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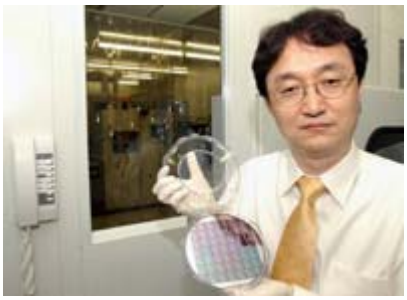
(Small) Size matters

- **NANOTECH WORK HERE MAKING A MARK**

By Ho Ka Wei

YOU can hardly see the goods, but nanotechnology research here is gaining global visibility.



SHRINKING THE STANDARD: Prof Cho Byung Jin holds a silicon wafer made up of chips, each with hundreds of millions of nano-size transistors. -- SHAHRIYA YAHAYA

South Korean firm Jusung Engineering last month pledged US$2.2 million (S$3.6 million) to a National University of Singapore laboratory to drive research into creating smaller, but more efficient, transistors - the building blocks for chips such as those used in computers.

The three-year partnership with NUS' Silicon Nano Device Laboratory (SNDL) aims to shrink transistors from the present industry standard of 90 nanometres (nm) to 30nm - so that hundreds of millions of such transistors can exist on one chip measuring just 1cm by 1cm, according to Associate Professor Cho Byung Jin, head of SNDL.

A millimetre equals one million nanometres. The smaller a transistor, the less efficient it is - its on-off rate is slowed.

However, through the Korea-Singapore collaboration, researchers at NUS hope to overcome that limitation and triple current speeds to some six billion switches per second.

The need for chips with such processing power has become imperative as devices such as laptops, mobile phones and digital cameras become smaller and need more functions crammed into them.

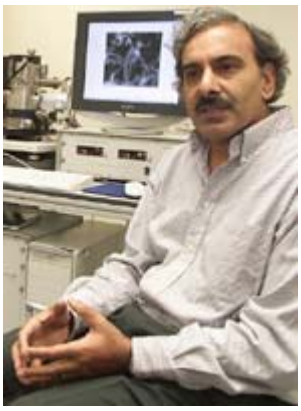
Such prospects caught the eye of Jusung director Oh Ki-Young, who said the partnership could also springboard his firm into newer markets.

Jusung is the largest maker of semiconductor manufacturing equipment in South Korea.

Electronics aside, nanotechnology work here for the life sciences is also being recognised.

Singapore firm NanoMaterials Technology, which specialises in making nanomaterials for the pharmaceutical industry, was mentioned last August in The Nanotechnology Report 2004 by Lux Research as one of the top seven private nanotechnology companies in Asia.

New York-based Lux is a research and advisory firm which looks at the business and economic impact of nanotechnology.



GOING PLACES: Prof Anjam Khursheed's scanning electron microscope is mobile, smaller and opens up research possibilities for scientists. -- LIANHE ZAOBAO

Nanotechnology is seen as Singapore's next big research and development area, after the life sciences.

In 2003, NanoFrontier was established in the Nanyang Technological University, with support from the Economic Development Board (EDB).

The centre, which has access to some $200 million in nanotechnology-related equipment, now has four projects in the works, its director, Associate Professor Bryan Ngoi, told The Straits Times last Thursday.

Meanwhile, the Nanoscience and Nanotechnology Initiative at NUS has some 20 ongoing projects, with a total value of $10.5 million. But more funds, particularly from the private sector, are needed to keep these projects going.

Lux estimates that total global spending on nanotechnology research and development was more than US$8.6 billion last year, with over half coming from governments, according to a recent report in The Economist.

It expects that in future years, companies are likely to spend more than governments.

NUS engineering dean Professor Seeram Ramakrishna, who is also the director of the initiative, has already urged his researchers to seek more industry partnerships and funding, such as that with Jusung.

'Partnering with these top firms also validates our work,' he said.

- **NUS DUO'S DOWNSIZED MOBILE MICROSCOPE IS NO SMALL FEAT**

TO GET the big picture, think small. At least that's what a research duo at the National University of Singapore have done by making the world's first mobile scanning electron microscope (SEM).

Associate Professor Anjam Khursheed, 47, and research engineer Nelliyan Karuppiah, 43, worked with a Czech firm to come up with the microscope, smaller and possibly cheaper than conventional SEMs.

SEMs use streams of electrons to create blown-up images - more than 200 times the original size - that can be viewed on a television set or computer screen.

With conventional optical microscopes, for instance, a strand of hair may look like just a thick black line - with SEMs, you can see all the little bumps on it.

The patented system is expected to cost less than regular systems, which can cost between US$100,000 (S$164,800) and US$500,000.

Conventional SEMs can fill up a room about the size of a small office and once installed, are not meant to be moved again - at between 500kg and 1,000kg, it would be difficult to, anyway.

The NUS machine weighs about a fifth of that, can be placed on a trolley and moved out into the field.

This could mean earlier disease detection for instance, since the 'lab' can now go out to the field, said Prof Khursheed, who also lectures at the electrical and computer engineering department at the university.

Optical microscopes cannot show viruses, while electron ones can, he explained.

'This kind of mobility creates many new possibilities. It's just like how the desktop shrank into a laptop and opened up new ways to work,' he added.

Such microscopes can also be used in areas like microelectronics and even archaeology, where magnified images may unearth more nuggets from the past.

For now, the NUS team have ongoing negotiations with distributors for their microscope from Taiwan, South Korea and the United States.

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