



Universidade do Minho
Centro de Física das Universidades do Minho e do Porto

NOTICE - RESEARCH SCHOLARSHIP (enrolled in Masters) - CFUM - 1 vacancy

Project PTDC/NAN-OPT/29417/2017

A call is open for the attribution of a Research Scholarship to a candidate enrolled in a Master's degree within the scope of the project "Graphene and novel thin films for super-resolution microscopy and bio-sensing" (PTDC/NAN-OPT/29417/2017) financed by the European Fund for Regional Development (FEDER), through the Competitiveness and Internationalization Operational Program (POCI), by Portugal 2020 and by the Budget of the Foundation for Science and Technology in its state budget (OE) component, under the following conditions:

Scientific Area: Materials Science and Engineering, Engineering Physics and Nanophotonics

Admission requirements: To be enrolled in a Masters's course in Physics, Engineering Physics, Materials Engineering, Biological Engineering, or the like.

On the date of the respective hiring, candidates must prove enrollment in one of the following courses:

- Masters/Integrated Masters (in the area or area related to that requested in the notice);

Qualifications granted by foreign higher education institutions must be recognized by a Portuguese higher education institution, under the provisions of article 25 of Decree-Law No. 66/2018, of August 16, which approves the legal regime for the recognition of academic degrees and diplomas in Higher Education, awarded by foreign higher education institutions, and paragraph e) of paragraph 2 of article 4 of Decree-Law No. 60/2018, of August 3. Any formalities established therein must be completed by the date of the legal contracting act. The degree recognition must also include converting the final classification obtained in the foreign institution to the Portuguese classification scale. According to the defined scale of values, to candidates who do not comply with these provisions, the jury assigns the minimum classification (10 points) in the selection method related to the curricular evaluation component.

Eligibility of applicants: Applicants must meet the eligibility conditions provided in article 9 of the FCT Research I.P Scholarship Regulation (2019).

Workplan: A research team from the 2D Materials and Devices group in collaboration with the Ultrafast Bio- and Nanophotonics group at INL recently showed that the graphene near field could be used to follow the stretching of DNA



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strands during hybridization with a target DNA (Ref.: Adão et al., 2D Materials, Vol. 6, No. 4, 2019). The reached axial resolution is about 1 nm and thus reaches the length scale of some proteins or artificial DNA nanostructures, often referred to as DNA origami. Future potential DNA origami applications include caged nanostructures that can act as drug delivery systems or provide enzyme immobilization, DNA nanorobotic functions, such as providing a 'railway' for molecular walkers, or DNA switches that allow for algorithmic computing.

The work aims to use the Graphene-Induced Energy Transfer Fluorescence Lifetime Imaging Microscopy (GIET-FLIM) technique to visualize and characterize nanoarchitectures formed by DNA origami on top of a graphene surface. Fluorescently labeled DNA strands are used, the fluorescence lifetime information shall then be used to obtain nanoscale distance maps.

The candidate will perform experiments in an optics lab, using a custom-developed FLIM microscopy setup based on the Time-Correlated Single Photon Counting (TCSPC) method and the use of a picosecond laser. Further s/he will learn to work with Matlab-based signal processing tools and understand graphene-related material handling and nanophotonic near field effects that can be used in the area of (bio)-sensing. The participation in regular group and project meetings, presenting and reporting the results ideally also, e.g., in the form of a poster at a conference.

Applicable legislation and regulations: Statute of Scientific Research Fellows, approved by Law No. 40/2004, of August 18, in the current wording published by Decree-Law No. 123/2019 of August 28; Regulation of Research Grants of the Foundation for Science and Technology, I.P. – in force <https://www.fct.pt/apoios/bolsas/regulamentos.phtml.pt>.

Workplace: International Iberian Nanotechnology Laboratory (INL), on an exclusive basis, and under the scientific guidance of Prof. João Pedro Alpuim (INL and UM) and Dr. Jana Nieder (INL).

Scholarship duration: The scholarship has a duration of 9 months, starting in September 2021. The scholarship contract is non-renewable.

Amount of monthly maintenance subsidy: The amount of the scholarship can be found in the table of scholarships awarded directly by FCT, I.P. in the Country (<http://www.fct.pt/apoios/bolsas/valores>), corresponds to the following:

- Masters or Integrated Masters students: 835.98 euros

Other benefits: Voluntary Social Security reimbursement, corresponding to the 1st Echelon of the contributory base (for grants lasting 6 months or more) and Personal Accident Insurance.



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Composition of the Selection Jury:

President: Prof. João Pedro Alpuim

Effective members: Dr. Jana Nieder, Dr. Edite Figueiras

Substitute member: Prof. Maria de Fátima Cerqueira

Criteria and procedures for evaluation and selection: The evaluation of the applications focus on the Merit of the candidates, applying the following evaluation criteria, valued on a scale from 1 to 5 points:

B. Candidate Merit - MC (70%):

- a. A.1: Academic trajectory (which reflects the academic degree classifications, according to the reference table), with a weighting of 60%;
- b. A.2: Personal curriculum (which reflects the scientific and professional path), with a weighting of 30%;
- c. A.3: Motivation letter, with a weighting of 10%.

The **Candidate's Merit** (MC) classification is obtained by applying the following formula:

$$MC=(A1*0.6)+(A2*0.3)+(A3*0.1)$$

Candidates classified in the first 3 positions, who obtain a minimum classification of 3.5 in the MC, are admitted to the Interview phase, with the Jury proceeding to evaluate the following sub-criteria:

B. Interview - ENT (30%):

- a. The. B.1: Interpersonal skills (30%)
- b. B.2: Knowledge demonstrated in the contest area (40%)
- c. B.3: Motivation (20%)
- d. B.4: Language skills (10%)

Interview valuation is carried out according to the following levels:

- High – 5 values
- Good – 4 values
- Enough - 3 values
- Reduced - 2 values
- Insufficient - 1 value

The **Interview** classification (**ENT**) is obtained by applying the following formula:

$$ENT=(B1*0.3)+(B2*0.4)+(B3*0.2)+ (B4*0.1)$$



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Dissemination of results: The evaluation results project, based on the minutes, are sent to candidates by email within 90 working days after the deadline for submission of applications.

If the result is unfavorable to the granting of the requested scholarship, the candidates have a period of 10 working days to comment, if desired, in the context of a prior hearing to interested parties, pursuant to articles 121 and 122 of the Code of Administrative Procedure (DL n° 4 /2015 of January 7).

Complaint and appeal procedures: The final results of the evaluation are publicized through an ordered list (alphabetically, by the final grade obtained), posted in a visible and public place of the Reception Unit, as well as by email to all candidates, attaching it if, for this purpose, the minutes with the deliberations of the jury.

The selected candidate must state in writing their intention to accept the scholarship. In case of non-acceptance, the scholarship is awarded to the candidate in order of final ranking.

A complaint may be filed against the final decision within 15 working days, addressed to the Jury President. Interested parties may also present an optional hierarchical appeal addressed to the Pro-Rector for Research and Projects, Professor Dr. Filipe Vaz.

Application deadline and form of submission of applications: The call is open from 07/05/2021 to 07/16/2021

Applications must be formalized, obligatorily, by sending an application letter accompanied by the following documents: curriculum vitae; certificate of qualifications or declaration of the candidate; proof of enrollment in one of the courses mentioned above; motivation letter.

Applications should be sent by email to Bolsas@ecum.uminho.pt, indicating the reference of the competition in Subject **(CFUM-BI-10/2021 - ON4SupremeSens)**. Applications sent by other means are not accepted.