

Evaluation Panel: EXACT SCIENCES – Chemistry

Panel Members

Pedro Merino (Chair)	University of Zaragoza, Spain
Angel Rios Castro	University of Zaragoza, Spain
Donatella Verbanac	University of Zagreb, Croatia
Fernando Bresme	Imperial College London, United Kingdom
Rosario Fernandez	Universidad de Sevilla, Spain
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R&D Units

Centro de Investigação em Química da Universidade do Porto (CIQUP)	Faculdade de Ciências da Universidade do Porto (FCUP/UP)
Centro de Química - Vila Real (CQVR)	Universidade de Trás-os-Montes e Alto Douro (UTAD)
Centro de Química da Madeira (CQM)	Universidade da Madeira (UMA)
Centro de Química da Universidade do Minho (CQ – UM)	Universidade do Minho (UM)
Centro de Química de Coimbra (CQC)	Universidade de Coimbra (UC)
Centro de Química Estrutural (CQE)	Associação do Instituto Superior Técnico para a Investigação e o Desenvolvimento (IST-ID)
Laboratório Associado para a Química Verde - Tecnologias e Processos Limpos (REQUIMTE)	REQUIMTE - Rede de Química e Tecnologia - Associação (REQUIMTE-P)
Unidade de I&D Química-Física Molecular (QFM-UC)	Universidade de Coimbra (UC)

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Investigação em Química da Universidade do Porto (CIQUP)

Coordinator: Antonio Fernando Sousa da Silva

Integrated PhD Researchers: 44

Overall Quality Grade: EXCELLENT

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 5
- (B) Merit of the team of Integrated Researchers: 5
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 4

Base Funding for (2020-2023): 801 K€

Recommended Programmatic Support

PhD Fellowships: 6

Programmatic Funding: 700 K€, including for 2 (Junior) New PhD Researchers Contracts.

Justification, Comments and Recommendations

CIQUP has 4 decades experience in chemical research. With 73 researchers, about half of them PhD students, the Unit performs fundamental and applied research in the areas of medicinal chemistry, molecular thermodynamics, nanostructures, analytical chemistry and electrochemistry. The Unit produces high quality work in these areas, which is recognized at international level.

The Unit promotes the freedom to pursue research and set up collaborations and it is firmly committed with education. This is reflected on the incorporation of a group on Education, Science Communication and Society. The Panel was happy to see that the new group is well integrated. In addition to its own research, it has a distinctive role in promoting outreach activities, and it contributes to the profile of the Unit outside the university. The senior members of the Team have well defined roles and show good leadership in their respective areas, with instances of a high level of productivity and impact. The management structure works well and has promoted a good level of productivity for researchers and PhDs, favoring scientific quality.

For the immediate future, the Unit aims to increase the scientific output in their areas of competence, as well as impact factor and scientific impact, in their areas of competence. The Team exploits synergies between the different subjects, and it has been successful at attracting funding at European level. They have been awarded very competitive projects (RISE) and they lead COST actions, showing international leadership. The strategic plan focuses on consolidation of the research, building on a strong expertise at making their own instruments, e.g. in thermophysical properties. The Unit designs advance training activities (e.g. summer schools which have an international profile). There is room to set up national schools in areas of excellence (e.g. molecular thermodynamics). Regarding the human resources, there are realistic plans in place. The group invests in new members providing a startup package. This is very positive.

Integration and Coordination (Synergies)

The Team shows and excellent integration. This is highlighted by the recent addition of the educational group, which has a well-defined mission. There are frequent interactions between members of the group and plenary meetings every year, where everyone is exposed to the science performed in the group. The Unit strives for integrating junior Research members, helping them in their professional career. However, with a limited number of possibilities in academia, this represents a challenge for the younger members of the group. The Team benefits from the advice of an Advisory Board with internationally renowned members, that advises the group on key aspects.

The Unit produces high quality work, with very good impact in most research areas. One distinctive feature of the Unit is the rigour in conducting fundamental research, and the development of instruments which are used in academic problems, and deployed in collaborations with industry. The Unit participates in knowledge transfer activities and in the creation of spin offs. There are more opportunities to further expand in this area. The research productivity of the Unit is very good. The PhD students finish their degrees with a good number of articles, highlighting a very good mentorship approach.

The supervision of students is fairly effective. They take a number of courses relevant to their research, and they receive good training through frequent interactions with supervisors. The commitment with education is very high, as revealed by the incorporation of a research group working on education and science communication. There is real commitment in this area. The mobility of the students is encouraged and they have opportunities to attend international conferences. The Unit has built a strong cohort of PhD students. Many of them are very productive in terms of research publications. The Unit promotes and provides significant support to the younger researchers.

The productivity is very good, with areas that are internationally leading. The research output across members of the group seems fairly homogeneous, showing good management practices. This is well organized and appreciated by the different stakeholders. The Unit hosts a group devoted to Education/Science communication, which is unique amongst the Chemistry Units in Portugal.

