



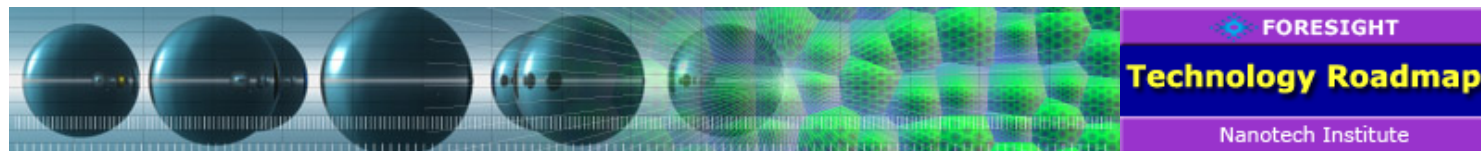
advancing beneficial nanotechnology

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Applications of Nanotechnology

Today's nanotechnology harnesses current progress in chemistry, physics, materials science, and biotechnology to create novel materials that have unique properties because their structures are determined on the nanometer scale. Some of these materials have already found their ways into consumer products, such as sun screens and stain-resistant pants. Others are being intensively researched for solutions to humanity's greatest problems — diseases, clean energy, clean water, etc. Other work is aimed at developing a [roadmap for productive nanosystems](#), in which a path is sought from today's nanotechnology capabilities to advanced future systems in which molecular tools will build useful materials, devices, and complex systems to atomic precision. The products of advanced nanotechnology that will become available in coming decades promise even more revolutionary applications than the products of current and near-term nanotechnology.

Current and Near-Term

Foresight has identified six [Foresight Nanotechnology Challenges](#) in which current and near-term nanotechnology is providing hope for solving critical challenges facing humanity.

1. [Providing Renewable Clean Energy](#)
2. [Supplying Clean Water Globally](#)
3. [Improving Health and Longevity](#)
4. [Healing and Preserving the Environment](#)
- Through May of 2006, Challenge 4 was [Maximizing Productivity of Agriculture](#)
5. [Making Information Technology Available To All](#)
6. [Enabling Space Development](#)

Since June of 2005, the [Foresight Nanotech Institute Weekly News Digest](#) has provided news on progress toward meeting each of the six Foresight Nanotechnology Challenges.

Applications of Advanced Systems

The products of molecular manufacturing, which will include microscopic robots and large complex systems, all manufactured to atomic precision, will transform many areas of life, including medicine, the exploration and colonization of space, and efforts to protect and restore the Environment.

Medicine

- Chapter 7 of *Engines of Creation*: ["Engines of Healing"](#)
- Chapter 8 of *Engines of Creation*: ["Long Life in an Open World"](#)
- Chapter 9 of *Engines of Creation*: ["A Door to the Future"](#)
- ["Medicine that Cures"](#) in Chapter 1 of *Unbounding the Future*
- Chapter 10 of *Unbounding the Future*: ["Nanomedicine"](#)
- Visit the [Nanomedicine Page](#), maintained by Robert A. Freitas Jr., which features a preview of *Nanomedicine*, a four-volume work that will comprehensively address the technical issues involved in the medical applications of molecular nanotechnology and medical nanodevice design, plus a growing collection of nanomedicine-related information, links, and technical papers.
- ["Nanotechnology in Medicine"](#), an article by Gregory Fahy in *Update 16*
- Ralph Merkle has written a paper ["Nanotechnology and Medicine"](#), available on his Web site.

Space Development

- Chapter 6 of *Engines of Creation*: ["The World Beyond Earth"](#) presents the potential of nanotechnology to harvest asteroidal resources and build space habitats. An earlier essay,

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["Space Development: The Case Against Mars"](#) by K. Eric Drexler, argues that colonies on planets are not the best use of space resources.

- [Molecular Manufacturing Shortcut Group](#): A Chapter of the National Space Society
- ["Some Novel Space Propulsion Systems"](#), by Forrest Bishop, presented at the [Fifth Foresight Conference on Molecular Nanotechnology](#).
- ["Implications of Molecular Nanotechnology Technical Performance Parameters on Previously Defined Space System Architectures"](#), by Tom McKendree, presented at the [Fourth Foresight Conference on Molecular Nanotechnology](#).
- ["The Logical Core Architecture"](#), by Tom McKendree, presented at the [Fifth Foresight Conference on Molecular Nanotechnology](#).
- ["Space, Nanotechnology, and Techno-Worries"](#) by Glenn H. Reynolds, published in *Ad Astra* and available as a PDF download (requires [ACROBAT READER](#) by ADOBE).

The Environment and Resources

- ["Healing And Protecting The Earth"](#) section 2 of chapter 8 of *Engines of Creation*
- Chapter 9 of *Unbounding the Future* ["Restoring the Environment"](#).
- ["BioArchive Project"](#), ["Will the BioArchive Work?"](#)
- [NanoEcology](#)
- [Environmental Regulation of Nanotechnology: Some Preliminary Observations](#), PDF format, 112 KB. Requires [ACROBAT READER](#) by ADOBE.
- 2002 Foresight White Paper on "Nanotechnology for Clean Energy and Resources" by Steve Gillett ([PDF](#) - 2.3 MB; [text only](#) - 272 KB).

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