Subject

Many of the technological challenges humanity is facing can, to a large extent, be mitigated by the development of novel materials with targeted functionality. As a neat example, the discovery of graphene opened the path for exploiting novel physical properties in 2D materials in a plethora of applications that concur transversally to many sectors like electronics, composites, biomedical, energy, etc. One of the peculiarities of graphene is the electronic band structure featuring Dirac cones that give place to exotic electronic and transport properties such as the observation of the Quantum Hall effect (QHE) at room temperature. The QHE has attracted much interest not only for revealing many important aspects of quantum physics but also has led to the establishment of a new metrological resistance standard based on the quantum resistance h/e².

Developing novel Dirac materials with fine control of electronic properties will represent a breakthrough in science and technology; opening the path for employing a new library of Dirac materials for applications where graphene has demonstrated limitations, while keeping the advantages already demonstrated by graphene. For example, many 2D covalent- and metallo-organic framework (COF and MOF) structures displaying Dirac cones have been predicted but, only recently, one of these materials has been demonstrated experimentally.

Position and duties

We are looking for an enthusiastic postdoctoral researcher to lead research on quantum transport and electronic properties of 2D COF-MOFs to demonstrate their Dirac nature and pursue the development of new quantum resistance standards based on these novel materials. This line of work involves cross-group/programme research within IMDEA Nanociencia. The PD will be directly involved and contribute in device preparation, electrical, optical and electronic characterization. We offer a 2-year contract with possibility of extension for another year.

Skills

The candidate should have a PhD in Physics, Physical-Chemistry, Material Science or in a closely related field of science. An ideal candidate will have research interests aligned with: quantum physics, quantum transport, organic electronics (metal- and covalent-organic frameworks), surface science, quantum materials and/or nanodevices. Practical skills on electrical characterization (optical and magneto-electrical) as well as cleanroom-based fabrication processes will be an advantage. Candidates with a strong publication record and a systematic research attitude are encouraged to apply. Furthermore, the ability to work on an interdisciplinary topic and international environment, analytical but creative thinking and effective communication skills are also of importance.

How to apply

- The application must include a complete CV and a motivation letter. Deadline: 30 September 2021.
- For more information please contact:
  - Dr. Enrique Cánovas (enrique.canovas@imdea.org)
  - Dr. Mariela Menghini (mariela.menghini@imdea.org)
  - Dr. Daniel Granados (daniel.granados@imdea.org)
What we offer

The research project is under the umbrella of the EU EMPIR project “COMET: Two dimensional lattices of covalent- and metal-organic frameworks for the Quantum Hall resistance standard”. Therefore, main part of the work will be based on direct collaborations with the project partners including EU metrology institutes (CEM, IMRIM, PTB, LNE, GUM and TUBITAK), TU Dresden (DE) and Max Planck Institute for Polymer Research (DE).

**Deadline for applications**: September 30, 2021.