



CALL FOR APPLICATIONS - August 2022

Research Assistant Position

Donostia International Physics Center (DIPC) is currently accepting applications for Research Assistant positions. This is a unique opportunity for highly motivated students, recently graduated from the University in Physics or related fields, to gain research experience in one of DIPC's high-profile research teams. A description of each of the available openings, contact information and deadlines can be found on the following pages.

Although candidates are welcome to contact the project supervisors to know further details about the proposed research activity, please be aware that the application will be evaluated only if it is submitted directly to the email address listed as "application email".

Applications received by the deadline will be evaluated by a Committee designed by the DIPC board on the basis of the following criteria:

- CV of the candidate (40%)
- Adequacy of the candidate's scientific background to the project (40%)
- Reference letters (10%)
- Other: Diversity in gender, race, nationality, etc. (10%)

Evaluation results will be communicated to the candidates soon after. Positions will only be filled if qualified candidates are found.

The DIPC may revoke its decision if the candidate fails to join by the appointed time, in which case the position will be awarded to the candidate with the next highest score, provided it is above 50 (out of 100).

However, the selected candidate may keep the position if, in the opinion of the Selection Committee, the candidate duly justifies the reasons why he or she cannot join before the specified deadline, and as long as the project allows it.

Ref. 2022/53
Chiral Multicolor Quantum Dots for Monitoring Biologically Relevant Phenomena

Supervisor(s):
Iván Rivilla de la Cruz (ivan.rivilla@ehu.es)

Duration*: 1 year

Application Deadline: 11/08/2022

Application Email: jobs.research@dipc.org

Graphene Quantum Dots (GQDs) are a new class of fluorescent carbon materials, which have attracted great attention due to their outstanding properties and potential applications in biological, optoelectronic, and energy-related fields. To synthesise GQDs, mainly containing oxidative cleavage, the hydrothermal or solvothermal method, the ultrasonic-assisted or microwave-assisted process, electrochemical oxidation, controllable synthesis, and carbonization from small molecules or polymers, are used. In 2004, Novoselov et al, discovered Graphene, a new kind of nanomaterial with excellent mechanical, electrical, thermal, and optical properties, zero-dimensional fullerenes and one-dimensional carbon nanotubes.

Many synthesis methods have been developed, such as micromechanical stripping¹⁻⁵ chemical vapour deposition (CVD), SiC epitaxial growth, and graphene oxide (GO) reduction. The raw carbon sources for CDs can be either man-made [e.g., candle soot, graphite, fullerene- C60, ammonium citrate, among others] or from natural products (e.g., orange juice, milk, coffee grounds, egg, etc, biomass in general or natural products (figure 1). In addition, some natural products have heteroatoms (N, S) in their chemical composition, which makes them very suitable raw materials for the preparation of NCDs doped with heteroatoms.

The use of this kind of starting material, has a different advantage, such as, natural products are renewable and have good biocompatibility. Natural sources contain heteroatoms, which facilitate the fabrication of heteroatom doped NCDs without the addition of an external heteroatom source. In addition, some natural products can be used to prepare NCDs in ways that are very green and simple relative to traditional methods for the preparation of carbon dots from manmade carbon sources. These new quantum dots, present many advantages, if, for example, we compare with traditional semiconductors, nanoparticles and organic dyes.

As photoluminescent, the CDs show, among other advantages, high photostability, high aqueous solubility, thus, as a great robust chemical inert, and easy modification. In addition, its low toxicity and good biocompatibility allow it to have potential applications in bioimaging studies, biosensors, or as drug repositories.

The candidate must have knowledge of organic synthesis, as well as NMR, IR, TEM, AFM, etc. characterization techniques.

Interested candidates should submit an updated CV and a brief statement of interest to the application email listed above. Reference letters are welcome but not indispensable. The reference of the specific opening to which the candidate is applying should also be stated in the subject line.