Transfer of Knowledge is supported by the dedicated Departments. The Unit is active at patent registration, and several patents have been licensed. They have connection with industry and host students funded by industry (e.g. Galp). The Unit produces work of technological interest. This has led to several patents, as well as to the set-up of a spin off company, co-funded by members of the Unit.

The Unit manages its own resources, but they are in need of specialized technicians and secretarial support.

The Unit makes use of expensive equipment. These are employed via third party services that are available locally, hence no major expenses on maintenance nor in the provision of external services are expected. The Unit hosts excellent resources to measure properties of fluids. The Unit has access to state of the art equipment and they design and develop their own instruments. This activity is strong in the area of thermophysical properties. The Unit participates in the PT-Openscreen network, which may open opportunities for interaction with the ESFRI programme EU-Openscreen.

The Unit has been very successful at attracting funding from the private sector, and nationally and internationally from research agencies (EU-H2020 Programme - RISE and COST).

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Química - Vila Real (CQVR)

Coordinator: Paulo Jorge dos Santos Coelho

Integrated PhD Researchers: 31

Overall Quality Grade: VERY GOOD

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 4
- (B) Merit of the team of Integrated Researchers: 4
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 4

Base Funding for (2020-2023): 465 K€

Recommended Programmatic Support

PhD Fellowships: 3

Programmatic Funding: 275 K€, including for 1 (Junior) New PhD Researcher Contract.

Justification, Comments and Recommendations

The Chemistry Center of Vila Real consist of 31 integrated researchers, working on applied aspects of chemistry: organic chemistry, materials, food, environmental chemistry and biochemistry. The Unit has built a distinctive research programme, which exploits the resources available to them, showing a commendable resilience and persistence to overcome the challenges of the area where they are located.

The Unit consists of 53 researchers (21 PhD students), 23 collaborators. There is an efficient structure to integrate all the strands of the research. The senior members form a cohesive group, with well defined roles and responsibilities. The group works closely to identify opportunities for mutual development and to establish collaborations with industry, seeking funding at national and international levels. The have been successful at establishing collaborations with the local industry. The Unit is inclusive, seeking to integrate people as much as possible in the normal activities of the group. The Team has a commitment to keep and promote excellent researchers within the group. The Team has a realistic and opportunistic approach, and it is completely aware of the challenges associated to the region they are located in. Despite the difficulties they have set up a very good research group, producing valuable applied scientific outputs.

The aim of the R&D Unit is to consolidate the development of chemical technologies that started several years ago. The focus is on functional materials, environmental technologies and food science. The Team plans to implement innovative technologies in the food industry, targeting safety aspects. Their strategy aligns with the goals set by the UN on sustainable development. These objectives are realistic and exploit the expertise and resources available to the Team.

The Team is strongly interconnected, with daily interactions between all members of the group. They have group and plenary meetings, where all the members are exposed to the science produced in the Unit. They promote good synergies between group members, mostly through the personal involvement of the PIs. Overall, the group is well integrated and works well as a Unit. The Team has set up an External Advisory Board (EAB), however, the meetings in recent years were cancelled due to funding constraints. There are no firm plans to meet with the EAB in the near future, while these are advisable. Part of the challenges faced by the Unit are related to the lack of a Chemistry degree. The Unit has setup three doctoral programs, two of them international, which allow the students from Vila Real to travel to The Netherlands and Spain.

The research output is of good quality, with good productivity. The expertise available in the group is recognized and exploited by the local industry. The Unit facilitates connections between small local companies providing input for new product development. The Unit has set specific requirements regarding the productivity of the members in the Unit, who should fulfil a minimum set of criteria (1 paper per year) set by the management Team. The Group has been successful at generating IP, which has been transferred to companies for further exploitation and commercialization. No specific needs to set up spin-offs were found, since the group reaches the market easily by dealing with the private sector.

The progress of the students is monitored mostly via personal interactions with the supervisors. The students highlighted the approachability of the PIs to discuss and steer their research. Additionally, they can attend courses on transferable skills and career development. The mobility of the students is encouraged and they have some opportunities to get additional training in the international programmes. However, this is highly related to the resources available in the Unit. The Unit has been successful at building a strong cohort of PhD students, overcoming the challenges associated to the lack of a chemistry degree in the university. This shows determination and initiative. The relationship student-supervisor seems excellent.

The productivity is good, while the research output varies across members of the group. Dissemination to general public (outreach activities) is well organized and appreciated by the different stakeholders

Transfer of Knowledge is supported by dedicated Departments. The Team has developed 9 patents in 5 years, a very good outcome. All the partners have connections with the industry. This is a clear strength of the Unit. It is a clear strength of the Unit with tangible outcomes. There is a very successful strategy, with a large number of patents that are being exploited commercially.

