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A Chinese nano-society?

When US President George Bush visited China in 2002, he was presented with a tie that he could not get dirty. The 'self-cleaning nanotie' has a nanoscale coating that repels both water-based and oil-based liquids. The tie was a big hit. But its prominence as a symbol of China's nanotechnology points to holes that the country is desperate to fill — a lack of basic science strategy in other cutting-edge fields and a shortage of nanotechnology-based industry. What can China do?

China's nanoscience looks set to boom. Traditional strength in metallurgy translated well into modern materials sciences. Success over the past decade included, for example, a method to control the growth and orientation of nanotubes[1] and more recently a synthetic approach to ordered chiral mesoporous silica materials[2]. Scientists affiliated with Chinese institutions now account for 10% of materials literature[3].

Nanotechnology funding is rising sharply. For example, the RMB840 million (US $100 million) in nanoscience funding for the major agencies — the National Natural Science Foundation of China (NSFC), the Ministry of Science and Technology, and the Chinese Academy of Sciences (CAS) — under the five-year plan from 2001 to 2005 is expected to double in the next five-year plan. A separate budget covering the next fifteen years will support nanofabrication facilities for universities and other institutes.

BUILDING DIPLOMATIC TIES: JIANG ZEMIN AND GEORGE BUSH EACH DON CHINA'S SMALL, CLEAN INNOVATION.

China is now in a position to diversify its approach. Chunli Bai, a scanning tunnelling microscope pioneer and CAS vice-president, says China will venture into multidisciplinary fields such as nanodevices, nanobiotechlogy and sensing. Much of China's hope for these new fields rides on two sister institutes — the Beijing-based National Center for Nanoscience and Nanotechnology[4], and the National Center for Nanoengineering in Shanghai, each budgeted last year with RMB250 million from the National Development and Reform Commission. The Nanoscience centre, set to start construction in mid-2005, will focus on materials science, biotechnology and processing. The Nanoengineering centre will aim to bridge processing and technology with industrial application.

Recruitment programs targeting returning scholars are expected to bring back talent to fill these spots. Between the mid-1990s and 2003, the CAS 'Hundred Talents Plan', the NSFC 'Outstanding Young Researcher Award', and the 'Cheung-Kong Professorship' combined to lure back 2,500 young, upcoming scientists. With the low cost of living, these grants — up to RMB2 million over three years — helped provide a comfortable life style. So all is in order. Or is it?

Lack of industrial support could cripple efforts. Bai warns against optimism based on basic science success: "Patents are more important, but China has few," he says. There are only about 200 real nanotechnology companies and most of those have less than 40 employees. "Chinese scientists don't want to spend time writing patents." Change could come with new policies promoting international patent applications and subsidies for companies that industrialize basic research.

Other problems, such as China's bureaucratic, top-down way of distributing funds, run deeper. Many leading scientists complain that it is difficult to apply — if indeed they can — for positions at the new institutes. The positions, like the institutes themselves, seem to come down as a *fait accompli* without much input from scientists. Younger scientists, especially fresh returnees, find this especially frustrating.

Clashes between personalities and lack of coordination between research units also remains a problem. Dissension among the CAS, Peking University and Tsinghua University over where to put the Nanoscience centre, for example, is said to have slowed down its construction.

With sparse critical and constructive scientific debate, many scientists fear, China could forever be fated to following initiatives set elsewhere — namely those in the United States. The slavish reception of project applications that says 'nano' is one example of a potential lost opportunity. Scientists say their 'micro' proposals are turned down even if micro is the right size for the job.

If China is to develop in new areas — especially multidisciplinary ones — it must break down the vertical walls and create horizontal ties. China needs a strong, interactive scientific community; but scientific societies don't provide a strong enough voice for this. Indeed, scientists mainly turn to managers, bureaucrats, or US colleagues — but rarely to each other. A stronger, tighter community of scientists, in nanoscience as in other fields, would be a base for collaborations and a voice that could make its way into scientific decision-making.

China is hosting China Nano 2005 in June[5] — an excellent place to build bridges overseas — but both China's researchers and policymakers should also try to strengthen bridges at home, between the new initiatives and among researchers.

References
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