

R&D Unit: Chemistry Research Center - Vila Real

Coordinator: Fernando M Nunes

Integrated PhD Researchers: 32

Overall Quality Grade: Excellent

Evaluation Criteria Ratings

Criterion A: 5

Criterion B: 4

Criterion C: 4

Laboratory Intensity:

Panel Agreement: Yes

Intensity Level: High [f=1,2]

Base Funding for (2025-2029): 874,38 k€

Recommended Programmatic Support

Programmatic Funding: 551,20 k€

PRR Equipment Funding: 493,54 k€

Total Funding: **1.919,11 k€**

Evaluation Result

Overall Score: 4,4 | Excellent

(A) Quality, Merit, Relevance, Level of Collaboration and Internationalization of R&D Activity Carried Out in the Evaluation Period

Score: 5

Panel comments:

CQVR delivers outstanding science, addressing important international challenges related to food, environment, and health. These range from analyzing wheat toxicity and wine contaminants, to heavy metal contamination and general environmental impacts, as well as obtaining innovative sustainable materials from silk wastes. Those activities focused on applied areas of research rely on well recognized expertise of the respective PIs as well as on the core skills of talented integrated researchers, PhD students and collaborators integrating the four main areas of Materials Chemistry, Organic Chemistry, Environmental Chemistry, and Food Chemistry/Biochemistry. This gives evidence that the CQVR excellence originates from a multidisciplinary team including chemists, physics, geology, biology, and environment scientists. Of particular relevance, the CQVR research directions align well to local challenges which maximizes leverage and impact to the agricultural communities of the Region. Indeed, a very good knowledge-based services is provided to the community, such as soil and plant analyses for national and international companies, farmers' associations, and biomass characterization studies for industry. Thus, the knowledge developed will enable innovative approaches and products, creating a significant impact on society. The group is actively engaged in scientific publishing as author, reviewer and indeed as editor of specialist titles. The high number of scientific publications in high quality journals, the majority of them with open access,

demonstrates the high scientific quality. The fact that around 38% of the Units' publications were produced in collaboration with European teams establishes its international character. Furthermore, this represents an improvement in relation to the previous period. The education programmes appropriately address labour market needs in terms of improving education, nurturing talent, and supporting the development of specialist food and environment skills. Appropriate consideration is also given to how the activities would raise awareness of societal challenges related to chemistry of food and of environment and their role in shaping future daily life. The Unit has set up four Master's programmes (Food Engineering, Oenology, Biochemistry, Environmental Engineering), one internationally funded PhD programme (Agrichains from Fork to Farm) and two national PhD programmes (Chemical and Biological Sciences and Environmental Sciences and Technology), and this has gradually attracted a larger number of PhD students to CQVR, from 7 between 2008 and 2012, to 25 between 2018 and 2023. Noteworthy, good plans for mentoring and including young researchers exist; young and senior researchers are continuously evaluated in order to promote continuous career improvement, and also to facilitate integration into permanent career positions when available. Notably the free access to facilities that is made available to them, which gives them the opportunity to initiate new lines of research to address their scientific interests. An appropriate number of dissemination and communication initiatives aimed at both scientific and general public audiences, with both physical and online events, has been organized, with good participation. Specifically, CQVR organized the international conference "Molecules for life" in 2023 and the 8th Portuguese Young Chemists Meeting in 2023 in Portugal; the 2018 E-MRS Spring Meeting on Hybrid Materials in Strasbourg; the ISGS Online Summer School on Hybrid Materials (2020) and the 8th International ISGS Workshop on Sustainable Sol-Gel Energy Materials in Castellón, Spain (2023). Excellent evidence of knowledge transfer has been provided via 29 patents, 11 of which are European patents on technologies developed in the Unit in the fields of materials chemistry, food quality, wastewater treatment and eco-efficient waste management, and 2 technology licensing contracts signed with the companies Versus Business Advisors and SAI Segurança Alimentar to explore new technologies. Furthermore, several important Portuguese companies (EDP, Iberdrola Generación, Geota, DouroGás renovável, Amorim cork) requested the services of the unit to perform studies involving chemical analysis, risk analysis, environmental evaluation, biogas production, and production of pellets. CQVR is very active in the effort to secure funding, participating in many nationally funded projects and several European projects spanning diverse EU programmes and topics. There is moreover a very good number of international contracts. Additionally, the Unit was involved as the main contractor in an international research project fully financed by the Minas Gerais Water Management Institute, Brazil (ENTIRE - Emergence Analysis of Tailings Impacts for a Restored Aquatic Environment (2021-2023)). Therefore, the information provided offers evidence of a compact Unit that is delivering on a level of local/national excellence with very good international visibility.

