Nanotechnology: How Tiny Particles Can Create Big Ethical Dilemmas

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On March 20, 2008, Dr. James Yardley presented an exciting discussion titled, *Molecules and Electronics, and the Columbia Nanocenter*. For an audience of over 30 faculty, students, and community members, Dr. Yardley discussed the profound implications of the National Nanotechnology Initiative (launched in 2000) and recent developments at the Columbia Nanocenter. Dr. Yardley described the efforts of the Nanoscale Science and Engineering Center (NSEC) in exploring electron transport in single molecules and molecular nanostructure. At Columbia, the Nanocenter has led investigations to analyze conductance, using different molecules to observe different conductances.

The group has come up with a long list of new rules based on its observations, including “Tunneling behavior observed: Distance matters!” referring to the distance between amine groups and a benzene ring. The group also determined that pi electrons conduct better than sigma electrons.

In addition to outlining the tremendous technical achievements at the Nanocenter, Dr. Yardley described the ongoing exploration of nanotechnology’s anticipated impact on society. He discussed how nanotechnology has the potential to illuminate a better understanding of nature and life, lead to the development of new technologies and products, improve health care delivery, and contribute to sustainability and energy reduction. At the same time, Dr. Yardley acknowledged that carbon nanotubes – rolls of graphite with a diameter of only a few nanometers – have caused lung lesions in rats, suggesting that the nanotubes might yield the same adverse health effects as asbestos in humans.

To this extent, Dr. Yardley and many others in the nanotechnology community acknowledge the wide range of risks and benefits associated with this exciting emerging field.