

Participant number	Participant organisation name	Acronym	Country
	The Institute for Bioengineering of Catalonia	IBEC	Spain

Call deadline	03/02/2010
Details	<p>Ester Rodríguez Aguilar Project Manager</p> <p>General Projects Unit Institute for BioEngineering of Catalonia (IBEC) Baldri Reixac 10-12 (Edifici Administració) 08028 Barcelona</p> <p>Phone: +34 934 039 270 Fax: +34 934 039 702 E-mail: erodriguez@ibec.pcb.ub.es</p>

Description of the organisation

The Institute for Bioengineering of Catalonia (IBEC) is a public research institute covering most bioengineering fields, from basic research to medical applications, founded with the aim of becoming a world-leading. IBEC was established in 2005 by the Government of Catalonia, the University of Barcelona (UB) and the Technical University of Catalonia (UPC) and is located at the Barcelona Science Park.

IBEC hosts over 200 researchers and technicians. The neuroengineering lab has been established to foster R&D in the field of neurosensors towards better understanding of information processing in living neuronal networks. A non-exhaustive list of resources includes standard confocal microscopy, electrophysiology rigs (multiple manual and motorised manipulators), infrared-pulsed fiber laser, UV solid state lasers, multichannel amplifiers, clean room facilities (aligners, chemical benches, contact aligners, evaporator, sputtering, etc.) as well as cell culture and animal facilities.

Main tasks in the project and previous experience relevant to the tasks

In the context of EU project the “Neuroengineering” group is interested in: (1) developing **novel assays** based on electrophysiological characterisation of **cultured neuronal networks** focusing on drug screening and (2) developing novel **neurochips** with a **rich sensor** range including, in addition to electrophysiological measurements, dynamic analyte quantification (e.g. growth factors and neurotransmitters) and pH sensing.

The “Neuroengineering” group led by Dr. Enric Claverol-Tinturé at IBEC, focuses its research on technology to **monitor and control neuronal activity** with the aim of empowering basic research, drug discovery and therapeutic action against neuropathologies. In particular, the group has developed the **PoM technology** (Polymer-on-Multielectrode Array) technology which combines planar arrays of substrate-embedded electrodes and 3D polymeric structures to monitor and stimulate neuronal activity in vitro. With PoMs it has

been possible to culture individual neurons within microstructure and to obtain multisite recordings of single-unit activity along individual neurites. This tool renders possible a whole new set of experiments in which anatomy and function of individual neurons can be correlated in vitro.

The production of **neurochips** with conventional technologies is costly and technically complex and, towards addressing this issue, we have developed a **laser-write lithography** system which supports rapid-prototyping of PoM and all-polymeric devices.

Further, the neuroengineering team has developed and initiated exploitation through its spin-off Aleria Biodevices of a multiwell 100% polymeric device, the **E2**, especially suited for drug screening based on electrophysiological measurements.

In parallel with work on lab-on-a-chip electrophysiology, we are pursuing research on novel optical techniques to monitor neuronal activity. We are particularly interested in photobleaching-free techniques capable of supporting long-term studies on learning both in vitro and ex vitro. Along these lines we are focusing on plasmon-resonance, as measured on functionalised nanoparticles bound to electroactive membranes.

Dr. Claverol-Tinturé obtained his degree in Telecommunications Engineering from the Technical University of Catalonia - UPC (1997) and PhD in neural dynamics from the University of Southampton (UK, 2000). He carried out postdoctoral research at the California Institute of Technology - Caltech (USA) and at Los Alamos National Laboratory (USA). Dr. Claverol-Tinturé established neuroengineering at UPC in 2003 as a RyC fellow and joined IBEC as leader of the NeuroTech lab in 2007. He has published papers in scientific journals and holds various patents on techniques for recording electrical activity produced by neurons. He founded the spin-off **Aleria Biodevices** which markets the E2 technology for parallel electrophysiology with 100% plastic devices. He coordinated national and European research projects, **FlashPoMs and VSNs**.