The Unit manages their own resources but often this is done by academic members of staff. There is a need for dedicated technicians, as well as resources for maintenance of the equipment.

The Unit makes use of expensive equipment, such as NMR, not available locally. Often, samples are sent to Spain. They find this option more efficient than using the Portuguese NMR network. The electronic microscopy unit is in the national microscope network. Providing external services is not always feasible, due to high overheads/taxes, as well as lack of technical support. The Unit hosts a center of reference at national level in the area of soil and plant analysis. The Unit is competitive, although there is a need for official accreditation, which is essential in order to provide service to international stakeholders.

The Unit has been very successful at attracting funding from the private sector and from regional programmes. They have had some success at winning projects funded by EU.

Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Química da Madeira (CQM)

Coordinator: João Manuel Cunha Rodrigues

Integrated PhD Researchers: 24

Overall Quality Grade: VERY GOOD

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 4
- (B) Merit of the team of Integrated Researchers: 4
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 4

Base Funding for (2020-2023): 341 K€

Recommended Programmatic Support

PhD Fellowships: 3

Programmatic Funding: 490 K€, including for 1 (Junior) New PhD Researcher Contract.

Justification, Comments and Recommendations

This is a small R&D Unit, very active in research, training, outreach and connections with industry. It is integrated by two consolidated research groups (Materials and Natural Products), which have gained national and international recognition.

The Panel has perceived a very good management, with clear leadership and direction of the Unit at this moment, demonstrating continuous creativity to provide financial support and promote the Unit within the scientific community and regionally. A good relationship with the local institutions has been accomplished.

The Unit has developed a strategic plan for the future, reinforcing the present objectives of the Units with the suitably selected new ones. The pursued objectives of the research are of general interest and the expected results have the potential to have a positive social and economic impact. This is especially remarkable at regional level, because of the peripheral location of the Unit. In fact, the research efforts of the Unit have successfully been addressed to applied research in the field of natural products of high local interest, and nanomaterials for biomedical applications. The objectives of the plan of activities for 2018-2022 are in coherence with the expertise and the potential of the R&D Unit, continuing to strengthen its ongoing work in areas of nanomaterials for health applications, natural products, and food safety. But it is also commendable the focus on sea technologies and resources, and the use of nanomaterials for diagnostic and therapeutic objectives. The expected results will be of general scientific interest, as well as some of them with direct impact to industry at local level and further.

There is a good integration among the research groups integrating the Unit. Synergies are demonstrated through collaborations within the Unit.

The R&D Unit has made significant scientific contributions and the main assessment indicators have clearly increased from 2013 to 2017 years. In addition to the attracting foreign students, the level of internationalization is good, implemented through scientific collaboration (Hungary, Spain, UK, and especially with China), and international projects.

Training activities for PhD studies has been well addressed. The students are motivated and enthusiastic with their research work and the possibilities for developing their work. There is a good working atmosphere. Although the supervisors are close to the students and follow very well the progress of the investigations, planned seminar series will give and opportunity of students/researchers to periodically presents their work and exchange ideas.

The scientific contributions are at a very good level in terms of publications in recognized international journals and communications in national and international meetings, with an opportunity to further improve the quality of the publications/presentations. The dissemination of the activities directed to the general public and those aimed to attracting researchers to the center are excellent.

Transfer of Knowledge through the collaboration with companies is of additional value of the team. The Unit is not focused on patenting the research results due to lack of experience and support considering the high costs.

During the evaluated period, human resources increased, especially the number of PhD integrated researchers (from 16 to 24), the PhD students (from 11 to 16), and the overall number of integrated researchers (from 44 to 70). It is important to point the incorporation of researchers outside of Portugal, demonstrating the scientific attraction of the two groups integrating the Unit.

The Unit has the adequate infrastructures to perform its activities. Good and new equipment is available. The Unit benefits of particular calls regarding European Region Development Fund that provide good opportunities for acquiring new infrastructure. On the other hand, there is a clear necessity of covering maintenance costs.

The Unit has been funded with national and international grants, and also from industry. The Unit managed around 1 million euros more than in the previous period of evaluation (2008-2012). It is noticed that for the next evaluation period (2018-2022), more than 3.5 M€ of competitive funding is already secured (1 million more euros than in 2013-2017 period).

The Unit can install a system of seminars where researchers can in a planned way present their research progress periodically. The integration of work groups can be improved to facilitate knowledge exchange, including training in soft skills e.g., grant preparation.

