Nano may well be the next big thing

Nasa's award-winning nanotechnology expert Dr Meyyappan speaks about the promises it holds

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ONE of the favourite pastimes of product manufacturers these days is trying to make things as small as possible.

Over the years, scientists and researchers have sought to create products out of components that measure less than 100 nanometres (a nanometre is a billionth of a metre) – a science known as nanotechnology.

But nanotechnology is not simply about miniaturisation, as most people believe. Its main premise lies in the manipulation of molecular matter that can revolutionise everyday life – be it in consumer electronics, medical sciences or communications.

Dr Meyya Meyyappan, director, Center for Nanotechnology, Ames Research Center National Aeronautics & Space Administration (Nasa), spoke to TODAY about the promises nanotechnology holds and its ethical implications.

Is nanotechnology merely the science of making things small?
No, simply making things small is traditional top-down miniaturisation and an example is the shrinking of computer chips.

Nanotechnology takes advantage of the novel properties that arise due to the nanometre size of materials and creates useful devices and systems.

What are some of the more important applications of nanotechnology?
Nanotechnology can provide early warning biosensors for diseases, effective ways of drug delivery and phenomenally-faster ways to sequence the human genome.

In the IT sector, higher computing capability with less power dissipation, terabyte memories and improved displays are possible. As an enabling technology, it is expected to have an impact on every sector.

Some have said that nanotechnology is the next big thing in the IT industry since the Internet. Is it overhyped?
Nanotechnology may well be the next big thing. But it is still in its infancy. It will take easily a decade or two for things to go from the lab to the store shelves. Look at biotech. Even after 15 years, it hasn't yet made a big impact. Things take time but in an era of 24/7 cable channels and news cycles, mass media and Internet, hype is inevitable.

What are some of the dangers (environmental, health, etc) of nanotechnology and is more regulation needed?
Yes, nano materials can be smaller than a cold virus. We do not know completely yet about any of the health effects or environmental effects. Well, we don't know much about such effects even in micro-systems but that hasn't stopped us from developing micro systems. Industrial pollution is a dynamic thing. No one seems to agree on the effect of fluorocarbons, methane and global warming. And we have been burning coal for over 150 years.

The point is societies just go ahead and clean up as they go. I don't think it is not going to be any different for nano. I also think industrialised nations have enough regulations and laws to cover most things.

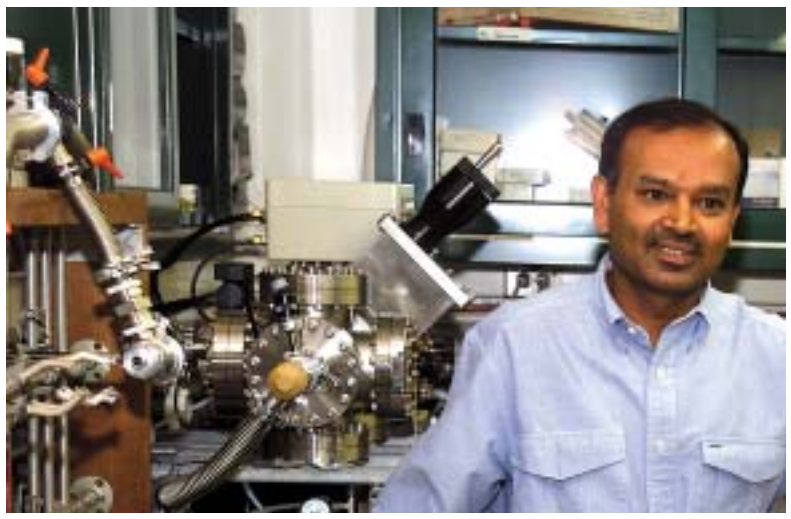
How far has nanotechnology industry developed and can we expect any commercial breakthroughs soon?
The field is in its early stages. It is likely to see some products such as displays based on nano in less than five years. The medium term (five to 10 years) has promise for biosensors, advanced lighting sources, memory devices and several other applications. The long-term applications are things we haven't even thought of yet.

What's the latest in Nasa Ames' nanotechnology efforts?
We are making carbon nanotube-based chemical sensors to detect various gases and vapours, as well as making carbon nanotube-based biosensors for extremely sensitive detection of biomolecules.

This will have an impact on developing handheld diagnostic devices in healthcare and security threat detection. In addition, we are working on inorganic nanowire-based memory and logic chips, novel ways of human genome sequencing, as well as various ultra-small instrumentation.

When you're not involved in nano research, what do you do?
I travel a lot. I like seeing places and learning about other cultures. I like classical music and am interested in antiques from around the world. No matter where I go, I check out antique shops. I also play racquet ball.

Dr Meyyappan will be on the GlobalTronics Summit panel discussing the topic "Evaluating innovative emerging and enabling technologies" at Suntec City Convention Centre this afternoon. He will also be delivering the keynote address on "Nanoelectronics and Nanodevices: What is ahead?" for the GlobalTronics Technology Conference tomorrow. Visit www.globaltronics.com.sg



In recognition of his contribution to nanotechnology education and training, Dr Meyya Meyyappan was awarded the 2003-04 Engineer of the Year award by the San Francisco section of the American Institute of Aeronautics and Astronautics.