

Nanomanufacturing for Energy Efficiency Workshop

Nanotechnology Will Help Secure Our Energy Future. Let's Accelerate this Change and Make U.S. Industry More Energy Efficient and Sustainable.

The U.S. Department of Energy's Industrial Technologies Program (ITP - www.eere.energy.gov/industry) will hold a Nanomanufacturing for Energy Efficiency Workshop on June 5-6, 2007 in Baltimore, Maryland at the Tremont Grand Conference Center. The ITP's nanomanufacturing initiative aims to accelerate nanotechnology toward practical applications that will lead to major reductions in petroleum and natural gas usage within the next 5 to 10 years. The workshop is an opportunity for industry and scientific personnel to help identify research priorities to meet that goal. Feedback from the workshop will provide the basis for the *Nanomanufacturing for Energy Efficiency Roadmap* – an important document that will guide DOE/ITP's nanomanufacturing planning and R&D solicitation efforts.

The meeting scope, priority topics, and agenda were developed under the guidance of ITP and the Workshop Steering Committee. Members of the committee include: Bob Doering, Senior Fellow and Silicon Technology - Development Manager (Texas Instruments), Jack Kruper, DOW Research Fellow (Dow Corporation), George Maracas, Director Nanotechnology (Motorola), Mohan (Mano) Manoharan, Manager Coatings and Surface Technologies Laboratory, Ceramics and Metallurgy Technologies (General Electric), Darlene Solomon, Chief Technology Officer and Vice President Agilent Laboratories (Agilent Technologies), Tom Theis, Director Physical Sciences (IBM), Larry Thomas, Business Director, Advanced Materials (Air Products and Chemicals), and Tim Weber, Director of the Advanced Materials and Process Lab (Hewlett Packard).

Nanomanufacturing is leading the next industrial revolution. It will provide our industrial manufacturing base with new, more precise, less expensive, more energy efficient and more flexible ways of making products. Like steam engines, electricity, and transistors, nanotechnology is a powerful enabling technology, with disruptive impacts in many markets, industries and

business models worldwide. It can provide our nation's manufacturing base with new production methods and enable products that themselves are more energy efficient than are comparable products of today. Increasing industrial energy efficiency reduces carbon dioxide emissions per unit of output, thereby directly supporting global climate change mitigation.

The U.S. Government has invested \$6.5 billion in nanotechnology research over the past five years. However, the vast benefits of nanotechnology cannot be realized without significant continued investment in applied research to translate scientific discoveries into new manufacturing processes and products.

This workshop provides a unique environment for defining *Nanomanufacturing for Energy Efficiency Roadmap* activities and for networking among your peers. It will bring together nanomanufacturing stakeholders from various sectors including basic sciences, applied research, end-users, business leaders, financial professionals, and federal agencies. Working together, this group can apply their differing perspectives to identify barriers that inhibit nanomanufacturing's advancement and suggest R&D solutions to surmount those barriers. The workshop's focus is on nanotechnology applications that will result in the more efficient use of energy in industrial manufacturing.



6/5/2007 DAY 1 - will be devoted to presentations and panel discussions from nanomanufacturing experts and will set the stage for the next day's breakouts.

	Start Time	End Time
Registration	12:00 pm	1:30 pm
Welcome Douglas Kaempf, DOE Program Manager, Industrial Technologies Program	1:30 pm	1:45 pm
DOE and the Nanotechnology Revolution TBD - DOE Executive	1:45 pm	2:10 pm
National Nanotechnology Initiative: The Next 5 Years Altaf Carim, <i>National Science and Technology Council,</i> <i>Committee on Technology Subcommittee on Nanoscale Science,</i> <i>Engineering and Technology Subcommittee Agency Co-Chair</i>	2:10 pm	2:25 pm
Nanomanufacturing Challenges Facing Industry Don Anthony, President, Council for Chemical Research	2:25 pm	2:40 pm
Nanotechnology Commercialization: Past, Present, Future Matthew Nordan, President, Lux Research Inc.	2:40 pm	2:55 pm
Break	2:55 pm	3:10 pm
Nanomaterial Manufacturing Panel This panel will address nanomanufacturing issues associated with the industrial production and scale-up of nanomaterials for energy efficient processes or products. Panelists: <ul style="list-style-type: none"> · Donald R. Young, Aspen Aerogels, Inc. · Daniel Rardon, PPG Industries, Inc. · Larry Thomas, Air Products & Chemicals, Inc. · Michele L. Ostraat, DuPont Engineering Research and Technology 	3:10 pm	4:00 pm
Manufacturing of Nano Intermediates, Systems, and Products Panel This panel will address design and production issues related to incorporating nanomaterials into products that will dramatically improve industrial energy efficiency or energy systems within the next 5 to 10 years. Panelists: <ul style="list-style-type: none"> · Brian Sager, Nanosolar, Inc. · John H. Belk, Boeing · Greg Leeming, Intel · Michael J. Lukitsch, General Motors 	4:00 pm	4:50 pm
Break	4:50 pm	5:05 pm

