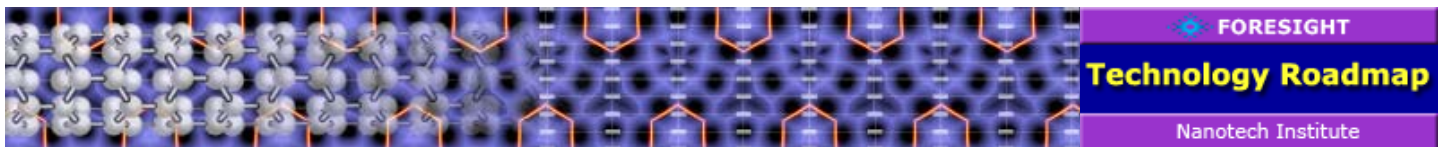



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**Foresight Nanotech Institute Weekly News Digest: July 18, 2007**

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[Productive Nanosystems: Launching the Technology Roadmap](#)  
 October 9-10, 2007, DoubleTree Crystal City in Arlington, VA

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The full conference program ([October 9](#), [October 10](#)) and [brochure](#) (PDF 949 KB) are now available.

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## Nanotechnology that's Good For People

### [Foresight Challenge: Supplying clean water globally](#)

**Headline:** [Nanotechnology and centrifugal force for clean water](#)

News source: Nanodot post by Christine Peterson

Today I was privileged to serve as Co-Chair of the Clean Water session at the [IEEE San Francisco Bay Area Nanotechnology Council](#)'s annual meeting "[Nanotech: From Promise to Reality](#)". This year's theme was Creating a Sustainable Environment.

Our session's first speaker was Olgica Bakajin of Lawrence Livermore, who is using carbon nanotubes to filter water. She is getting amazing flow rates, much higher than theory would predict, due to the atomic smoothness of the tubes. ...

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### [Foresight Challenge: Improving health and longevity](#)

**Headline:** [Nanocomposite turns up the heat on cancer](#)

News source: Nanotechweb.org, written by Belle Dumé

Iron/iron oxide nanocomposite particles could be used to heat tumours and destroy them, say scientists in the US. Ian Baker of Dartmouth College in New Hampshire and colleagues have found that iron particles have a large "specific absorption rate" and so produce lots of heat. The iron particles are then coated with iron oxide, which allows the nanoparticles to be observed using magnetic resonance imaging (MRI).

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### [Foresight Challenge: Improving health and longevity](#)

**Headline:** [Nanobubbles deliver targeted cancer drugs using ultrasound](#)

News source: PhysOrg.com

A new targeted drug delivery method uses ultrasound to image tumors, while also releasing the drug from "nanobubbles" into the tumor.

...In mice treated with this method, the nanobubbles were more effective at blocking tumor growth than other nanoparticle delivery methods.

*Journal of the National Cancer Institute* [abstract](#)

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## Nanotechnology that's Good For the Planet

### [Foresight Challenge: Providing renewable clean energy](#)

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**Headline: [Low-cost catalysis](#)**

Inexpensive MoS<sub>2</sub> mimics precious-metal catalyst

News source: *Chemical & Engineering News*, written by Mitch Jacoby

In work that could lead to economical substitutes for precious-metal catalysts, researchers in Denmark have produced hydrogen from water through a reaction catalyzed by a low-cost metal sulfide.

The unique surface properties of platinum, ruthenium, and other metals located in the same region of the periodic table endow those materials with the ability to catalyze numerous chemical reactions. They are widely used, for example, in automotive emissions cleanup and fuel-cell processes. Nonetheless, the metals' high cost has long motivated scientists to search for less expensive substitutes.

