I’m pleased to welcome all of you to the second Georgia Tech Conference on Nanoscience and Nanotechnology. One of the most often-quoted tidbits of pop psychology wisdom is, “Don’t sweat the small stuff.” And normally that’s good advice – it just doesn’t work for this group. All of you devote your time and energy to sweating the small stuff, and we’re glad to welcome you to our campus to spend a few days learning how to do it even better.

Two and a half years ago, the Institute of Global Studies asked the chief executives of the Fortune 1000 companies what they knew about nanotechnology. Only four percent had heard of the word, and less than two percent could define it accurately. Then President Clinton started the National Nanotechnology Initiative with a $422 million investment, and President Bush proposed an additional $500 million. Other national governments are investing more than $1 billion in nanotechnology research this year. I suspect that more than two percent of the world’s leading CEOs have now heard of the word.

Not only is research in nanoscience and nanotechnology mushrooming rapidly, but it also draws on a wide variety of science and engineering disciplines and has ramifications for everything from computers to medical vaccines to automobile tires. As a result, things have been pretty hectic and piecemeal so far. So, we hope the next three days will help you to gain a better overview of what is happening in nanoscience and nanotechnology, and also provide an opportunity to make contacts with others whose research is complementary to your own.

For Georgia Tech researchers, this conference is an exercise in getting in touch with each other as well as with all of you. Even though we have a Center for Nanoscience and Nanotechnology under the capable direction of Z. L. Wang, nanoscience and nanotechnology are just so diverse that research projects keep popping up all across our campus.

Georgia Tech physicist Uzi Landman won the 2000 Feynman Prize in Nanotechnology (Theoretical) last year in recognition of his work in modeling and defining the dynamics of fluids on a nanoscale level. Other Georgia Tech researchers recently developed a new, simpler all-optical technique to produce Bose-Einstein condensates, which means cooling atoms to a fraction of a degree above absolute zero at which point they enter a quantum state in which they all act alike.

At the same time, Georgia Tech researchers in the state’s Cancer Initiative are developing molecular-scale beacons to help detect cancer before it produces symptoms. These beacons seek out cancer cells, attach themselves to the cells, and release a fluorescent dye flare. Other bioengineering researchers are studying various operations within living cells to discover principles that might be applicable to nano-machines.
Georgia Tech researchers have also developed a method to produce tiny three-dimensional polymer structures that are expected to have a variety of uses, from photonic band gap materials and optical wave guides to tiny chemical beakers. And they have produced nanobelts of metal oxides that have the potential to make practical the mass production of nanoscale electronic and optoelectronic devices.

At our Molecular Design Institute, researchers have demonstrated binary optical storage using blue light with a short wavelength to “switch on” the fluorescent properties of nan-clusters of two to eight silver atoms. And Georgia Tech was recently granted allowance of all claims on a patent covering the use of blue lasers in the area of semiconductor dopant molecular design.

These are just a few of the exciting areas of nanoscience and nanotechnology where Georgia Tech is working, and they have developed as the result of a campus environment that encourages interdisciplinary interaction. Not only are many of our research centers interdisciplinary, but the buildings that house them feature interdisciplinary research neighborhoods that gather faculty and graduate students around the issues and problems they are studying, rather than by academic discipline.

The posters and receptions for this conference will be in the J. Erskine Love Building, which is one of two buildings that gather manufacturing-related disciplines and research centers. I also encourage you to visit the Bioscience and Bioengineering Building, which is the first in a three-building interdisciplinary science and engineering complex. The second building is under construction, and will focus on environmental science and engineering. The third building will be underway shortly, and it will focus on molecular science and engineering, gathering together many of our nanoscience and nanotechnology programs.

A century ago, the world was proceeding on the assumption that bigger was better. It was generally taken for granted that to make anything stronger, faster, more powerful, or more durable, it obviously had to get bigger and use more energy. Today, small is beautiful, and our challenge is to make things stronger, faster, more powerful and more durable while making them smaller and requiring less energy.

Dr. Neal Lane, former director of NSF and chief technology advisor to President Clinton, said in 1998, “If I were asked for an area of science and engineering that will most likely produce the breakthroughs of tomorrow, I would point to nanoscale science and engineering.”

Even when we can see its trendlines developing, the future usually turns out to be different than what we expect. Microscopic helicopters whirring through the air and nanorobots swimming through the body to perform “closed heart surgery” are still the stuff of science fiction. But the anti-lock brake systems of the cars we drive are already routinely fitted with sensors tinier than the width of a human hair. And scientists at the Delft University of Technology in the Netherlands recently reported in Science magazine that they had built a transistor of a single molecule one nanometer wide, with a single electron to toggle it on and off.
These are clearly exciting times to be involved in science and technology, and over the next three days, you will hear about some of the most extraordinary research in the world – research that has tremendous potential to change our lives in ways we have not yet begun to imagine.

So welcome to the second Georgia Tech Conference on Nanoscience and Nanotechnology. It is our hope that you will be enlightened and inspired as you listen to the presentations and talk with colleagues over the next three days, and that you will return home with new ideas, new understanding, and new contacts that will serve you well.