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Panel Discusses Ethics in Science

Researchers explore issues in nanotechnology

by Neil Mukhopadhyay
Sun Contributor

Last Thursday, a group of researchers convened in the Biotechnology building to discuss the social and ethical issues surrounding Nanoscience; the science of atomic and molecular manipulation at the scale of one millionth of a meter.

The panel discussion, the first of a series sponsored by the Nanotechnology Infrastructure Network and the Cornell Center for Nanoscale Systems, featured four prominent speakers in the field of Science and Technology Studies. Issues analyzed by the quartet of Cornell scientists included the rhetoric of nanotechnology, the early history of nanotech, and engineering and research ethics in nanotechnology.

The symposium was initiated by Prof. Bruce Lewenstein, communication, who went over some of the most salient social and ethical issues in the discourse on nanoscience. Issues

"There are concerns out there about pollution, health and environment," said Lewenstein. He went on to break down some of these issues in terms of ethical, medical, and environmental contexts. According to Lewenstein, in addition to nanomanufacturing consuming very large quantities of water, critics of nanotech say that nano-particles may cause health problems. He also detailed privacy issues which could result from the potential ubiquity of nearly invisible nano-cameras, microphones, and other surveillance machines. Lewenstein concluded by bringing up the ethical questions within the prospect of an era of human enhancement ushered in by tiny nano-probes that could repair parts of the body and even fight diseases at the cellular level.

Stephen Hilgartner, an Associate Professor in the Department of Science and Technology Studies turned the discussion toward the subtleties of language used to describe nanotechnology, which he believes hold special importance owing to their power in effecting public opinion, and thus indirectly have great effect on funding for Nanotech research. Hilgartner explained that proponents of nanotechnology often employ excessively positive language to support its progress, but to contrast this, critics use rhetoric that

dramatizes the possibilities of novel weapons, new toxic chemicals, and the potential for mass destruction.

"There are all kinds of claims about Nanotechnology that have not completely materialized," Hilgartner said regarding the problem of choosing which facts to believe, "its very difficult to see how social institutions will make decisions about Nanotechnology."

Cyrus Mody, a Ph.D. student in the Department of Science and Technology Studies, spoke about the early history of nanotechnology and its future evolution. According to Mody, nanoscience was truly born with the invention of the scanning tunnel microscope, which allowed scientists to finally examine phenomena at the atomic level. Although STM does not fall into what we today consider "nanotechnology," the ability to see the smallest building blocks of matter was a crucial step to being able to manipulate atoms and molecules. The commercial availability of these extremely powerful microscopes was the factor that led to the eventual spread of nanotechnology. In the 1980s, nanotechnology was dominated by large industrial companies, but now, two decades later, Universities reign as centers for nanoscience innovation.

"People at at the National Science Foundation really see places like the Cornell Nanocenter as filling in the spots left by the decline of of companies like IBM and Bell Labs," Mody said.

He sees the organization of the nanotechnology industry to become an issue of greater significance in the future.

"Nanotech is a community of communities, a study where there are many subfields," explained Mody, "people who can mediate between communities will be extremely important."

Ron Kline, Bovay Professor in History and Ethics of Engineering ended the discussion by clarifying some of the complexities of the relationship between Engineering and Research Ethics in Nanotech. Kline described the deliniation between research and engineering in nanoscience to be considerably more nuanced than that in other sciences.

"Science produces knowledge, engineering produces products; in nanotech, the same people do both." Kline expounded upon the notion that technology inevitably leads to progress and concluded the discussion stating, "Social and technological issues are bound up in research, production and design. This will be difficult to tease apart."

The field of nanoscience has been growing exponentially since the millennium, both in the United States and across the globe. Many scientists promise nanotechnology's impact on society will be on the scale of the industrial revolution; ranging from supercomputers powered by complex molecular circuitry, to fabrics engineered on the atomic level capable of repairing themselves. But, as with any far-reaching technology that holds such promise for humanity, an equal potential for disaster could lie latent within the folds of its progress.

These possible dangers are of increasing concern within the scientific community, as many feel that the blinding speed at which nanotechnology is progressing is fast outpacing the necessary research on the ethical and social ramifications that must accompany any powerful technology. A common fear of nanotech is advanced by the profligate science fiction writer, Michael Crichton, who wrote of hordes of microscopic nanomachines turning the world into "grey goo."

Although these fears exist, the public's lack of knowledge regarding nanoscience remains an issue. According to a study by England's Royal Society, only 29% of the public had even heard of nanotechnology, much less, the potential Pandora's box of hazards that it could present.

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