*Science* [abstract](#)

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**[Foresight Challenge: Healing and preserving the environment](#)****Headline: [The potential for nanotechnology to replace hazardous substances](#)**

News source: Nanowerk Spotlight, written by Michael Berger

A European project has set out to give an overview of already used and conceivable applications of nanotechnology in order to replace hazardous chemicals. The overall idea behind this project is to identify new nanotechnology applications which could help to reduce the risks related to hazardous substances and chemical processes. Currently, nanotechnologies are not contributing exceptionally to an increase in the substitution of hazardous substances for safer ones. However, experts believe that this could well change in the future. These are two of the messages coming out of a study by STOA, the European Parliament's Scientific Technology Options Assessment committee, on the role of nanotechnology in chemical substitution.

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**[Foresight Challenge: Making information technology available to all](#)****Headline: [Speed bumps less important than potholes for graphene](#)**

News source: National Institute of Standards and Technology (NIST), via AAAS EurekAlert

For electrical charges racing through an atom-thick sheet of graphene, occasional hills and valleys are no big deal, but the potholes—single-atom defects in the crystal—they're killers. That's one of the conclusions reached by researchers from the National Institute of Standards and Technology (NIST) and the Georgia Institute of Technology who created detailed maps of electron interference patterns in graphene to understand how defects in the two-dimensional carbon crystal affect charge flow through the material.

Science [abstract](#)

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## Foresight Events

### [Productive Nanosystems: Launching the Technology Roadmap](#)

Conference sponsored by Foresight Nanotech Institute and Society of Manufacturing Engineers with support from Battelle

October 9-10, 2007

DoubleTree Crystal City in Arlington, VA

Now, for the first time, the Technology Roadmap for Productive Nanosystems will describe the R&D pathways and products resulting from this ultimate technological revolution. Join us as we explore the power of advanced "bottom-up" nanotechnology in this 14th Foresight Conference on Advanced Nanotechnology.

Feynman Prize luncheon on October 9, 2007

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### [Advancing Beneficial Nanotechnology](#)

Do you believe that nanotechnology will give society the ability to tackle the hard challenges facing humanity? What's your priority for nanotechnology: cancer treatments and longevity therapies, sustainable energy, clean water, a restored environment, space development, or "zero waste" manufacturing? Or perhaps there are potential nanotech scenarios you would like to prevent.

If you would like to help influence the direction of this powerful technology, please consider becoming a [member](#) of Foresight Nanotech Institute. With your support, Foresight will continue to educate the general public on beneficial nanotechnology and what it will mean to our society.

Members receive the *Foresight Nanotech Update* newsletter. For a sample from the archives, see the interview of Donald A. Tomalia, President and Chief Technical Officer, Dendritic Nanotechnologies, Inc. "Perhaps the greatest reason for being excited about nanotechnology research is that it provides society an opportunity to examine new options for solving old problems." Join Foresight and help steer nanotech in the directions you personally support most!

Tomalia interview starts on page 4 of [Update 57](#) (2.1 MB PDF)

To join:

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### [SmallTimes NanoCon International](#)

The Leading Nanotechnology and MEMS Networking Event

November 14-16, 2007  
Santa Clara, CA

Attracting hundreds of decision makers from around the world, Small Times NanoCon International is your premier source for business alliances, information exchange and commercial strategy.

Event Highlights:

- An international audience of more than 400 nanotechnology and MEMS professionals
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- Excellent networking events designed to connect you with key decision makers
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## Nanotech News

**Headline:** [EPA foregoes opportunity to improve nanotechnology oversight](#)

Action needed urgently to ensure public and market confidence in safety

News source: Project on Emerging Nanotechnologies, via AAAS EurekAlert

The U.S. Environmental Protection Agency released its current thinking on whether a nanoscale material is a "new" or "existing" chemical substance under the Toxic Substances Control Act (TSCA). ...EPA states that it will maintain its practice of determining whether nanoscale substances qualify as new chemicals under TSCA on a case-by-case basis.

According to former EPA official and Project on Emerging Nanotechnologies (PEN) senior advisor J. Clarence Davies, "The agency's current practice is inadequate to deal with nanotechnology. It is essential that EPA move quickly to recognize the novel biological and ecological characteristics of nanoscale materials..."