(B) Scientific and Technological Merit of the Research Team

Score: 4

Panel comments:

The research team has multidisciplinary expertise in Materials Chemistry, Applied Organic Chemistry, Environmental Chemistry, Food Chemistry & Biochemistry, and fully covers the activities proposed in the programme, spanning from food chemistry, development and study of different types of advanced oxidation processes (AOPs), synthesis of organic photochromic compounds and on their industrial application to studies of ceramic oxides. The feasibility of the programme is convincingly supported by well-equipped laboratories with equipment essential for conducting the proposed research. Because of this large expertise, the research team is participating to European projects and to European thematic networks, such as the Oenovitis European Network, the International GLOSOLAN Network, and the National Network of Electronic Microscopy. This level of influence is competitive on a national scale and demonstrates significant value to the local agri/manufacturing community, manifesting appropriateness and impact in terms of local societal alignment and supporting consistent delivery of impactful PhD projects led by talented PIs who understand the local need. A strong point of the Unit is made by the very good knowledge-based services provided to the community and the companies in the Region, such as soil and plant analyses and treatments of agro-industrial wastewaters. Furthermore, the team has a very good ability, human resources and infrastructures to complete grants and contracts with companies, the latter mainly

related to wine companies. The team had capacity to attract funding by both national entities, primarily QREN, PRODER, and FCT, and international entities, including INTERREG, POCTEP, a COST Action, a HEI Initiative-Innovation Capacity Building for Higher Education and a Socrates/Erasmus programme.

(C) Quality, Merit and Relevance of the Scientific Objectives, the Overall Strategy, the Activity Plan and the Organization of the R&D Unit for the Next Five Years

Score: 4

Panel comments:

The proposed objectives are clearly stated, have global significance, and align to the grand challenges of contemporary society, specifically a drive towards reducing environmental degradation alongside nutritional and physiological welfare. Those objectives are particularly vital in the economically challenged Northern Region. The objective of creating a new associated laboratory in the field of molecular sciences for sustainable development is especially noteworthy and valuable. The achievement of the objectives will certainly contribute to consolidate the position of CQVR both in the European community and with the companies of the area. Integration into international networks is a strategy for the internationalization of the CQVR in recent years, as it promotes cooperation among researchers, institutions, and industry. Currently, the integrated members are involved in OENOVITI (since 2019) and the Global Soil Laboratory Network (GLOSOLAN, since 2017). Operationally, CQVR is focused on the delivery of four core functions/activities which resonate through all research programmes of Innovation, Development, Networking and Dissemination. The very good commitment to promote dissemination actions, such as the Week of Science and Technology, UTAD Open Day, Junior University, and the European Researchers Night will certainly contribute to attract new talents. Concerning training plans, through the FCT-Tenure program, CQVR is very and convincingly committed to promote the staff renewal. The unit welcomed new integrated PhD researchers who have research contracts with UTAD, funded by different projects or by the unit itself. Finally, the reduction of university tuitions and the applied nature of the unit's activities will contribute to attract PhD students. An empowering well developing strategy is the very good integration of visiting professorships, which can provide valuable short-term contributions to specialized teaching and research activities and strengthen international relations. Gender equality and inclusion policy are gaining more and more attention also in recruitment, and more female students are attracted by the chemistry topics of the team. Ethical concerns are very well addressed through health and safety protocols for creating a safe working environment for researchers and staff. There is also appropriate consideration of adherence to animal welfare guidelines for research involving animals. The management structure of CQVR is adequate, and appropriately comprises a Direction Board, a Scientific Council, an Advisory Council and an External Advisory Committee, which meet frequently, assuring concerted management. They have in place the best-practice of organizing a CQVR day where each researcher will present and discuss their results. There are very good plans for human resources. Most of the expected budget for the 2025-2029 period will be spent funding human resources (approximately estimated 66%) to strengthen the human capital of the Unit. As an example, the proposal requests the hiring of 3 senior researchers in the FCT-Tenure funding programme, 4 young researchers and several PhD students. The proposal indicates a request for financial support for 4 young scientists over a period of 3 years in 4 different complementary thematic areas of (1 in Environmental Chemistry, 1 in Organic Chemistry, in Material Chemistry and 1 in Food Chemistry). Their role and research contribution to the Unit are clearly and convincingly presented. The plans demonstrate acknowledgement of the importance to resonate to the local community and industry sectors. The forward-looking research plans show minor limitations in terms of detail; however, the appropriate levels of leadership will deliver high quality activity commensurate with the world leading environment an experience embedded within.

