



American Institute of Chemical Engineers

2nd Quarter 2008

## Nanotech News

- **The Power of Small.** A three-part television series was presented this spring entitled the 'Nanotechnology: The Power of Small'. A diverse panel of experts gathered to discuss how nanotechnology may affect privacy, human health, and the environment. The series balanced the perceived hazards with the benefits of nanotechnology. Its aim was to show how nanotechnology touches the core of things we do in our everyday lives. The series was hosted by the Woodrow Wilson Center for International Scholars and the NSF.
- Nano-sized motors from bimetallic nanowires. Nanowires with gold at one end and platinum at the other can catalyze the decomposition of hydrogen peroxide. The oxygen generated provides the thrust needed to propel the nanowires. The researchers have been able to achieve speeds of 50 – 200  $\mu\text{m}/\text{second}$ , which is comparable to the speed of biomolecular motors.  
<http://pubs.acs.org/cgi-bin/abstract.cgi/ancac3/2008/2/i05/abs/nn800154g.html>
- Striped nanoparticles penetrate cell membrane without rupturing it. Gold nanoparticles coated with alternating bands of molecules quickly pass into cells without harming them. The new approach provides an alternative approach to endosome-based delivery.  
<http://www.nature.com/nmat/journal/v7/n7/abs/nmat2202.html>
- Nanometer-sized particles outperform larger particles in energetics and hydrogen-release temperature. Reducing the particle size also reduces the pressure needed to recharge the material with hydrogen.  
<http://pubs.acs.org/cgi-bin/abstract.cgi/jacsat/2008/130/i21/abs/ja710667v.html>
- Aligned carbon nanotube membranes with diameters below 2 nm reject 98% of ions. The pore openings of the carbon nanotubes were functionalized with negative charged groups to introduce selectivity and mimic biological pores. The membranes may have promising applications in efficient desalination.  
<http://www.pnas.org/content/early/2008/06/05/0710437105>
- Spiraling nanotrees provide the best evidence for "Eshelby twist". This theory suggests that screw dislocations cause mechanical deformation of the crystal, which were visualized in a twisting trunk and spiraling branches.  
<http://www.sciencemag.org/cgi/content/abstract/sci.320/5879/1060>
- Aluminum and aluminum oxide nanoparticles improve the ignition properties of diesel fuel. It is suspected that the nanoparticles improve its heat- and mass-transfer properties allowing lower ignition temperatures.  
<http://pubs.acs.org/cgi-bin/abstract.cgi/nalefd/2008/8/i05/abs/nl080277d.html>
- EPA urged to regulate nano-sized silver particles as a pesticide. Silver nanoparticles are used in a wide variety of household products, which claim to kill germs. <http://pubs.acs.org/cen/news/86/i19/8619news3.html>
- Nanomaterials move up the food chain. Researchers have found that nanomaterials are transferred from the single cell organisms to multi-celled organisms. However, there was no evidence that the particles studied accumulated in the organisms.  
<http://www.nature.com/nnano/journal/v3/n6/abs/nnano.2008.110.html>

## AICHE 2008 Annual Meeting in Philadelphia

The AICHE Annual Fall Meeting in Philadelphia is just around the corner – November 16-21, 2008. This year AICHE will be celebrating its Centennial, and the program will include special events to mark the occasion.

As seen by this year's programming, NSEF is dedicated to bringing top quality nanotechnology-related programming to the chemical engineering community. This fall, NSEF is sponsoring or co-sponsoring over 60 sessions dedicated to nanoscale science and engineering. We encourage you and your colleagues to attend the 2008 Annual Meeting and take advantage of the rich content that we offer.

### NSEF Core Programming includes:

- *Nanoelectronic Materials I/II*
- *Chemical Engineering Principles for Nanotechnology I/II*
- *Commercialization of Nanotechnology*
- *Nanofabrication and Nanoscale Processing*
- *Nanoscale Structure In Polymers I/II: Self-Organization of Polymers at Surfaces and Interfaces*

- *Nanoscale Structure in Polymers II: Nanostructured Polymeric Materials*
- *Nanoscale Structure In Polymers III: Polymer Nanocomposites*
- *Nanoscale Structure in Polymers IV: Polymer Nanocomposites*
- *Nanotechnology and Nanobiotechnology for Sensors I/II/III*
- *Poster Session: Nanoscale Science and Engineering*
- *Self and Directed Assembly at the Nanoscale I/II*
- *Templated Assembly of Inorganic Nanomaterials*
- *Education Issues in Nanotechnology*
- *Carbon Nanotubes I: Synthesis*
- *Carbon Nanotubes II: Characterization, Functionalization, and Applications*
- *Carbon Nanotubes III: Adsorption and Transport*
- *Carbon Nanotubes IV*
- *Carbon Nanotubes V: Applications*
- *Sensors and Bio-Imaging Contrast Agents at the Cellular Level I/II*
- *Magnetic Nanoparticles In Biotechnology and Biomedicine I/II*
- *Bionanotechnology for Gene and Drug Delivery I/II/III*
- *Bionanotechnology: Plenary Session I/II*
- *Bionanotechnology Graduate Student Award Session*
- *Micro- and Nanodevices for Targeted Therapeutics*
- *Nanoscale Science and Engineering in Biomolecular Catalysis I/II/III*
- *Nanostructured Biomimetic and Biohybrid Materials and Devices*
- *Nanostructured Scaffolds for Tissue Engineering*
- *Nanotechnology for Biotechnology and Pharmaceuticals I/II*
- *Nanotechnology for In Vivo and in Vitro Imaging*
- *Polymers as Functional Components of Micro- and Nanodevices*
- *Self-Assembled Biomaterials II*
- *Nanowires I: Synthesis*
- *Nanowires II: Modeling, Integration Strategies and Applications*
- *Nanowires IV: Applications to Photovoltaics or Renewable Energy*
- *Nanowires V: Applications to Sensors, Devices and Energy Storage*
- *Nanowires III: Bulk Production, Dispersions and Composites*

