

# Nano World: New nanoelectronics roadmap

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A new initiative will develop a roadmap for industry standards that will help get electronic nanotechnology from the laboratory to the marketplace, experts told UPI's Nano World.

The initiative launched by the non-profit Institute of Electrical and Electronics Engineers plans to have its nanoelectronics standards roadmap by the end of 2006. The roadmap "will help the industry prioritize the standards it needs and focus its resources," said roadmap initiative coordinator Nathan Tinker, who is also co-founder of the NanoBusiness Alliance.

Nanotechnology comprises an emerging and incredibly diverse set of technological developments defined on the nanometer or billionth of a meter level, or the scale of molecules.

"The introduction of nano-enabled electronic products is clearly accelerating," said Edward Rashba, manager of new technical programs at IEEE's standards association. "This means there will be an urgent need for standards in the near future to address all aspects of nanotechnology from raw materials to devices and high-volume manufacturing."

The roadmap could prove as important for advancing nanoelectronics as the WiFi 802.11 IEEE standard proved for popularizing wireless networking, Tinker said.

"Right now nanotechnology is all over the map," he explained. "We're looking just at the specific area of electronics to see how

nanotechnology might impact it, and build a roadmap of standards that can provide customers with a level of credibility and validity that the product they are buying from, say, a small nanotech company achieves a certain level of quality and meets the needs of the end user, without having to go through months and months of testing and revision."

So far the roadmap has broken nanoelectronics up into four areas. Nanostructured solutions and materials include nanotubes, nanowires, nanoparticles, nano dots, nano rods, nanocomposites and the like, and include companies such as Buffalo, N.Y.-based Nanodynamics. Device concepts include diodes, capacitors, resistors and biosensors. Functional blocks include logic gates, antennas, multiplexers, beam splitters, optical switches, batteries, lasers and the carbon nanotube memory devices Woburn, Mass.-based Nantero is developing. Applications include the microprocessors or labs on chips that Motorola or other electronics giants might develop.

"Once we can agree on how to characterize materials and publish the data, one can now think of ways to start designing next-generation circuits or sensors or communications products," said roadmap participant Daniel Gamota, Motorola's director of printed electronics in Schaumburg, Ill.

A group representing industry leaders such as Motorola and smaller companies such as Nantero will develop the roadmap. They plan to support other efforts in the field, such as those marshaled by the International Technology Roadmap for Semiconductors and the International Electronics Manufacturing Initiative.

"We want as broad a range of industry participation as possible about what standards are necessary in the short term, mid-term and long term -- which are vital, which are not," Tinker said. The roadmap will get updated annually to adapt to the eventual changes and growth the

nanoelectronics field is expected to undergo in future, he added.

"The roadmap is extremely important. Standardization in nanotechnology provides a unified platform for moving forward and converging in the future, which will impact everything from inventions to commerce," said Cynthia Kuper, chief technical officer at magnetic memory company Micromem Technologies in Toronto, who is also helping to develop the roadmap.

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