ANNOUNCEMENT FOR THE AWARD OF A RESEARCH FELLOWSHIP

Title: Master's Research Fellowship - BIOCLEANLIGHT (1 Vacancy)

Reference: BIOCLEANLIGHT – NORTE2030-FEDER-02137200 – BI-02/2025

A call for applications is open for one (1) research grant for Master's within the scope of the R&D project **"BIOCLEANLIGHT – Antibacterial paints, with photoluminescent properties and photocatalytic oxidation for urban shelters"**, at the Center for Electromechanical Microsystems of the University of Minho (CMEMS-UMINHO), operation no. 20818, operation code Balcão dos Fundos NORTE2030-FEDER-02137200, financed by the National Innovation Agency (ANI) through the Innovation and Digital Transition Program Compete 2030, SIID - Business R&D - Co-promotion Operations - Low Density, under the following conditions:

Scientific Area: Mechanical Engineering.

Recipient category: The scholarship is intended for PhD students or Master's degree holders enrolled in a non-degree course integrated into the educational project of a higher education institution.

Identify the type(s) of scholarship to be awarded:

a) **Degree courses:** Research grants (BI) are intended for I&D activities by students enrolled in an integrated master's degree, a master's degree or a PhD.
b) **Non-conferring degrees courses:** They may also be intended for I&D activities by graduates or masters enrolled in non-academic degree courses.

Requirement for granting the fellowship:

- The applicants may apply without prior registration in the course for which the fellowship is open. The requirement to enroll in a degree course or non-academic degree course will be verified on the date of contracting the fellowship;
- Only fellowships whose selected applicants present a valid proof of enrollment in a degree course or non-academic degree course will be contracted, according to the type of the fellowship, issued by a Higher Education Institution, indicating, respectively, the academic year or its duration (star and term).

Applicants' eligibility: Candidates who meet the conditions set out in Article 9 of the Research Grant Regulations, No. 950/2019, of 16-12-2019, of FCT I.P. are eligible.

Nationals or citizens of other European Union member states, third-country nationals, stateless persons, and citizens with political refugee status are eligible to apply for this competition.

Candidate eligibility requirements:

Applicants must hold, at the time of application, a Master's degree in Mechanical Engineering. For the contractualization, proof of the academic qualifications completed within the application period is required, including those resulting from academic degree recognition processes.

Preferred Requirements:
• Background in Mechanical Engineering with a strong focus on design.
• Experience in structural and dynamic modeling and simulation (ANSYS or equivalent).
• Knowledge of vibratory systems, modal analysis, vibration control, and fluid dynamics.

• Familiarity with data acquisition and processing tools (MATLAB).
• Experience with prototyping techniques.
• Ability to interpret and validate complex experimental results.
• Strong interdisciplinary communication skills, especially with chemistry and biology teams.
• Initiative, rigor, autonomy, and results-oriented mindset.

Work Plan and Objectives to be Achieved

1) Development of a Bioreactor with Vibration Generation Capability for Antibacterial Validation
• Initial system design, definition of the physical and functional principles of the bioreactor, including the ability to generate controlled vibrations and photocatalytic stimuli.
• Selection of materials and components compatible with biological environments and the testing requirements of piezoelectric and photocatalytic coatings.
• Definition of vibration parameters (frequency, amplitude, type of excitation) suitable for promoting the antibacterial effect.

2) Design and Prototyping of the Bioreactor for Simulating Controlled Mechanical Vibrations under Real Use Conditions
• CAD modeling and structural analysis of the bioreactor elements, ensuring robustness, vibration isolation, and compatibility with liquid and biological media.
• Prototyping and experimental assembly, integrating actuators and mechanical excitation sources.
• Support in creating testing interfaces that enable contact between coatings and bacterial agents in a controlled environment.

3) Assembly and Integration of the Bioreactor Hardware with Vibration Systems, Piezoelectric Sensors, and Electronic Control
• Integration of vibratory actuators, piezoelectric sensors, and data acquisition systems for measuring deformations, displacements, and stresses.
• Development of the electronic control system, including calibration, synchronization, and automation of test parameters.
• Execution of preliminary stability, noise, and reproducibility tests of the system.

4) Vibration Testing with Laboratory Instrumentation to Verify Bioreactor Performance
• Conducting experimental tests with the instrumented bioreactor, measuring the deformations, displacements, and stresses induced in the coatings.
• Analysis of the correlation between mechanical vibration, charge generation, and antibacterial response.
• Fine-tuning of vibration parameters (frequency and amplitude) to maximize piezoelectric and antimicrobial effects.

5) Preliminary Experimental Validation of the Antibacterial Effect in Parametric Tests
• Execution of microbiological tests in collaboration with the biology and chemistry teams, assessing bacterial colony reduction and coating effectiveness under different vibration and lighting conditions.
• Interpretation and analysis of experimental data, supporting predictive modeling of antibacterial behavior.
• Assistance in preparing the preliminary validation report (Deliverable E3.1) and compiling results for technical and scientific dissemination.