**NSEF Co-sponsored Sessions include:**

- *Functional Nanoparticles and Nanocoatings on Particles*
- *Nanoscale Structure in Polymers II/III*
- *Nanostructured Biomaterials*
- *Processing of Nanocomposites*
- *Nanoscale Materials as Catalysts I/II*
- *Nanomaterials for Hydrogen Production and Fuel Cells*
- *Nanomaterials for Energy Storage I*
- *Nanomaterials for Photovoltaics I/II*

This year's NSEF award lectures will be given on Tuesday afternoon, November 17th, in the two sessions entitled Chemical Engineering Principles for Nanotechnology.

## Society News

The NSEF is pleased to announce this year's award lectures. The 2008 NSEF Forum Award Winner is given to Meyya Meyyappan from NASA for technical and educational contributions to and leadership in nanotechnology. Dr. Meyyappan will talk about "One Dimensional Nanomaterials and their Applications." The 2008 NSEF Young Investigator Award is presented to Ravi Kane from Rensselaer Polytechnic Institute for his contributions to the design of potential nanoscale polyvalent therapeutics and functional nanocomposites. The title of Professor Kane's talk is "*The Design of Nanoscale Polyvalent Therapeutics.*"

Meyya Meyyappan is Chief Scientist for Exploration at the Center for Nanotechnology, NASA Ames Research Center in Moffett Field, CA. After receiving his Ph.D. in Chemical Engineering from Clarkson University in 1984, Dr. Meyyappan worked as a research scientist at Scientific Research Associates in Glastonbury, Connecticut where his focus was semiconductor heterostructure device physics, plasma processing, and device and process modeling. He moved to NASA Ames in 1996 to establish the nanotechnology group. His current research interests include growth of carbon nanotubes and inorganic nanowires, biosensor and chemical sensor development and nanodevices. Dr. Meyyappan is a member of IEEE, AVS, ECS, MRS, AIChE, and ASME and a Fellow of the IEEE. He is the IEEE Distinguished Lecturer on nanotechnology and ASME's Distinguished Lecturer on nanotechnology. For his contributions to nanotechnology, he has received the Arthur Fleming Award and NASA's Outstanding Leadership Medal. He has published over 130 peer-reviewed articles in various science and engineering journals. Dr. Meyyappan serves on numerous nanotechnology advisory committees across the world and has given over 200 Invited/Plenary talks and invited seminars.

Ravi Kane is a Professor of Chemical and Biological Engineering at Rensselaer Polytechnic Institute. He received a B.S. in Chemical Engineering with distinction from Stanford University in 1993. Dr. Kane went to graduate school at MIT, where he received an M.S. in Chemical Engineering Practice and a Ph.D. in Chemical Engineering working with Dr. Robert Cohen and Dr. Robert Silbey. After postdoctoral research with Dr. George Whitesides in the Department of Chemistry and Chemical Biology at Harvard University, Dr. Kane joined Rensselaer Polytechnic Institute as an assistant professor in 2001. He was promoted to associate professor in 2006 and to professor in 2007. Dr. Kane's research interests lie at the interface of biotechnology and nanotechnology. His group is designing nanoscale polyvalent therapeutics and working on the molecular engineering of biosurfaces and nanostructures. Dr. Kane has published over 70 technical papers, delivered over 80 invited lectures, and holds two patents. In 2004, he was named by MIT's Technology Review as one of the TR100 – the top 100 young innovators in the world. In 2008, he received a NYSTAR faculty development award and was selected as the Dr. G.P. Kane Visiting Professor in Chemical Engineering at the University Institute of Chemical Technology, Bombay, India. He is also a member of the editorial board for the Annual Review of Chemical and Biomolecular

Engineering and Biotechnology & Bioengineering.

### Visit the NSEF website

The NSEF website contains online Web/Forum Community at <http://forum.aiche.org/Forum23-1.aspx>. Visit the forum and exchange ideas, post suggestions, questions, or news to the NSEF community.

### Comments and Feedback

Please let us know what you think of NSEF, its newsletter, or provide us with your suggestions by emailing: [nano@aiiche.org](mailto:nano@aiiche.org).

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