Nano Commercialization Panel This panel will address broad commercialization issues specific to nanotechnology (e.g., financing novel products, ES&H, nanomaterials characterization.). Panelists: <ul style="list-style-type: none"> · Robert Smith, Nantero, Inc. · Margaret Blohm, General Electric · Craig Prater, Veeco Instruments · Michael Janse, Harris&Harris 	5:05 pm	6:00 pm
Networking reception	6:00 pm	7:30 pm
Dinner (on your own - Baltimore Inner Harbor)		
6/6/2007 DAY 2 - devoted to 5 concurrent facilitated breakout sessions. Suggested breakout session Topical Areas and Subtopic are listed below		
Continental Breakfast/Registration	7:00 am	8:00 am
Breakout Session Facilitation Rule	8:00 am	8:15 am
Five Concurrent Facilitated Sessions	8:15 am	2:30 am
Facilitated Sessions	8:15 am	10:00 am
Break	10:00 am	10:15 am
Continuation of sessions	10:15 am	11:30 am
Lunch	11:30 am	12:30 pm
Continuation of sessions	12:30 pm	2:30 pm
Break	2:30 pm	2:45 pm
Sessions Reporting	2:45 pm	3:45 pm
Close out and Thank you	3:45 pm	4:00 pm

Breakout Sessions Topical Areas and Subtopics

The purpose of the breakouts is to develop an industry-driven set of R&D priorities for nanomanufacturing that will yield energy saving within industry manufacturing processes or from product use. The outcome of the workshop will be a set of recommendations for applied research and development to be incorporated into a *Nanomanufacturing for Energy Efficiency Roadmap*. The Roadmap will be an important document that will guide industrial R&D activities, provide the financial community with industrial interest areas and support DOE/ITP's programmatic planning and R&D solicitation efforts.

Manufacturing Nanomaterials - Commercial success of nanomaterials will require new quality control and material consistency measures.

Session 1 - Nanomanufacturing Materials (Moderator – Jack Solomon, Chairman Chemical Industry Vision2020 Technology Partnership) Manufacturing processes and scale-up for cost-competitive large-scale (high-rate, high-volume) production of high-quality nanomaterials.

Manufacturing of Energy-saving Nano-derived Products – Manufacturing processes must be developed and scaled up for integration of nanomaterials into energy efficient products.

Session 2 - Manufacturing Phase Energy Savings (Efficiency) (Moderator – Jack Kruper, Dow Corporation)
Nanotechnologies offer numerous opportunities to improve energy efficiency in the industrial manufacturing process. These improvements can come from:

- Molecularly tailored catalysts (selectivity, activity, stability...)
- Separations (membrane, sorbent, ion exchange...)
- Materials properties (ultra-strong, ultra-hard, corrosion/erosion resistant, frictionless surfaces...)
- Nanostructured systems for sensors and controls with broad applicability
- Microelectronics

Session 3 – Use Phase Energy Savings (Efficiency) (Moderator – John Belk, Boeing) Nanotechnology offers numerous opportunities to develop new products that result in energy savings when compared to traditional products.

- High-strength materials (light-weighting for transportation...)
- Super conducting materials (low heat loss...)

Session 4 - Power Production Energy Savings (Efficiency) (Moderator – Mohan Manoharan, GE) Nanotechnology will offer more efficient ways to recover, convert, produce, and store energy.

- Solid-state energy generation (solar, photovoltaic, thermoelectric, piezoelectric, fuel cells...)
- Power production (turbines...)
- Electric/power storage

Nanotechnology Commercialization – Science and Engineering are not the only hurdles to producing nanotechnology. Broad issues relating to finance, ES&H, market acceptance, etc... impact commercial potential.

Session 5 - Accelerating / Capitalizing Nano-Ventures (Moderator – Michael Holman, Lux Research) Nanotechnology presents new and different hurdles in traditional product commercialization pathways.

Registration

To register for the event, please visit <http://eenm.govtools.us/>. After completing the pre-registration form at this web site, you will receive an e-mail confirming your reservation. There is no registration fee for the workshop, but attendance will be limited. Please register early to ensure that your registration request is accepted.

Lodging and Transportation

The meeting will be held at the Tremont Grand Conference Center, 225 North Charles Street, Baltimore, MD 21201. The hotel is located in the heart of downtown Baltimore, just blocks from the Inner Harbor, National Aquarium, and Science Center and within minutes of exciting shopping, dining, and historical sites.

Baltimore is accessible by the Baltimore-Washington International Airport (BWI) located approximately 10.5 miles from the Tremont Grand Conference Center.

A block of rooms has been reserved at the adjoining all-suite hotel at a special group rate of \$169.00. In order to receive this rate you must make your reservation by Friday, May 11, 2007. For more information on lodging, transportation, parking and directions visit <http://www.tremontsuitehotels.com>. For additional information on the meeting agenda and lodging, please visit <http://eenm.govtools.us/>.

Contact

Please contact info.eenm@bcs-hq.com, with questions.



U.S. Department of Energy
Industrial Technologies Program

Bringing you a prosperous future where energy
is clean, abundant, reliable, and affordable