Laboratory Intensity

Level: *High* [f=1,2]

Panel comments:

The level of intensity of the Chemistry Research Center - Vila Real is certainly high considering the various listed instrumentation and equipments, such as SEM, TEM, HPLC-MSn, GC-MS, AFM, DSC, ATG, FTIR, ICP-OES, RF Magnetron Sputtering, as well as the members fully active and involved into several research projects. The groups are clearly delivering to expectation and able to maintain levels of quality that are consistent with national level outputs. Provision of larger capital infrastructure is a challenge for a Unit of this size.

Programmatic Funding

Programmatic Funding (k€): 551,20 k€

Panel comments:

In allocating programmatic funding to research units, the panel considered quality, excellence, future plans, and relative size, with continuity in research, training, and technical support deemed fundamental. Due to the high pressure on the programmatic funding, it does not appear likely that the amount of funding received will allow fulfilling all the requests of the unit. The panel recommends that the funding should be essentially applied to: 1) Investment in Early-Career Researchers and Assistant Researches is a high priority. The panel recommends to recruit with precedence the best and most promising candidates and integrate them into teams that are creating a significant impact on the community and the companies in the Region, delivering excellence at national level with good international visibility. 2) Specific Infrastructure and Equipment. The panel recommends to invest in the most relevant equipment that could be beneficial to intersectoral scientific activity. It is panel opinion that some required small instruments, such as UV spectrophotometer and a microwave reactor, could be acquired through other sources. 3) Internal Call for Project Applications. The panel acknowledges the reasonable request for funding devoted to internal calls. However, CQVR has demonstrated significant activity in securing external funding, and the unit, with some concerted efforts, could further improve external grants acquisition through participation in nationally and internationally funded projects. The Unit is well engaged in encouraging collaboration and innovation through internal and international calls suitable to foster a dynamic research environment and to attract talented researcher. Part of the funding from item 15.5 should be employed to hire young personnel and to advance training programs. 4) PhD Students. The panel recommends securing most PhD grants through other regional, national or international funding opportunities. The increase of the PhD resources at the unit over the years shows the capability and effectiveness to find adequate resources and guidance to ensure that PhDs can focus on their research and contribute significantly to the Units objectives. 5) Advanced training programs of the R&D Unit. The panel acknowledges the relevance of securing the possibility of advanced training programs to ensure that researchers and young acquired talents are equipped with the latest skills and knowledge. The panel recommends that those programs are designed to foster continuous learning and professional development among researchers at all levels. Some budget should be dedicated to specialized training sessions to enhance the technical and analytical capabilities of its researchers. The small fraction of budget dedicated to this could be complemented by the Units collaboration with leading academic institutions and industry partners to provide researchers with opportunities to engage in cutting-edge research and innovation.