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Química da Universidade do Minho (CQ – UM)

Coordinator: Maria Fernanda de Jesus Rego Paiva Proença

Integrated PhD Researchers: 27

Overall Quality Grade: GOOD

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 3
- (B) Merit of the team of Integrated Researchers: 3
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 2

Base Funding for (2020-2023): 335 K€

Recommended Programmatic Support

PhD Fellowships: 1

Programmatic Funding: 85 K€

Justification, Comments and Recommendations

The Chemistry Centre - University of Minho (CQUM) focuses on basic and applied chemistry. It consists of two integrated researchers clustering in three different groups: applied bimolecular chemistry, heterocycle chemistry and sustainable chemistry. During the evaluation period the Unit has been reorganized changing the number of research groups from 4 to three. Now it is composed by 27 Integrated Researchers with PhD, number that is the result of a dramatic reduction in the last years, especially important in the case of post-doc integrated researchers. On the other hand, the number of PhD students has remained almost the same. It is important to highlight that there are no scientific requirements concerning the scientific activity to be fulfilled to belong to the Unit. As a consequence, it is possible to find some members with a very low productivity. The Panel has detected that the Unit has made a critical assessment of their present situation through a SWOT analysis from which it has planned new activities to be developed in the period 2018-2022.

The decisions concerned with the Unit are taken by a scientific committee that is elected every three years, consisting of the coordinator and one representative from each group. The structure of the committee is well thought for the size of the group, and it should be able to take decision in a flexible way. However, there is not a clear management structure although an external advisory committee is considered and the Panel has perceived a lack of leadership and direction of the Unit at this moment, perhaps in some way associated to the recent change of the Unit leader.

The pursued objectives of the research are in general of interest and could have a positive social and economic impact. The objectives of the plan of activities for 2018-2022 are in coherence with the expertise and the trajectory of the R&D Unit. It is considered positive the aim of reinforcing the research quality and increasing their national and international relevance, interdisciplinarity and national and international collaboration.

There is some integration and coordination between the research groups integrated in the center. However, very limited synergies among the groups have been demonstrated which might be due to the recent re-organization. During the evaluation the research groups have presented their research activities but a joint project towards a general goal of the Unit has not demonstrated. There is no definition of research lines beyond the particular interests of the research groups.

The group has contributed in the period 2013-2017 to the preparation of bioactive compounds and synthetic methods. This work has resulted in over 100 articles. The work on heterogeneous catalysis seems to follow well defined studies, and the research of the group working on functional materials has tackle study with carbon nanomaterials, with potential applications on medical diagnostics. This activity produced a good amount of articles: about 200. The research activities thus consist of fundamental questions concerned with methodological developments in the traditional area of synthesis and study of materials of relevance in e.g. medical applications. In spite of the accident that took place in 2013 which destroyed several laboratories and forced the closing of the building for a relative long time, and taking into account the reduction of the budget following a precedent evaluation of the Unit by FCT, the general productivity is good. However, their international recognition and visibility is not very high and should be improved.

The R&D Unit has made significant scientific contributions together with an important training of Master and PhD Students. They have developed a new Master Program on Applied Biochemistry, and their PhD students (21) can also benefit of an active Doctoral Program in Chemistry.

The scientific productivity, in terms of the amount and the quality of the publications in specialized journals can be considered good although the productivity is not very high. In fact, the Unit publishes regularly in peer reviewed journals, but the level of output has decrease significantly in the last years. Loss of personnel due to an average evaluation of the Unit contributed to this. The quality of the publications should be increased by accessing to journals of a higher impact factor. Outreach activities have been planned at several levels. Dissemination to the general public is very good involving participation of early stage researchers.

The Unit has some contact with local and national industries demonstrating certain transfer of knowledge to the private sector. Most of the activity is developed with local industries and two national patents have been released. These activities are acceptable but an effort to increase the indicators should be desirable. Indeed, the Unit has not analyzed properly the impact of this research beyond the academic publications. Hence, the impact seems to be confined to the academic sector, given the lack of strong collaboration with industry, or knowledge transfer to the industrial sector.

The Unit has an acceptable number of human resources including Ph.D. students and post-docs. However, during the visit it was clear that several members of the Unit decided to abandon it without an apparent explanation.

The Unit has some infrastructure that provides service for the researchers of the Unit. The NMR equipment forms a part of the Portuguese Nuclear Magnetic Resonance Network. However, the Unit has not explained convincingly the benefits of that membership in terms of research and/or training. The existing in-house equipment needs of maintenance that should be provided by the Unit. There are no infrastructure that could be considered a reference at a national or international level.

This research has been funded with national and international grants and also from the industry, but in this last case mainly concerning the studies of Master students. The level of funding about 3M EUR about 100KEUR per integrated researcher is not high. The expected budget is realistic, and the distribution of the budget can be considered adequate according to the needs of the Unit.

The CQC deserves to be supported in its work within the national laser and NMR networks.

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Química de Coimbra (CQC)

Coordinator: Rui Fausto Martins Ribeiro Silva Lourenço

Integrated PhD Researchers: 84

Overall Quality Grade: EXCELLENT

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 5
- (B) Merit of the team of Integrated Researchers: 5
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 4

Base Funding for (2020-2023): 1465 K€

Recommended Programmatic Support

PhD Fellowships: 8

Programmatic Funding: 1185 K€, including for 2 (Junior) New PhD Researchers Contracts.

