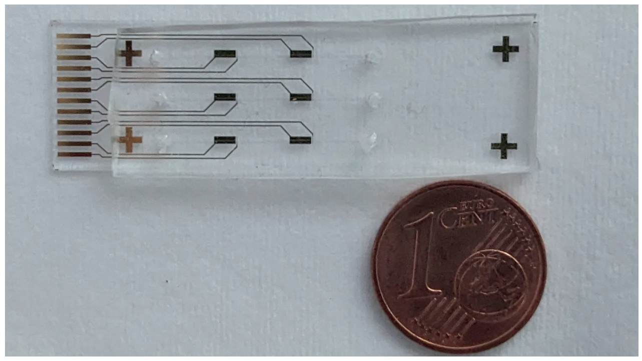

The HORMONIC-CARD project is selected by the “Poc-In-Labs 2023” project call at Université Paris-Saclay

This project, with a strong socio-economic impact, offers, thanks to the coupling between electrochemistry and microfluidics, a new technical solution for a sensitive, specific, portable sensor to detect simultaneously 3 hormones used for monitoring them before assisted medical procreation. This lab-on-chip will significantly improve the treatment process and benefit patients, doctors and the healthcare system. This project will be carried out within the Biosys team of the MicroSystems and NanoBiofluidics department of C2N, in collaboration with the “Service de la reproduction” (Angers University Hospital, CHU) and the MINT laboratory (University of Angers).

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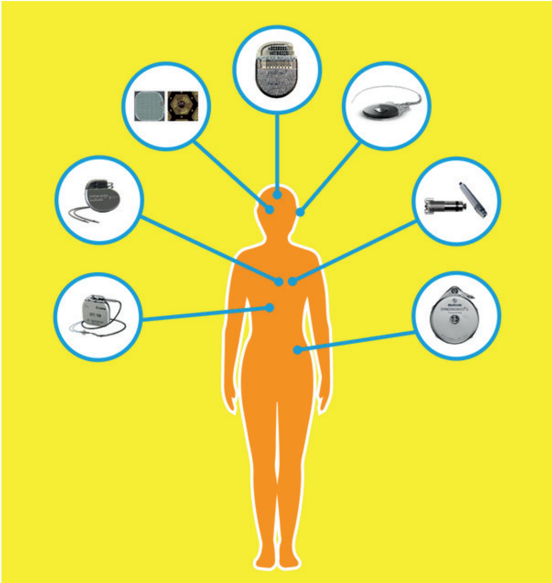
ABOUT US

AROUND 400 MEMBERS
173 PERMANENT RESEARCHERS, ENGINEERS AND ADMIN STAFF
200 PHD STUDENTS AND POST-DOCS
43 NATIONALITIES

2,900 M² CLEANROOM
600 PROCESS TOOLS
50 M€ TOTAL EQUIPMENT
170 FACILITIES



Creation of the FESTIN Joint Laboratory between C2N and MISTIC

The C2N, Microcapteurs pour le Biomédical team1 and MISTIC2 (MIcro Structuration of Titanium for Innovative Components) have created a joint laboratory (LabCom) called FESTIN (Filière Emergente de Systèmes en Titane pour Implants Novateurs) with the support of the French National Research Agency (ANR) to develop innovative titanium-based packaging, thus paving the way for new generations of implantable medical devices (IMDs)

This project is part of the development of a breakthrough technology for the AIMD market. It aims to develop and perpetuate the emerging world leadership in the Ile de France region in the innovative and ambitious field of solid titanium-based microsystems (MEMS). This technological field was born from unresolved and limiting constraints in the design and development of active implantable medical devices (pacemakers, neurostimulators, implantable pumps or cochlear and retinal implants) with a biocompatible and waterproof but non-functional titanium shell. This joint laboratory is therefore intended to manufacture titanium-based MEMS, transferred onto this shell, thus providing intelligence and eliminating various layers of connectivity and packaging. This opens the way to new generations of less invasive implants.

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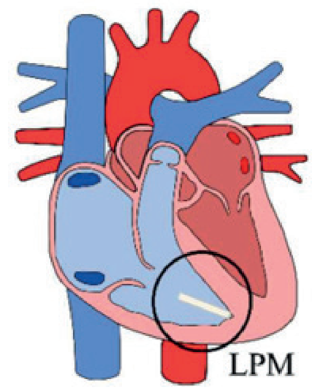
▶ PUBLICATION

Clinical tests have shown leadless pacemakers (LPM) are safer than conventional pacemakers because they significantly reduce the risks of lead-related complications such as lead infection, lead failure, lead fracture, lead dislodgement and sepsis. Nevertheless, the small size of LPMs makes their powering an enormous challenge.

Last generation of commercial leadless pacemakers have longevities from 5 up to 10 years. The average power consumption of LPMs being less than 10µW, researchers have looked to solutions such as wireless power transfer and vibration energy harvesting to tackle with the battery-related longevity limitations. Converting a small part of the heartbeat mechanical energy to power LPMs to charge the battery of LPMs is possible. In the present work we report the fabrication and characterization of a novel MEMS device intended to power leadless pacemakers.

The presented device is based on a MEMS electrostatic transduction principle, and shows dimensions suited to fit inside an implantable capsule. To our knowledge this is the first electrostatic MEMS energy harvester allowing such application. We show that the presented device has potential to match the average power consumption of commercial leadless pacemakers.



Leadless Pace Maker (LPM) implanted in the right ventricule of the heart and powered by MEMS biomechanic micro-harvester (From Ambia et al, 2023, 10.1109/TBME.2023.3327957)

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Ambia et al, 2022, 10.1109/PowerMEMS56853.2022.10007568