ERA Chair VIBraTE

Senior Postdoctoral Researcher Material Science

The Horizon Europe project VIBraTE is currently seeking a highly motivated and skilled postdoctoral researcher to join our research team in the field of material science. The successful candidate will be responsible for conducting cutting-edge research in the project and will have the opportunity to collaborate with leading researchers from different countries.

Location

Sofia, Bulgaria

Responsibilities:

- Develop a biomimetic viscoelastic brain phantom.
- Research the diffusion phenomena around implanted electrodes.
- Develop a "vascularized" brain phantom to model the impact of microvibrations due to brain circulation on implant displacement.
- Collaborate with an interdisciplinary team.
- Contribute to scientific publications and presentations related to the project.

Qualifications:

- A Ph.D in Physics, Chemistry, or a related field
- Strong background in material science
- Minimum of 3-year experience in developing novel materials
- Experience in data analysis and modeling
- Strong publication track record
- Strong written and verbal communication skills in English
- Ability to work independently and guide junior members of the team

We offer:

- A competitive salary according to the Marie Curie European standards
- An international and dynamic research environment
- Access to state-of-the-art facilities and equipment
- Opportunities for professional development and career advancement

This is a **part-time position** (0.5 Full Time Equivalent) for **two** years (12 months+12 months), with the possibility of an extension based on the performance of the candidate. The position is available from **June 2024**, and applications will be reviewed on a rolling basis until the position is filled.

Application

We look forward to receiving your application and will screen it as soon as possible. To apply, please submit a

- cover letter (max 2 pages)
- CV, including a list of 5 most important publications.
- 2 letters of recommendation
- 3-minute video pitch in English

The applications will be evaluated by an international hiring panel. Shortlisted candidates will be invited to an interview and may be asked to give a research presentation.

Applications should be sent to Tsvetelina Yorgova : tsvetelina.yorgova@iict.bas.bg

About the project

ERA Chairs are funded by the European Union to support the development of research excellence in specific scientific areas. The objective of the ERA Chair project is to attract and maintain high-quality researchers at the host institution, improve research quality and impact, and enhance the institution's research environment. The project provides funding for research projects, mobility opportunities, and training activities for researchers.

The Neurotechnology lab was established in 2023 as part of the VIBraTE Chair at the Institute of Information and Communication Technologies of the Bulgarian Academy of Sciences. Among the objectives of the lab is to model and investigate the **properties, geometry, and mechanical effects of the interaction of the brain with the implanted electrodes**. The immediate axes of the project of the Neurotechnology Laboratory are described in engineering terms, however, the global perspective is to develop academic knowledge and research in the communication between brain and machine. A strong integration of engineering and biomedical expertise is thus expected. Beyond a mere collaboration between different disciplines, this project will encourage engineering/mathematics candidates to familiarize themselves with biomedical research, including hands-on experiences to gain a more complete view of the issues. Working on the 'brain-machine interface' must lead to expertise bridging disciplines in the rapidly developing field of bioengineering. This is a major challenge that offers future collaborators to the VIBraTE project a unique opportunity to contribute to some of the most active fields in science. The research objectives of the VIBraTE Chair are situated along the following research axes:

- Axis 1: Viscoelastic coupling between implants and the brain
- Axis 2: Optimization of the interface geometry of implants

- Axis 3: Diffusion phenomena in the brain tissue
- Axis 4: Effects of viscoelastic deformations on modeled brain activity

This position will focus on Axes 1 and 4, i.e. to experimentally investigate the influence of the implant's geometry and properties on the bio-mechanical interaction with the brain tissue. It includes the development of a biomimetic viscoelastic brain phantom that accurately mimics the mechanical properties of a healthy human brain tissue, crucial for assessing the interactions between various BCI implant geometries and materials. To enhance the precision of the model, a "vascularized" brain phantom will be engineered to assess the impact of microvibrational forces caused by cerebral circulation on the positional stability of brain electrodes, and their subsequent influence on the accuracy of neuronal activity measurements. Furthermore, diffusion phenomena around brain electrodes will be experimentally established, assessing substance interactions and dispersion in the brain matrix to help formulate guidelines for implant design and effectiveness. These tasks will refine the capabilities of neural electrode signal decoding processes, contributing significantly to the project's goals of innovating less invasive BCI technologies and improving the accuracy of brain signal interpretation.