Objectives to be Achieved

• Design and build a functional bioreactor capable of generating controlled vibrations and photocatalytic stimuli.
• Experimentally validate the antibacterial effect induced by mechanical vibrations in piezoelectric coatings.
• Correlate vibration parameters (frequency, amplitude) with bacterial elimination efficiency.
• Ensure functional integration between mechanical, electronic, and biological systems within the developed equipment.
• Support the development of standardized laboratory protocols for antibacterial testing under mechanical activation.
• Deliver a fully developed and functional bioreactor capable of generating controlled vibrations for antibacterial testing.
• Produce a comprehensive technical report on preliminary experimental validation (E3.1).
• Develop standardized protocols for combined piezoelectric and antibacterial testing.
• Generate consolidated experimental data confirming the antibacterial effect induced by vibrations.
• Provide a direct contribution to milestones M3.1 (Bioreactor design and prototyping) and M3.2 (Bioreactor validation).

Note: The work plan should aim at consolidating the scientific training of the research fellow in the framework of the course conferring a degree or academic diploma.

Applicable legislation and regulations: Research Fellow Statute (EBI), approved by Law nº. 40/2004 of August 18, in its current wording and FCT Research Fellowship Regulation, approved by Regulation nº 950/2019, published in the Diário da República, 2nd series, of December 16, 2019, in its current wording, and Scientific Research Fellowship Regulation (RBIC) of the University of Minho, approved by order nº 4998/2025, published in the Diário da República, 2nd series, nº 81, of April 28, 2025 Amended and republished through amendment statement no. 634/2025/2, published in the Official Gazette, 2nd series, no. 132, of July 11.

Host/Contracting institution and scientific supervision: The workplan will be carried out in the CMEMS of University of Minho), located in the no Campus de Azurém, Guimarães, under the scientific supervision of the Professor Óscar Samuel Novais Carvalho and coordination Professor Luís Miguel Valente Gonçalves.

Fellowship duration: The grant will take place for a period of 12 months, with a provisional starting date on the January of 2026. The fellowship grant may, eventually, be renewed up to the maximum limit allowed by the project and/or applicable legislation.

Amount of the research grant: The amount of the grant corresponds to 1 309,64 €/month, according to the table of values of the Research scholarship of the University of Minho, updated annually, as decided by the Management Board.

Payment is made on the 23rd of each month, through bank transfer to the Bank Identification Number of the fellow identified in the contratualization process.

Other components of the research grant: Define other components of the scholarships, as provided for in Article 18º of the FCT Research Scholarship Regulations (RBI).

Other benefits: Reimbursement of Voluntary Social Insurance, if the candidate chooses to receive it, corresponding to the 1st level of discounts (for research grants with a total duration 6 months or higher) and personal accident insurance.

Exclusivity regime: The grantee will perform the activities under exclusivity, as foreseen in article 5º of the Research Fellow Statutes and applicable regulations.

Selection panel: (identify the selection panel President and the effective and substitute members)

The selection panel is constituted by the following members:

a) President of the Committee: Doctor Óscar Samuel Novais Carvalho, Associate Professor, Department of Mechanical Engineering, University of Minho;
b) Effective Member: Doctor Pedro Filipe Lima Marques, Assistant Professor, Department of Mechanical Engineering, University of Minho;
c) Effective Member: Doctor Diana Margarida Domingues Pinho, PhD Researcher, Centre for MicroElectroMechanical Systems (CMEMS-UMinho), University of Minho;
d) Substitute Member: Doctor Margarida Maria Macedo Francesko Fernandes, Auxiliary Researcher, Centre for MicroElectroMechanical Systems (CMEMS-UMinho), University of Minho;
e) Substitute Member: Doctor Sara Cristina Soares Madeira, PhD Researcher, Centre for MicroElectroMechanical Systems (CMEMS-UMinho), University of Minho.

The first effective member will substitute the President of the selection panel in case of impediment, being nominate the first substitute member in the place of the first effective member.

Criteria and procedures for applications assessment and selection: The applications assessment will focus on the candidate's Merit, following evaluation criteria, valued on a scale of 0 to 5 values (or another scale)[1]:

Applicant Merit - AM (100%):

a) Academic path (considering the classifications of academic degrees), with a weighting of 45%;
b) Personal curriculum (considering professional and scientific background), with a weighting of 45%;
c) Motivation letter, with a weighting of 10%.

Note: Other assessment criteria may be applied as deemed relevant.

The final classification of the applicant's merit with the achieved through the following formula:

$$MC=(a*0,45) + (b*0,45) + (c*0,10)$$

A positive evaluation is required for the granting of the scholarship.

Application deadline and submission: The call for applications is open for a period of 10 working days from the date of publication on the Euraxess portal.

[1] If a second evaluation method is fixed – Interview, it may not have a weighting higher than 40%, according to nº 4 of article 11º of UMinho regulation;
The jury shall define whether all candidates are interviewed or identify the criterion to be applied to a set of candidates to be interview and its valuation (for instance, selection of candidates ranked between the 1s and 4th position in the evaluation list of MC (candidate merit)). The jury may adjust the weightings (the assessment must be substantiated in as much detail as possible, in a clear and consistent manner).