Justification, Comments and Recommendations

The Coimbra Chemistry Center (CQC) is a multidisciplinary research Unit, founded in 1977. It represents major multidisciplinary R&D Unit in the Central Region of Portugal encompassing many areas of Chemistry. The Unit is recognized as reference center at the national and international level.

The management of the Institution is one of the strongest points of the Unit. The roles and the responsibilities are clearly defined. External Advisory Board is included in the managerial process and provides valuable advice on a regular basis. The Coordinator is recognized in the scientific and professional community. The Coordinator possesses broad experience and significant expertise. The Coordinator is also a member of the evaluation panels for several distinguished committees and agencies. The integrated researchers are experts in particular areas and their work is well recognized in the scientific community. The responsible mentors and principal investigators are familiar with all the steps related to the work progress of PhD students and assure the proper and smooth monitoring.

The proposed strategic approaches are realistic and valid for the organization, yet not developed significantly. The intention is to employ additional PhD researchers to maintain the scientific excellence and sustainability of the Unit, as well as to assure additional funding from the different sources. Their goal is to provide proper sense to keep human capital/assets in order to mitigate emigration. Additionally, CQC is focused on broadening its international dimension.

The Unit is very well integrated within the University and the city of Coimbra, as well as with other national and international Units. Of the highest importance are activities related to the training and continuous education. The Unit has been very successful in building a very prestigious program for advanced training in Medicinal Chemistry.

Research within the Unit is of high quality and the average scientific productivity is very good. The level of competitiveness within the research is high, which has been justified with the high number of patent applications and the creation of spin-offs. These demonstrate the commitment of the Management Team to acknowledge and valorize the research outputs obtained. The CQC has very good publication output and it is very active in presentations at the conferences and symposia. All researchers, including also the younger fellows are able to participate regularly in the national and international scientific and professional events.

Education, as already mentioned, is carefully planned and continuously monitored. The training provided includes training in scientific areas, while the appropriate training in transferable skills can be improved since its results are less pronounced. Additionally, the career planning of the researchers should be more carefully addressed and more effective attention should be provided to this segment. Activities in this sense were not clearly defined and not explicitly stated during the meeting. The procedures and conditions to obtain a doctorate degree and fulfill all requirements for a PhD thesis defense are in place and the CQC has been successful in this over the years. The CQC members actively participate and provide also organization of international courses.

A good record of publications in top journals within the area of expertise is demonstrated. Dissemination to general public (outreach activities) is well organized and perceived by the different stakeholders.

Transfer of Knowledge is very well organized and it is supported by the dedicated Department within the University. The CQC has significant activity with the private sector and was able to start and accomplish clinical studies (Phase I/IIa) with its new chemical entity. Potential licensing/exploitation of these results are envisaged and negotiation with the big Pharma has initiated. The number of patents is very good (about 36) and several spin-offs have been established based on their own IP.

In general, the CQC possesses most of the human resources necessary to carry on the daily activities. The Unit is appropriately staffed. However, due to the cost cuts they have not obtained continuous support to hire new faculty to assure smooth sustainability in the near future, therefore there is a need to support shadowing the senior scientific personnel with younger ones.

The Unit is housed in a building from the early 70's and there is a noticeable need for an upgrade and the improvement of the regular working conditions (e.g. service rooms, air conditioning, ...) in order to meet current working & safety standards. As far as instrumentation is concerned, the Unit has all necessary equipment needed to perform their regular activities. What was mentioned by one of the Unit's members there is the need to upgrade the IT equipment (Computer Cluster) for the Computational work. The Unit possesses several core-facilities that are available to provide services as well as serve to other researchers. A Laser Lab is an internationally leading facility widely used and recognized at the European level.

The Unit is very capable to obtain funding both from private and public sources at national, European and international levels

The CQC deserves to be supported in its work within the national laser and NMR networks.

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Centro de Química Estrutural (CQE)

Coordinator: Armando Jose Latourrette de Oliveira Pombeiro

Integrated PhD Researchers: 179

Overall Quality Grade: EXCELLENT

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 5
- (B) Merit of the team of Integrated Researchers: 5
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 5

Base Funding for (2020-2023): 3258 K€

Recommended Programmatic Support

PhD Fellowships: 17

Programmatic Funding: 940 K€, including for 4 (3 Junior, 1 Auxiliar) New PhD Researchers Contracts.

Justification, Comments and Recommendations

Centro de Química Estrutural (CQE) comprises 11 research groups which work in four thematic areas. Its structure is a result of a recent integration which has been highly efficient and successful. There are 178 Integrated Researchers in this multidisciplinary team working in a trans-disciplinary and intersectorial manner closely connected to the main stakeholders (students, industry, partners in professional networks).

