Department of Biomedical Engineering
The Chinese University of Hong Kong

Interfacing with the peripheral nervous system using implantable bioelectronics



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Abstract

The peripheral nervous system is a crucial organ, forming the bridge of communication between the brain and the rest of the body. Implantable devices interfacing with this part of the nervous system hold great potential for the development of treatments for a wide range of clinical conditions, whether by recording electrical activity carried by nerves, or modulating it through electrical stimulation. However, current nerve interfacing technologies lack the necessary selectivity and stability to enable their widespread therapeutic use. By leveraging flexible bioelectronic techniques we have created an implantable platform capable of forming an intimate interface with tissue, resulting in high recording and stimulating resolution as well as high biocompatibility. Applying this to nerves around the body allows us to record, classify, and modulate activity of a variety of organs including limbs, bladder, and bowel in freely-moving models. The developed implantable bioelectronic technology represents a platform enabling new forms of fine nerve signal sensing and modulation, with therapeutic applications in conditions such as spinal cord injury and chronic pain.

Biography

Dr Alejandro Carnicer Lombarte is a Presidential Assistant Professor at the Department of Biomedical Engineering at City University of Hong Kong. Before joining CityU in January 2026, he was a postdoctoral research associate at the University of Cambridge Bioelectronics Laboratory led by Prof. George Malliaras. He holds a PhD in Clinical Neurosciences from the University of Cambridge, an MSc in Neuroscience from University College London, and a BEng in Engineering and BA in Natural Sciences from the Open University and the University of Cambridge, respectively. Alejandro works at the interface between engineering and neuroscience. His research focuses on the development of implantable technologies to interface with the nervous system, with a focus on peripheral nerves, to restore function in conditions such as spinal cord injury. His research and academic trajectory have been recognised by awards such as the University of Cambridge Borysiewicz Interdisciplinary Fellowship and the Institution of Engineering and Technology 2023 J.A Lodge Award.

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