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## Toward Productive Nanosystems

**Foresight note:** This theoretical study reveals new opportunities for designing molecular machinery to work in liquid environments. It also broadens our understanding of what is important for molecular machinery to work.

**Headline:** [Nano propellers pump with proper chemistry](#)

News source: University of Illinois at Chicago, via AAAS EurekAlert

... chemists at the University of Illinois at Chicago have created a theoretical blueprint for assembling a nanoscale propeller with molecule-sized blades.

Using classical molecular dynamics simulations, Petr Král, assistant professor of chemistry at UIC, and his laboratory coworkers were able to study realistic conditions in this microscopic environment to learn how the tiny propellers pump liquids. ...

The findings present new factors to consider in developing nanoscale liquid-pumping machines, but Král added that such technology probably won't become reality for several years, given the difficult nature of constructing such ultra-small devices.

"The 21st century will be about hybrid biological and artificial nanoscale systems and their mutual co-evolution," Král predicts. "My group alone is working on about a half-dozen such projects. I'm optimistic about such nanoscale developments."

*Physical Review Letters* [abstract](#)

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### Editor's Pick

We continue our tradition of citing a special story that strikes the Editor as especially cool, but which doesn't fit within the usual editorial categories of the News Digest.

Biology inspires nanotechnologists and demonstrates the enormous potential of molecular machine systems. However, as shown by this example, there is still room to improve upon evolved nanostructures.

— Jim

### Headline: [Self-assembled nanostructures function better than bone as porosity increases](#)

Improved possibilities for microelectronics, membranes

News source: Sandia National Laboratories, via Nanowerk News

Naturally occurring structures like birds' bones or tree trunks are thought to have evolved over eons to reach the best possible balance between stiffness and density.

But ... researchers at Sandia National Laboratories and the University of New Mexico (UNM), in conjunction with researchers at Case Western Reserve and Princeton Universities, show that nanoscale materials self-assembled in artificially determined patterns can improve upon nature's designs.

The silica nanostructures ... may improve performance where increased pore volume is important. These include modern thin-film applications such as membrane barriers, molecular recognition sensors, and low-dielectric-constant insulators needed for future generation of microelectronic devices.

*Nature Materials* [abstract](#)

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### Nanodot: A sample from Foresight's blog

**Headline: [Nanotechnology risk governance to include weapons](#)**

In the postal mail today was the paper copy of a 6-7 July 2006 conference report: "The Risk Governance of Nanotechnology: Recommendations for Managing a Global Issue" ([link to PDF](#)) held at the Swiss Re Centre for Global Dialogue last summer. This well-run and highly international meeting is the highest profile meeting to include consideration of longer-term risks in nanotech. From the "Summary of Frame Two NGO Workshop" presented by yours truly (page 49 of paper version, page 51 of PDF):

"Military offence applications are particularly concerning because, unlike nuclear arms, verification difficulties mean there is no clear point at which opponents reach stability in the process of escalation and proliferation. Existing arms treaties may not apply to nanotechnology-based weapons, and there are important intellectual property, commercial confidentiality, and national security issues involved in addressing this challenge...

"Finally, while current attention is focused on near-term concerns, questions raised by Frame Two nanotechnologies are more difficult, particularly with respect to fourth-generation, atomically-precise manufacturing of macroscale products. The risk governance process must move faster to address longer-term political, military, and civil liberties issues in time."

The meeting also discussed the risks of \*not\* getting nanotech benefits into the hands of those who need them — an important perspective to remember.

I had trouble finding the URL for this report; thanks to Nanowerk for posting it.

—Nanodot post by [Christine Peterson](#)

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[Dr. James Lewis](#), Research Analyst at Foresight Nanotech Institute, is the editor of the Foresight Nanotech Institute Weekly News Digest. If you would like to submit a news item or contact him with comments about the News Digest, please send an email to [editor@foresight.org](mailto:editor@foresight.org)



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