

Nanotechnology and Nanoengineering

Nanotechnology is defined as the creation of functional materials, devices, and systems through the control of matter at a scale of 1–100 nanometers, as well as the exploitation of novel properties and phenomena developed at that scale. Although the word “nanotechnology” is new, the processes are not. Photography and catalysis are examples of nanotechnology that were developed through the process of trial and error and that have been around for a while. Nature is the master of nanotechnology, transforming atoms of various elements into miniature building blocks and power plants that result in a living, functional person. And the photosynthetic machinery that harnesses solar power and converts it to chemical energy in plants is another prime example of nature’s nanotechnology capability.

In the same way that miniaturization has changed the world of electronics, nanotechnology has the potential to revolutionize the fields of medicine, pharmaceuticals, drug delivery systems, biotechnology, energy, environmental remediation, and much more. The ability to manipulate atoms and electrons will allow the probing of nanometer-scale structures, ultimately yielding the ability to control the fundamental properties of materials. In turn, this will allow scientists to increase the efficiency of chemical reactions, create harder, more durable materials, manufacture drugs with more precise activity, develop diagnostic tools that can be placed inside cells, and achieve many other accomplishments not yet imagined.

The National Institutes of Health (NIH) is particularly interested in the possibilities that nanotechnology presents to the field of biomedicine. To that end, in June 2000, the NIH held a meeting titled “Nanoscience and Nanotechnology: Shaping Biomedical Research.” The intent of the meeting was to foster scientific interchange and communication among the nanoscience, nanotechnology, and biomedical research communities, and to identify future applications of nanotechnology relative to biology and medicine. This meeting was organized by the Nanotechnology and Nanosciences Subcommittee of the Bioengineering Consortium (BECON) at the NIH. For more information on BECON, see http://grants.nih.gov/grants/becon/becon2_t.htm.

In addition, in December 1999, the NIH issued a program announcement titled “Bioengineering Nanotechnology Initiative.” This announcement has receipt dates of April 1, August 1, and December 1 in the years 2000, 2001, and 2002. For the complete announcement, see <http://grants.nih.gov/grants/guide/pa-files/PA-00-018.html>.

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