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Nanotechnology may be next big thing for Singapore

Scientists here say future lies in building things at atomic level, like minuscule robots
By Chang Ai-lien

GREAT things come in tiny packages, and the science of building things an atom at a time may well provide the next research boom for Singapore, said scientists here.

They were commenting on an announcement by a high-powered government committee looking to place future bets on Singapore's research front.

The potential seems limitless.

Already, researchers are looking at building intelligent nano-robots that can be injected into the bloodstream to fight diseases, said Associate Professor Andrew Wee, who heads the National University of Singapore (NUS) nanoscience and nanotechnology initiative.

Another breakthrough being explored is the creation of carbon nanotubes to replace silicon for superfast, power-efficient computer chips, he added.

Also, the research frontier of nanotechnology and nanoscience is being used to develop tiny particles that produce a more effective sunscreen, said Prof Wee.

Such discoveries are possibilities the new Ministerial Committee on Research and Development will bear in mind as it reviews the current state of R&D here.

It aims to make recommendations on how Singapore can best organise and sustain its efforts in R&D to remain competitive.

The committee is headed by Deputy Prime Minister Tony Tan.

Its formation comes none too soon.

Said Prof Wee: 'Nanoscience and nanotechnology is a very broad field and it's starting to catch on all over the world, with countries like the United States and Japan pumping billions into such research.'

While it is still 'pre-competitive' because much of the research is yet to become commercialised, Singapore needs to move fast to gain an advantage, he added.

Such research involves developing and producing extremely small tools and machines by controlling the arrangement of individual atoms. A nanometre is one-billionth of a metre: line up 100,000 nano-particles and you'll get something as thick as a strand of hair.

What researchers are trying to do is manipulate the individual atoms and molecules of various substances to produce new structures with unique properties.

Promising work is being done in universities and institutes here.

The Agency for Science, Technology and Research (A*Star), for example, has 88 unique technologies from such research, arising from 148 filed patent applications - targeting areas such as biotechnology, electronics, materials, medicine and imaging.

Said Prof Wee: 'More important, funding must be pumped into basic research so we can open up new areas for future industries.'

Agreeing, Dr Edison Liu, head of the Genome Institute of Singapore, said: 'It's clear there's going to be greater allowance for high-level, blue-sky research. There's an understanding you need this component to spot the flames of use-inspired research.'

Dr Liu highlighted bioimaging and biomarkers as two clear areas to pursue in the biomedical sciences.

Bioimaging involves studying the body in a non-invasive manner. Biomarkers are substances the body produces which can act as early warning signs of disease, and give doctors an idea of how well a patient will respond to treatment.

Nanotechnology calls for the lines between science, mathematics and engineering to blur.

This melting pot of disciplines is the way forward in research, said Professor Barry Halliwell, head of the NUS graduate school for integrative sciences and engineering.

For example, he said, while a diagnostic chip may be considered a biomedical sciences tool, it is also a mix of precision engineering and microelectronics.

'We have pockets of excellence in separate areas,' he said.

'More and more, it is becoming necessary for all the different disciplines to work together in many fields. And Singapore is small enough, that it's easy to make that happen.'