Management structure and procedures are of very high quality, with roles and responsibilities clearly defined. External evaluation has been carried out regularly and the obtained recommendations were taken into account and implemented whenever possible.

The objectives outlined for 2018-2022 build on the recent successes of the Unit and also on the wide expertise available to them through the extensive number of integrated researchers. The mission is clearly stated, including addressing society challenges, training and knowledge transfer relevant in industry, culture, etc. The priority areas are ambitious in terms of content covering a wide range of scientific as well as engineering disciplines. The Unit will be able to compete successfully in attracting funding. The plans target excellence, providing incentives for the generation of top articles. There are concrete plans to establish stronger collaboration with the private sector. Creating a collaborative lab with the private sector would be an excellent approach to strengthen these interactions.

The four research thematic areas are highly competitive. What is of high significance is the fact that although nominally separated, the Units actually overlap in some topics, and the researchers can meet in these intersections and perform research jointly. The senior researchers (most of them acting as Supervisors) are recognized experts within the scientific community, particularly for their contribution in maintaining excellence which is visible through an outstanding scientific output, active participation in national and international projects, international events, as well as through the organization of different meetings and workshops. The CQE is also very successful in the exploitation of their research results, dissemination and outreach activities towards different public.

The overall performance of the group in research output is excellent. Some members of the group have a fragmented number of articles over the years. It is understood that publication output changes from field to field, but the Team may want to address these issues via integration in joined projects or other mechanisms. The work of the group is valued at international level, as can be judged by the analysis of the research output. Further, the research is producing results of technological interest, and there are several instances of spin outs created by members of the group. Members of the Team also serve as committee members, and members of the Team have been awarded several prizes, which highlights again the recognition of the research performed by the Team by their peers. The degree of internationalisation is large, as shown by the number of authored articles with foreign labs, and participation in EU networks.

Education of the PhD Students is of very good quality and is closely supervised and monitored by the senior Supervisors. Unique knowledge and experience in the different areas exists and the impression is that with targeted financial support in human and infrastructure-related resources from the national and other sources, the CQE would be able to keep and

even advance its performance in scientific training and education of different students (Master, PhD and Postdoctoral). The supervisors actively participate in the activities that could result in creating conditions for structured and successful professional growth of the PhD students. The students are exposed to different sectors, through the joint project with the industry, through the initiatives started by the senior researchers in order to get the PhD students accustomed to the entrepreneurial mindset and the researchers' career development is also the result of the very good relationship and trustful relationship between senior and younger members of CQE Unit. The PhD students are also trained in complementary skills and the courses are carefully planned at the master and doctoral level in order to avoid any unnecessary duplication of resources. The PhD programs are run smoothly, and the PhD students are included in teaching and mentoring activities. The PhD students can actively participate in international courses and are included as speakers on the conferences.

Publications record of the CQE is exceptional in the terms of quantity and quality of the work. The dissemination is outstanding through the organization of workshops, conferences, congresses and symposia. The CQE actively promotes actions dedicated to the outreach activities and results of these activities are visible.

Transfer of Knowledge activities are supported by the dedicated Department within the University. The CQE has been very successful in patenting, contracting (national and international contracts, with public and private entities), and the initial attempts to set-up a spin-off have also been pursued. Additionally, the CQE is planning to employ a new person (Science Manager) that would help in writing Projects' application and also participate in the Project Management. This is necessary in order to increase efficiency of the Unit as a whole and free time for the researchers to deal with scientific and educational activities. Transfers of knowledge activities are very good in the terms of intellectual property protection. However, the exploitation of results via creating new spin-offs is expected to result in more tangible outputs in the near future, since they have in the initial phase.

The CQE hosts a quite large number of researchers. Altogether there are 178 integrated researchers, 54% are faculty members, 15% on contracts and the rest are postdoctoral fellows. However they are asking for 7 contracts to be supported by the FCT, one of this is already elaborated before, dedicated to a Science Manager. It is important to highlight that the research positions are in general too short to program well their work, and specific funds for young researchers to support independent career would be appropriate. It would also very convenient in the hiring process to interview the applicants, to improve the selection process. There is also need for more professional help in identifying grants and support in formulating better applications with a higher chance of success.

Although the CQE possesses good infrastructure in terms of equipment needed to smoothly run the research activity, specific items and facilities need to be upgraded by the new/renewed equipment in order to replace the old depreciated one. This was clearly communicated and reported during the site visit.

The Unit receives support of different sources, national and international on-going projects, as well as from the collaborations with different sectors. Financial aspects comprise basic (fundamental budget) and dedicated programmatic funding. Due to the issues in national financing in the previous period (2015-2017) CQE had only 3% dedicated to equipment due to the restrictions implemented by the central governance bodies of the state; now they increased it to 20% (2018-2013). However, additional justification of this increase has not been clearly provided.

