Addressing Social and Ethical Issues in Nanotechnology

Under the heading of "Risky Technologies," five speakers focused on the social and ethical issues associated with nanotechnology at the Twenty-second Science, Technology, and Society Meeting of the International Association for Science, Technology, and Society (formerly National Association for Science, Technology, and Society) at the Radisson Plaza Lord Baltimore Hotel in Baltimore, MD, on 3 February 2007. Participating were Ashley Shew and Gouk Tae Kim of Virginia Polytechnic Institute and State University, Bernard Lo and Jarret Liberman of the University of Pennsylvania, and Aldrin Sweeney of the University of Central Florida.

Shew observed that the National Nanotechnology Initiative (NNI) begun in 2001 defines nanotechnology as control of matter at a scale of 1 to 100 nanometers, and Kim noted that the allocation of NNI funds to address related social, ethical, and educational issues is unique to the United States. Among the types of issues cited by Kim are health and safety, medical, privacy, economic and international, legal, and educational.

Sweeney related how he has addressed the social and ethical issues associated not only with nanotechnology but also biotechnology and information technology at the University of Central Florida -- with an undergraduate course he has designed, Societal Implications and Ethical Issues in Nanotechnology, Biotechnology and Information Technology Research. He feels that students should emerge from his course knowing the following four things: 1) what is speculation about nanotechnology and what is possible, 2) progress toward and implications of convergence of nanotechnology, biotechnology, information technology, and cognitive technology, 3) the scope and limitations of current research methods and instrumentation, and 4) the political and cultural contexts of research. Related to the distinction between speculation and reality is a "split" among nanotechnologists, characterized by a debate between Nobel Laureate Richard Smalley and Eric Drexler in a 2003 issue of *Chemical & Engineering News,* which was the centerpiece of Shew's presentation. And Sweeney emphasized that, given the large number of social, ethical, environmental, economic, and legal dimensions that needed to be explored in assessing nanotechnology, a large variety of positions could be taken, not just two widely polarized positions with which news media often seek to oversimplify complex issues.

Lo and Liberman focused on the use of radiofrequency identification (RFID) chips, originally placed in animals in order to track them. According to Lo and Liberman, VeriChips©, one type of RFID chip, about the size of a grain of rice, have been implanted in hands of patients with chronic diseases to allow medical personnel to retrieve their medical records in case of emergency and in individuals with jobs requiring access to secure areas. Now, they reported, the suggestion has been made to implant RFID chips in guest workers and immigrants. Lo and Liberman closed their presentation by citing three different laws restricting the use of RFID chips in three different states and suggested that, given the mobility of people among states, a national standard for regulating the use of RFID chips is needed.

(*Editor's Note*: The importance of studying societal implications of nanotechnology has already been reported in this *Newsletter* by resource #3 of our Winter 2005 issue. Resource #2 of the same issue describes the 5% set-aside to study ethical ramifications of nanotechnology. The contrast between Drexler's "hype" and the hopes of others for nanotechnology was included in the review of the September 2001 issue of *Scientific American* in our Fall 2001 issue.)