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Challenges for a champion

One of the UK's research councils is looking for a 'nano champion'. Whoever gets the job will have a major challenge on their hands.

The United Kingdom likes to think that it punches above its weight in science and technology. This is certainly true in many areas of research, but nanoscience is not one of them. Indeed, in recent years, international panels of experts called in to assess the strength of UK research in different areas of basic science — including chemistry, materials science and physics — have pointed out that the UK is falling behind the rest of the world in nanoscience and technology. This message is finally getting through to funding agencies in the UK, although researchers hoping for a funding bonanza like those seen in the US and Japan will be disappointed.

In December last year the Engineering and Physical Sciences Research Council (EPSRC) — the agency that funds most chemistry, engineering, materials and 'small' physics research in the UK— accepted a report prepared by a nanotechnology strategy working group that calls for increased investment, more efficient use of equipment and the appointment of a 'nano champion'. The report, which has just been published[1], makes the scale of the challenges facing the nano champion and the UK nanoscience and technology community very clear. According to the figures and definitions used by the working group, the UK government invested £92 million in nanotechnology R&D in 2004, with almost half of this sum coming from the EPSRC. However, international comparisons showed that the UK lagged behind the US (£828 million), Japan (£518 million), Germany (£202 million), France (£155 million) and South Korea (£119 million).

The picture is similar when citations are analysed, although the US lead is even more pronounced. For the 10-year period from 1996, the US accounted for an astonishing 42% of the citations in nanoscience and technology, followed by Germany (9.1%), Japan (8%), France (6.6%), China (6%) and the UK (5.5%). On the plus side (just about), nano papers from the UK are cited 13.2 times on average, which is slightly higher than the global average of 12.7. The report also contains interesting data on the relative sizes of the different areas of nanotechnology: some 3.4 million papers were published in the 10-year period covered by the analysis, with the biggest areas being nanomaterials (35% of the total), functional materials (22%), nanofabrication (16%) and modelling and simulation (13%). Nanomedicine and nanobiotechnology, on the other hand, accounted for less than 3% of the papers between them, with the UK ranking third in the world in both areas in terms of citations.

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The UK has never had a national nanotechnology programme and the working group does not propose such a programme. Rather, it recommends that the EPSRC should continue to fund nanoscience and technology through 'responsive mode' grants, with more money going to areas that can be exploited by UK companies. In particular it recommends that the EPSRC should identify three or so 'grand challenges' to address social issues "where nanotechnology can make a unique and significant contribution". The challenges are likely to be chosen from areas such as health care, energy and the environment, with each challenge receiving £8–10 million over its lifetime.

The report also calls for £10 million to create an extra 40 PhD studentships per year (which would double current numbers), £3 million per year to make greater use of nanometrology and nanofabrication equipment and facilities, and a nano champion who would be responsible for all nanotechnology activity at the council. The working group acknowledges that this extra investment — £78 million over four years, on top of the current budget of £42.5 million per year — can only have a modest impact. Indeed, one of the objectives in the report is for the UK to improve its position in total citations from 6th to 5th place within five years.

Selecting the grand challenges will be the biggest decision facing the nano champion. However, by going into detail about three specific examples — energy, drug discovery, and medical diagnostics and delivery systems — the working group drop some heavy hints about how they see the future. The absence of nanoelectronics from the possible grand challenges is not surprising given the lack of a big industrial player in this field in the UK, and it makes sense to focus on the much stronger pharmaceutical and health-care sectors.

However, success in these areas will very much depend on the establishment of multidisciplinary collaborations between researchers traditionally funded by EPSRC and the biomedical community that is supported by the Biotechnology and Biological Sciences Research Council and the Medical Research Council. Indeed, getting the biomedical community — including companies — to buy into a national strategy for nanotechnology and health care should be a top priority for the nano champion.

Reference

1. www.epsrc.ac.uk/CMSWeb/Downloads/Other/NanotechStrategy.pdf