The CQC deserves to be supported in its work within the national laser and NMR networks.

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Laboratório Associado para a Química Verde - Tecnologias e Processos Limpos (REQUIMTE)

Coordinator: Baltazar Manuel Romão Castro

Integrated PhD Researchers: 317

Overall Quality Grade: EXCELLENT

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 5
- (B) Merit of the team of Integrated Researchers: 5
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 5

Base Funding for (2020-2023): 5651 K€

Recommended Programmatic Support

PhD Fellowships: 34

Programmatic Funding: 2225 K€, including for 8 (4 Junior, 3 Auxiliar, 1 Principal), New PhD Researchers Contracts.

Justification, Comments and Recommendations

REQUIMTE (CQC), founded in 1996, is a well-established research that has become a Unit of reference in the area of Sustainable Chemistry. The Unit encompasses major activities in basic research, knowledge transfer and an excellent provision of training in a wide range of traditional areas in chemistry as well as boundary areas (bioengineering, chemical engineering). The Unit is recognized as a center of reference at national and international levels. This Team consists of 800+ researches distributed in several sites, with strong poles in Porto, Lisbon and Aveiro.

The management of the Unit is exemplar. The Team has set up an excellent management Team, with strong leadership and vision. The Group Leaders exemplify the ambition of the Unit to become excellent in every aspect: research, knowledge transfer and training. The roles and the responsibilities of the management Team are clearly defined. An External Advisory Board with renowned international researchers provides useful feedback. A number of the integrated members with permanent positions are recognized researcher in their own right. The Panel had a stimulating and valuable discussion with a group of PhDs and postdoctoral researchers. Clearly, they care about the Unit and are proud to belong to REQUIMTE. The Panel recommends that the Unit consider including representatives of the student and postdoctoral community in the management structure to ensure prompt input from this community. Self-assessment is performed every two years paying particular attention to the productivity of its members, to ensure they are active.

The proposed strategic plan is realistic and valid for the organization. The plan is ambitious in terms of increasing research output, taking care of quality. To achieve these objectives the Unit has implemented an incentive programme. There are plans to strengthen specific areas, such as organic chemistry, as well as hiring both PhD and postdoctoral researchers. Clearly, the Unit pays lots of attention to the hiring process, targeting excellence, and they are proactive at offering competitive salaries to excellent candidates.

The Panel was convinced that the Unit, despite the large size, has “engineered” an excellent structure that promotes and nurtures internal synergies via both, sharing of equipment and co-supervision. In addition, there is enough flexibility to undertake blue-sky research and to establish joint projects via seed funding.

Research within the Unit is of very high quality and the average scientific productivity is very good. The Unit is proactive at ensuring a minimum on the productivity of integrated researchers. The body of research articles is highly cited. The Unit has been successful at producing IP, and creating spin-offs, some of them with considerable success.

The training programme is complex. Some rationalization of the training programmes may be considered. The Panel understood that there are constraints at institutional level that hinder introducing changes in a flexible way. The training of the students is carefully planned and continuously monitored. The students have access to courses on transferable skills and entrepreneurship, taught by technologist with demonstrated experience in knowledge transfer.

REQUIMTE productivity is excellent and it has a significant impact at international level. A very good record of scientific publications in top journals has been achieved during the evaluated period. Members of the Team have occupied management positions in international organizations. The researchers participate actively and regularly in national and international events. The Unit ensures that their student cohort is highly competitive. It trains a very large number of PhD and MSc Theses, 700+ in total. Dissemination to the general public (outreach activities) is well organized and appreciated by the different stakeholders.

REQUIMTE demonstrates a significant activity with the private sector and it is very active at filing patents as well as setting spin-offs. These metrics rate very high.

REQUIMTE possesses the human resources necessary to carry out their mission. They seem to have the necessary administrative support. One key issue is the stabilization of excellent researchers via incorporation as permanent members. This, however, seems difficult given the constraints in hiring new academics.

Infrastructures

The Unit has access to a number of facilities, but the Panel did not have the opportunity to visit these, except for the NMR facility. The Unit manages several core-facilities that are available to provide services inside and outside the University.

The Unit has demonstrated to be very successful at attracting funding both, from private and public sources.

