

JAPANESE RESEARCHER: NANOTECH IS CRUCIAL FOR DEVELOPED WORLD

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Aug. 24, 2005 – Small is beautiful, believes nanotechnology pioneer Morinobu Endo. He knows, though, that not everybody sees things the same way.

The Shinshu University professor, who works to develop a key nanotech material called carbon nanotube, is convinced that molecular-scale engineering will revolutionize people's lives in the coming decades.

"Nanotechnology is certain to play a crucial role in creating technological innovations in the 21st century," says Endo, who is believed to be a Nobel Prize candidate for a method to mass produce carbon nanotubes.

Endo says success in nanotechnology is a "matter of life and death" for developed nations, because developing nations are rapidly catching up in the mature technologies that led the 20th century, such as antibiotics and semiconductors.

"Without technological innovations, industries in developed nations will be caught in a price competition with developing nations and will consequently suffer a further hollowing-out," he says.

Though many nanotechnologies are still at the nascent stage, some kinds are already available commercially. Among them are nanotubes, used in lithium-ion and lead-acid batteries to prolong their lifetimes, among other purposes.

Nanotubes – cylindrical carbon molecules of high strength and conductivity – became widely known after Sumio Iijima, a senior research fellow at Japan's NEC Corp., discovered their structure in 1991.

In Japan, Endo believes that nanotechnology will be a key force in boosting the competitive edge of small and midsize companies, the sector most severely affected by cheap imports from emerging economies.

"Nanotechnologies can be incorporated easily into manufacturing at not only large firms but also at small- and medium-sized local companies," he says. "They differ from 20th century-style technologies, which tend to be dominated by large firms because of the large-scale funds and research needed for industrial use."

Endo cites the case of a midsize company in Nagano Prefecture, a mountain region northwest of Tokyo, that developed carbon nanotube-based lens holders for mobile phone cameras.

Carbon nanotubes help resin to harden evenly when it is cooled in a metal mold, preventing warping. Lens holders made of carbon nanotube-based resin can therefore position lenses more accurately, helping to achieve high-precision images.

"This technology has helped the company produce lens holders with the world's best precision and quality, but the products are still price-competitive compared with those produced in China," says Endo.

The example, he continues, illustrates that nanotechnology can "revitalize Japan's high-quality manufacturing craftsmanship."

At the same time, Endo is aware that this powerful technology, if mishandled, could spark a public backlash in the way that genetically modified foods have done.

Alarms have been already raised.

The Action Group on Erosion, Technology and Concentration, an international nongovernment organization that campaigned against genetically modified crops in early 1990s, is urging a ban on the manufacture of new nanotech materials until their environmental impact had been assessed.

Some warn that nanotechnology could be the "new asbestos," pointing out that carbon nanotubes resemble asbestos fibers in shape.

To prevent enthusiasm over the new technology from turning into public fear, scientists should themselves be responsible for addressing the associated safety, health and environmental concerns, Endo maintains.

"Scientists in the 20th century developed new materials with the attitude that someone else would carry out the risk assessments," he says. "But for 21st century materials, those who develop them should themselves clarify the social implications of their products."

Endo stresses that this applies particularly to nanotech materials, because these often have unique properties that only their developers understand properly.

"Nanotech scientists need to raise 'nanotech literacy' by providing adequate information to the public and explaining how to use the new technology properly," Endo said.

Endo himself is actively involved in assessments for carbon nanotubes. His research has so far uncovered no biological hazards, and he is planning to report the findings in the near future.

When Endo started his research career more than 30 years ago, he never dreamt that carbon – an academic backwater at a time when silicon was grabbing the spotlight – would usher him into a world of revolutionary technology.

He says nanotech is now developing into a huge multidisciplinary field that covers a wide academic spectrum, from chemistry, physics and biology to economics, sociology and religious studies.

"People with all sorts of scholarly backgrounds are joining the world of nanotechnology to explore various possibilities for a better future," Endo says. "It is becoming the area where academic disciplines are being fused – an extremely exciting place to be."