

GLOBAL REPORT ON THE EVALUATION OF THE RESEARCH UNITS ON MATERIALS SCIENCE AND ENGINEERING

1. The research Units of the Materials Science and Engineering area were evaluated by the following scientists: Professors Brian Ralph (Brunnel University, UK), Jacques Lucas (Université de Rennes I, France), James Hay (University of Birmingham, UK), Michael Coey (Trinity College, Republic of Ireland), Paul O'Brien (University of Manchester, UK), Relva Buchannan (University of Cincinnati, USA). Professors Carl Lawrence (University of Leeds, UK) and Göran Gellerstedt (KTH, Sweden) assisted the evaluation by producing specialised reports. This group was coordinated by Professor João Carlos M. C. G. da Rocha (University of Aveiro, Portugal).
2. The panel visited and evaluated twelve research Units in the period 13 to 18 January 2003.
3. Each evaluation took into consideration: the reports presented prior and during the visits to the research Units; the discussions with Unit members; and the general impression gathered during these visits. The criteria used for the evaluations were derived from the classification attributed to each of the items in the evaluation forms and from the general impression left on the evaluators from the personal contacts during the visit. Consideration was given to comparative aspects between different units and also to the quality of similar research Units in Europe and the USA. The grades were obtained by general consensus in the panel.
4. Detailed individual reports were produced for each unit evaluated and contained a general appreciation and several suggestions aimed at improving the future performance of the Unit.
5. The panel was impressed by the quality of the programme and logistics of the visits organised by the staff of the FTC evaluation Centre and by the technical support during the visits.
6. The panel acknowledges all research Units for the productive scientific atmosphere under which the visits took place, allowing stimulating discussions and interactions with Unit members.
7. The panel was impressed by the overall scientific quality of many research Units, which has increased significantly since the last research assessment. Although still relatively

small, the Materials Science and Engineering community in Portugal is active and on an upward slope. Some groups within Units are clearly competitive at an international level. Six out of the twelve Units evaluated were grade 5, and the panel felt it was convenient to split grades into three distinct levels. Hence, one Unit was singled out at the top with 5 + , two at 5 and three at 5-. The Standard of the research performed in these Units is clearly very good to excellent on an international basis. The remaining Units were graded 4- (1), 3 and 3- (2) and 2 (1). Despite the lower grades, the panel believes that these Units have the potential to improve considerably. In most cases, a major problem is leadership, which must be improved. Two very small groups did not have the critical mass to become a new research Unit and were graded I.

8. The best research Units have a mission statement and a strategy for the next five years. The panel strongly recommends all Units to have a mission statement. In addition, when producing a report, Units should identify and put forward a few (achievable) milestones for the assessment period.

9. In general, the research being carried out needs to be more interdisciplinary. Materials Science and Engineering is a scientific domain where significant progress can only be made if problems are solved with the contribution of scientists from different backgrounds.

10. In general, the research Units are well aware of the importance of drawing financial support from industry and many are already engaged in R&D collaborations. However, it is clear that establishing fruitful links with Portuguese companies remains a difficult task with limited success. Many researchers expressed the view that although they are ready to collaborate, companies and industrialists are not paying attention. This issue deserves special attention from FCT and other Portuguese scientific policy agents.

11. The rate of scientific publication (papers in SCI journals) of the best research Units in Portugal is increasing and, in many cases, is already up to international levels. However, in almost all Units a few researchers still publish almost nothing. Although it is understandable that people who also have teaching (and other) duties publish less than full-time researchers, one would still expect that they publish at least one paper per year. The Unit leaders must address this problem. The panel noted that although researchers are now targeting SCI journals for publication, very few papers are published in the top (large impact factor) Materials journals, which are general in scope. It is advisable that some of the best work produced by the teams is submitted to these journals.

12. The number of patents filed by the Portuguese research Units is also increasing, though most are national. In general, the Units do not seem to have a clear strategy as to

what to do in the future with the filed patents. Here, again, the links with industry are vital for the Units.

13. The financial management of some Units is, at best, poorly professional and difficult to understand. Often, the Unit leadership only has information on how the Pluriannual budget allocated by FCT was spent, and has little or no idea on the financial income (projects, grants...) of individual members. As a result, it is impossible to assess whether the Portuguese Units are under or over funded. This situation is unacceptable.

14. Although, in general, research Units provide a friendly scientific environment for young researchers, there is concern that in some groups Ph.D. students may not be adequately supervised (particularly in their first year). Some Units hold few (or no) seminars where students may present and discuss their work. In fact, the all issue of a Ph.D studies programme in Materials Science and Engineering deserves careful consideration.

15. A recurring complaint of researchers, which the panel fully endorses, is the need for equipment upgrading. Indeed, since CIENCIA, some ten years ago, no major programme for purchasing new equipment has been put forward by the Government. If nothing is done in the near future it will be impossible to continue research in Portugal in many domains of Materials Science and Engineering. Worst of all, the training of young researchers may stop and the scientific edge that has been painfully gained over the last decade will probably be lost. This issue deserves special attention from FCT and other Portuguese scientific policy agents.

16. The lack of technical support may seriously hamper the efficient use of sophisticated equipment. This issue, which can not be solved with the present policy of short-term recruitment, must be addressed by both FCT and the Universities.

17. The access of Portuguese researchers to scientific literature is still somewhat limited. Though some databases (such as *Web of Knowledge*) are now accessible, it is not easy, or it takes too long, to get hold of many scientific periodicals. This problem could be solved through digital subscriptions (such as *Science Direct*) made centrally by FCT.