Applications must be submitted by email to oscar.carvalho@dem.uminho.pt, indicating the reference number of the competition in the subject line. Only applications submitted within the established deadline and accompanied by the following documents will be accepted:

a) Candidate's updated curriculum vitae;
b) Certificates of the academic degrees obtained or, if applicable, the candidate's declaration of honor that he/she has completed the degrees required in the notice by the application deadline (not applicable to research initiation grants).
For degrees obtained abroad, the record of recognition of the academic degrees and record of the conversion of the respective final classification to the Portuguese classification scale must be presented, or, alternatively, a declaration of honor from the candidate.
This declaration must attest to facts that occurred prior to the application. In the event of a discrepancy between the information contained in the declaration and the documentation submitted for the purposes of contracting the scholarship, only the information contained in the latter will be considered. If it is found that the documents proving the academic degree and diploma, or their recognition under the terms of Decree-Law n. º 66/2018, of August 16, do not correspond to the classifications awarded in the assessment of the academic career and may consequently alter the candidate's ranking, the scholarship will not be contracted;
c) Letter of motivation.

Form of publication/notification of results: The results of the evaluation are published in a single list (in alphabetical order or by final score obtained), posted in a visible and public place in the host unit, as well as by email to all candidates, attaching, for this purpose, the minutes of the jury's deliberations, within a maximum period of 90 working days from the deadline for submission of applications.

Candidates are informed, at a preliminary hearing, in accordance with Articles 121 and 122 of the Administrative Procedure Code, of the likely outcome of the final decision, and may comment within 10 working days of this notification.

The waiver of the hearing for interested parties must be justified in accordance with Article 124 of the CPA.

An appeal may be lodged against the final decision within 15 working days, or an appeal may be lodged with the highest executive body of the funding entity within 30 days, both after the respective notification (Article 12(nº6) of the FCT Research Grant Regulations).

Within 10 working days of notification of the grant award, the applicant must declare their acceptance in writing. In case of non-acceptance, the next highest ranked applicant will be notified immediately.

Fellowship contractualization: The scholarship is awarded through the signing of a contract between the University of Minho and the scholarship recipient, in accordance with point 2.4 of the Rules for the Award and Management of Scholarships https://www.fct.pt/wpcontent/uploads/2022/03/Normas_de_Atribuicao_de_Bolsas_2021.pdf and the draft contract in Annex II of the University of Minho's Scientific Research Scholarship Regulations.

The contract can only be signed after receipt of all the documentation required for the type of scholarship, which must occur within a maximum period of 6 months, including proof of academic degrees or diplomas, as well as enrollment in non-degree study cycles or courses, as applicable.

Once all the documentation has been received, the contracting entity has 60 working days to sign the scholarship contract. Once received by the scholarship holder, the contract must be returned, duly signed, within 15 working days.

Term and cancellation of fellowship contracts: Without prejudice to the other grounds laid down in the University of Minho's Scientific Research Scholarship Regulation and in the Research Fellow Statute, the scholarship will cease on completion of the contracted work plan, as well as on expiry of the period for which it was granted or renewed.

The **final report** must be submitted to the scientific advisor, in accordance with the defined objectives and evaluation criteria, no later than 60 working days after the end of the scholarship and must be drawn up in accordance with Annex I of the Regulations of the University of Minho.

Non-discrimination and equal access policy: Universidade do Minho actively promotes a policy of non-discrimination and equal access, so that no candidate may be privileged, benefited, harmed or deprived of any right or exempt from any duty due, namely, to ancestry, age, sex, sexual orientation, marital status, family status, economic situation, education, social origin or condition, genetic heritage, reduced working capacity, disability, chronic illness, nationality, ethnic origin or race, territory of origin, language, religion, political or ideological convictions and trade union membership.

Declaration of Honor

Academic qualifications

I, (full name), candidate for the vacancy for the award of a (type of scholarship), within the scope of the project (name or reference of the project), published on the Euraxess portal, with the reference (ref. notice), declare on my honor that I have completed the academic degree of (academic degree), qualifying for the type of scholarship in the competition, namely the course (designation), by the (University conferring the degree), on the date XX/XX/XXXX, with a final average of XXXXX values on the YY scale.

As it is not possible for me to present proof of qualifications until the end of the competition, I declare that I undertake to present the aforementioned certificate at the conclusion of the scholarship contract, in the event that I am selected for the vacancy in the competition.

As this is true, I hereby date and sign this declaration.

(Place), (date).

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(full name)

NOTE: The declaration may only attest to facts that occurred prior to the application.

In the event of a discrepancy between the information contained in the declaration and the documentation submitted for the purpose of contracting the scholarship, only the information contained in the latter will be taken into account.

Declaration of Honor

I, (full name), bearer of identification document number (XXXX), candidate for a research grant (type of grant), within the scope of the project (name or reference of the project), published on the Euraxess portal, with the reference (ref. call for proposals), declare on my honor that (I have not received any research grants to date / I have received the following research grants) under the Research Grant Holder Statute.

University	Financing Entity	Project	Type of Grant	Duration	Start	Term

As this is true, I hereby date and sign this declaration.

(Place), (date).

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(full name)