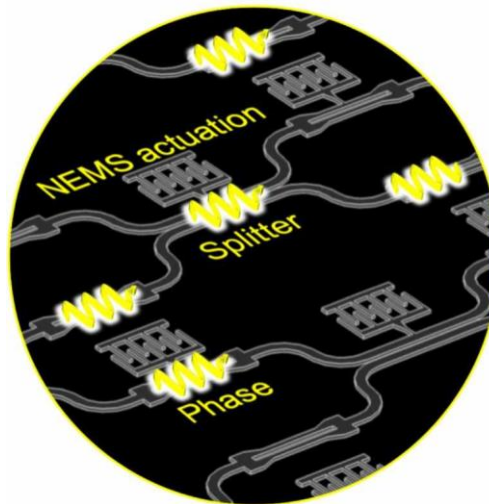


## Post-doctoral research position on integrated photonics

### **General description**

In March 2023, we will start a 4-year EU Pathfinder project on integrated and programmable photonic circuits (Neuropic - Nano electro-optomechanical programmable integrated circuits for neuromorphic computing) coordinated by the [Material Science Institute in Madrid](#) in collaboration with the Department of Electrical and Photonics Engineering at the DTU (Copenhagen) and the Catalan Institute for Nanoscience and Nanotechnology (Barcelona) and other research institutes and small companies located in Ireland and Germany. Our main goal is to design, build, measure, and explore a fully controllable real hardware for neuromorphic computing based on novel photonic chip architecture with transformational impact potential on photonics for data centers, autonomous vehicles, quantum information processors, and much more.



NEUROPIC concept: we will integrate nano-electromechanical (NEMS) actuators controlling beam-splitters and phase controllers in a reconfigurable photonic mesh as a sustainable platform for programmable photonic circuits.

Building on very recent breakthroughs from the consortium partners, the nanotechnology is now in place to begin the exploration of programmable photonic chips scaled to thousands of programmable nodes. The main objective of this project is to use the complex nano electro-optomechanical network for neuromorphic computing.

### **Main Tasks and responsibilities**

The position is experimental with its core on photonics and optomechanics. The electro-optomechanical nodes will be characterized with light and actuated electrically. In summary, the main activities will be:

- To participate in the design of the nano electro-optomechanical nodes and network final connectivity.
- To characterize the nonlinear dynamical regimes of a nano electro-optomechanical.
- To implement an electrical actuation of the nodes and characterize the input/output photonic performance.
- To characterize the connectivity of the network by quantifying the coupling and synchronization between nodes.
- To quantify the training conditions of the network for neuromorphic computing and optimize it for different conditions.

In addition, the position offers a unique possibility to be trained in a responsible and leading position within the EU-funded consortium. This allows to establish strategic network connections with the partners. The applicant will be part of project assessments, meetings and periodic reviews. The applicant will also be able to stay in different labs of the consortium to implement different specific tasks. We also offer support and training on leadership and organization skills by defining a clear short and long term Personal Career Development Plan which includes: a) background identification: performance summary, career interests and abilities, identification of strengths and weaknesses; b) identification of short- and long-term development goals; c) development of a clear career plan by defining the necessary actions, the context for each action and the result of each action. We also offer a unique opportunity to get in contact with industrial partners located in Denmark and Germany.

### **Requirements**

We are looking for an experienced researcher on experimental photonics and/or optomechanics. Experience on free-space optics and/or fiber coupling approaches to couple light into integrated photonic circuits is a major plus. Experience on optical nonlinear dynamics and/or electrical actuation of microelectromechanical systems are also good starting points. Experience on numerical modelling tools to calculate basic photonic and phononic properties of nanostructures and/or programming experience on python/matlab are also valuable. But most important than anything: passionate and enthusiastic candidates are strongly encouraged to apply to this research position.

### **The Institute - ICMM**

The [Material Science Institute of Madrid](#) (ICMM) is a research centre of the [Spanish National Research Council](#) (CSIC) located in the [University Campus of Excellence](#) in the north of Madrid, Spain. Our mission is to generate new fundamental and applied knowledge on materials and processes with added value, and transfer this knowledge to the productive sectors at the local, national and European scales. The ICMM aims to provide an environment of excellence with an interdisciplinary and transversal view on material science and applications with research lines devoted to a Sustainable World (energy and green processes), Health (therapy, diagnosis and nanomedicine) and Information and Communication Technologies (advanced photonic, electronic and quantum technologies).

### **Summary of conditions**

- Full time work (37,5h/week)
- Contract Length: three years (with possible extension to a fourth year)
- Salary (negotiable) will depend on qualifications and demonstrated experience.
- Health insurance and social security covered.
- Possible internships at the [ICN2](#) in Barcelona to be trained in cavity-optomechanics
- Estimated incorporation date: **March 2023**

### **How to apply**

All applications will be made via the CSIC [training and employment web](#) including the following:

- A cover letter.
- A full CV including contact details.
- 2 Reference letters or referee contacts.

Informal enquiries regarding the vacancy and how to apply can be made directly to the coordinator of the project **Dr. P. David García**: [pd.garcia@csic.es](mailto:pd.garcia@csic.es)

### **Equal opportunities and diversity**

ICMM - CSIC is an equal opportunity employer. The research group and the project coordinator are particularly committed to diversity and inclusion. People with different backgrounds and minorities are encouraged to apply to this research position.