

The dragon awakens

Do you think there are too many scientific papers coming out of China? Think again. As our special focus on China highlights, improvements in quality over quantity are inevitable.

The dynamic of the China's economic growth is obvious. Construction sites everywhere, office blocks are on the rise, public transport systems are expanding. Beijing is bursting even beyond its fifth ring road, and new ones are planned.

Science in China mirrors this exuberant growth. Public research funding is growing relentlessly. New research institutes are being built, equipped with state-of-the-art instruments. In the elite institutions of the country the tenor is markedly different to many western labs, as researchers generally are happy about their research funding.

In this issue, we take a closer look at the scientific development in China. In an interview on page 606 with President Lu of the Chinese Academy of Sciences, the role of the Academy is discussed. In their Commentary on page 603, Zhou, Li and Shi, three former presidents of the Chinese Materials Research Society, analyse the state of materials research in China. Last but not least, President Chu of Hong Kong University of Science and Technology discusses (page 600) the influence of mainland China's economic development on the city, concluding that Hong Kong has to reinvent itself as a knowledge-based society.

The record-breaking economic growth since China opened itself to the outside world thirty years ago is mirrored in the number of scientific publications. For 1981, the Thomson ISI Web of Science lists 1791 papers with at least one author based in China, for 2007 this figure has grown to 98,147 publications. In materials science, China's output in publications already ranks third behind the US and Japan.

This fast scientific growth has been enabled by dramatic increases in research budgets, which are expected to increase from about 1.5% of the gross domestic product (GDP) to at least 2.5% by 2020. All this on the back of an already fast-growing



The Bird's Nest Olympic stadium in Beijing.

GDP that has averaged about 10% growth per annum in recent years. The budget of the National Natural Science Foundation of China, which funds basic science in China, grew by an average of more than 20% each year for the past decade. These figures illustrate that research funding, even for basic sciences, is much less an issue than in many other countries.

However, the quality of some of this research is still an issue, because in the past the system used to be geared towards high-volume output rather than quality. This problem is now acknowledged and there is a perceptible shift in emphasis towards high-quality research.

Further deficits lie in the education of students. Each year, approximately 10 million students take the nationwide National College Entrance Exam. Of these, only a few thousand will be accepted for the country's most prestigious universities. The question is whether the present extreme selection process truly promotes independent, creative thinking that is needed in many areas to push Chinese

science towards the forefront of research in fundamental sciences.

Nevertheless, the situation is improving rapidly, and close scientific exchange with Chinese scientists is more and more inevitable. Indeed, western countries should ask themselves whether it is not scandalous that even distinguished Chinese scientists need to undergo with strict procedures that involve personal trips to embassies in Beijing for every visa application. Such policies do not only disadvantage the Chinese scientists, but all of us as these scientists increasingly headline conferences.

This month sees the Olympics in Beijing. The organizers are determined to use this event to highlight the positive developments taking place in China. However, those that have been to China recently will agree that the country actually has to be experienced first hand to grasp the complexity and magnitude of the country's scientific and economic development. Those that haven't visited China recently should make it a point to do so; the Chinese dragon has arrived on stage!