

## NEUROCTOPUS project

### **Job description**

This project is supported by an A\*MIDEX grant; initiative of excellence from Aix-Marseille Université.

The aim of this project is the development of novel implantable biomedical devices for neuroscience applications and it has two main objectives. The first one is to develop a multimodal and multi-branch neurotech able to simultaneously stimulate and record on different branches, which contain several electrodes. The second objective is to use advanced data analysis methods to explore cross-regional correlations in the areas of interest.

In the first phase of the project, the candidate develops the neurotech in a fully equipped cleanroom, containing all the necessary microfabrication technologies. This will be followed with electrical and basic biological characterizations.

In the second phase, the device will be tested *in vivo* in rats. Two connected regions will be recorded simultaneously (the hippocampus and the medial prefrontal cortex) and local stimulation will be used to map the responses and modulate the neuronal activity in the target region. The data acquired from the device will be analyzed using advanced data analysis, computational and Artificial Intelligence methods.

Publications from the group relevant for the project: Khodagholy et al., Adv Mater 2011; Khodagholy et al., Nature Comm 2013; Williamson et al., Adv Mater 2015a, b; Rivnay et al., Science Adv 2015; Jonnson et al., PNAS 2017; Proctor et al., Science Adv 2018; Clawson et al. Science Adv 2019.

The candidate will be fully supported on the data analysis aspects of the project. The project is collaborative between École des Mines and Systems Neuroscience Institute (INS) of the faculty of Medicine of Aix-Marseille University. Basic neuroscience training will be provided during the PhD training. Animal experimentation and neuroscience aspects will be fully supported by INS.

### **Required qualifications**

We look for a highly motivated candidate with exceptional academic performance and holding or very close to completing their Master degree in one of these fields: electrical engineering, biomedical engineering, microelectronics, systems design, material engineering or physics, interested in multi-disciplinary research.

A good understanding of electronic circuits, electrical characterization and signal processing using Matlab/Python is mandatory.

The candidate is expected to conduct the research independently.

The knowledge of English language is essential.

### **Additional qualifications**

Other skills such as microfabrication, data analysis (principle component analysis etc.) and Artificial Intelligence (Machine Learning) are a plus.

### **Finances**

We are offering a fulltime position for three years. The gross salary is according to standard French PhD studies, which covers social security. A monthly mobility allowance will be paid in addition.

### **Candidate examination**

For all of the above, knowledge is proven by certificates, master thesis or equivalent documentation, as well as important projects' descriptions during the studies. Skills should be acknowledged in reference letters and demonstrated during the interview (presentation skills). During the interview each applicant presents his/her master thesis (or other study-related research project) and a scientific paper from an area unrelated to his/her specialization (chosen by the interviewers).

### **Required documents**

1. Motivation letter
2. Two reference letters
3. Curriculum Vitae
4. Copies of Bachelor and Master certificates

The candidate is expected to start the position from 15. November to 15 December 2019.

Address for applications

[srm\\_emse@outlook.fr](mailto:srm_emse@outlook.fr)  
[christophe.bernard@univ-amu.fr](mailto:christophe.bernard@univ-amu.fr)  
[rodney.oconnor@emse.fr](mailto:rodney.oconnor@emse.fr)