Evaluation Panel: EXACT SCIENCES – Chemistry

R&D Unit: Unidade de I&D Química-Física Molecular (QFM-UC)

Coordinator: Luis Alberto Esteves Batista de Carvalho

Integrated PhD Researchers: 14

Overall Quality Grade: GOOD

Evaluation Criteria Ratings

- (A) Quality, merit, relevance and internationalization of the R&D activities of the Integrated Researchers in the R&D Unit Application: 3
- (B) Merit of the team of Integrated Researchers: 4
- (C) Appropriateness of objectives, strategy, plan of activities and organization: 3

Base Funding for (2020-2023): 167 K€

Recommended Programmatic Support

PhD Fellowships: 1

Programmatic Funding: 100 K€

Justification, Comments and Recommendations

Molecular Physical-Chemistry Research and Development Unit from the University of Coimbra (QFMUC) was established in early nineties. It comprises a small number of researchers (around 20), of which approximately two thirds are integrated PhDs. The Team is very enthusiastic in studying different research topics and develops potential solution for the treatment of different diseases such as cancer and cystic fibrosis. The main activities are: development of metal based (platinum Pt and palladium Pd) compounds as medicines: diagnostics, chemo-protective properties of food, development of functional food, analysis of heavily burnt human bones for forensics and education.

Management is performed by two main supervisors of the Unit, who need to combine many different tasks, including administrative ones. Due to the lack of dedicated Project Manager responsible for daily research-based activities, the roles and responsibilities related to research/projects are not clearly delineated. External evaluation has been carried out regularly and the obtained recommendations were taken into account and implemented whenever possible. The senior researchers (most of them acting as Supervisors) are recognized experts within the scientific community, particularly for their work on chemistry curricula and the organization of international Courses (e.g. FEBS meetings and workshops, COST action meetings).

The Unit lacks a clear strategy plan defined with realistic and measurable short, medium and long term goals. This is necessary to assure their sustainability as a stand-alone Unit, considering the Team members have very clearly expressed their intention to remain independent within the University of Coimbra.

The integration and coordination between the groups is not very high. In fact, two research groups have been recently merged into one and the resulting group decreased in number of publications which can be interpreted as a lack of synergies between the researchers within the group. The Unit participates in several national and international collaborative actions and has joint projects with hospitals and food industry. The lack of a larger European funded project is recognized, and the Team members are willing to continue to apply within new calls, particularly as a partner institution, rather than the coordinating one.

Research at the Unit is original but is fragmented between diverse topics and therapeutic areas. This apparently does not have negative impact on the good publication output, realized in good Journals. More focused research could increase the overall competitiveness of the Unit and create conditions for obtaining substantial funding outside of the already established paths, which is highly relevant in order to assure better working conditions, scientific productivity and personal development of the Team members.

Education of the PhD students is of good quality and is closely supervised and monitored by the senior Supervisors. The Unit's spectroscopic facility still needs to be upgraded by the new equipment in order to replace the old one. Unique knowledge and experience in the spectrometry exists and the impression is that with the targeted financial support, the Unit would be able to organize advanced courses in this scientific area. The supervisors make a consistent effort to share their network with the students in order to increase their chances of professional growth. Researchers career

development is also the result of the very good relationship and trustful support from the Professors to students and vice versa. There is a continuous intention of the PhD students to return into the Unit as soon as they accomplish some of their professional obligations (obligatory education, internships, defence of PhD theses, ...). More attention should be paid to a more structure initiatives and activities that would promote targeted career development of the PhD students, particularly in acquiring new transferable skills through the complementary training courses. PhD theses are regularly defended, and the researchers are quite productive, delivering on average 5-6 papers out of each PhD thesis. The principal scientists, post-docs and PhD students usually participate on international courses; on average the PhD students are able to participate on at least one international conference annually.

Dissemination in the form of scientific publications in journals is acceptable although not very high in terms of productivity and impact factor. Publication in multidisciplinary journals of high impact factor should be desirable. A correct participation in dissemination activities directed to the general public is demonstrated.

Transfer of Knowledge is supported by the dedicated Department within the University. The new person responsible for the Project Management could help in better structuring of Unit's activities and free time for the PIs for strategic research management, networking, fund raising and publication policy. Transfer of Knowledge activities should be enhanced. This can be achieved by utilizing existing networks, by delegation of particular tasks between the Team members and more effective planning. These could result in new contracts, potential patent protection, as well as creation of spin-offs or a more profitable for the Unit collaboration with Industry in the near future.

The Unit is small and tightly knit, comprising of only a few investigators and several students. Unit needs FTEs with specific expertise and experience, project manager and laboratory technician. Furthermore, there is a need of obtaining additional PhD grants and appropriate administrative support.

The Unit is housed in a building from early 70's with a felt need for an upgrade and the improvement of the regular working conditions (e.g. service rooms, air conditioning, ...) in order to meet current safety standards. Additionally, the space available for regular laboratory work is not sufficient and needs better maintenance.

As far as instrumentation is related, the Unit needs an upgrade of the existing equipment, new microscope, hood for medicinal chemistry and new IT hardware

The Unit receives some support of on-going projects and a recently obtained FCT grant. However, this part of activities can be significantly improved by the dedicated attention of the PIs to fund and grants rising, as well as by enhancing the value of potential industrial projects with the protection of intellectual property.

The Programmatic Funding can be partially used to upgrade instruments as well as to employ a dedicated technician/lab coordinator.