

**Date:** November 19<sup>th</sup>, 2007  
**To:** Birck Nanotechnology Center Members  
**From:** Tim Sands  
**Subject:** Peripheral Vision: Report on “*Breaking the Barriers: The BIG Business of Nanotechnology*”

Dear Birck Nanotechnology Center Member:

In my capacity as BNC director, I attended a workshop entitled “*Breaking the Barriers: The BIG Business of Nanotechnology*” sponsored by the U.S. Chamber of Commerce on November 13<sup>th</sup>, 2007 in Washington DC. This was not an event that was designed to attract anyone from the nanoscale science and engineering research community. Although the issues discussed may seem peripheral to research, all you have to do to see the relevance is read an NSF or NIH solicitation for proposals in any topic related to nanotechnology. Furthermore, with our dual emphasis in the BNC and DP on “discovery + delivery,” the topic of this workshop was right on the mark. That said, I was the only representative from a university other than one of the speakers, a dean of business and management. Of the ~100 participants, about 40 were from U.S. government agencies, 30 from industry or industry associations, 20 from various foreign embassies, and another 10 from miscellaneous NGOs. Featured speakers and panelists included R. Stanley Williams (H-P, possibly the only other practicing researcher in the room), John Marburger (Science Advisor to the President), and Senator Ron Wyden (Co-chair, Congressional Nanotechnology Caucus).

This event was a very efficient way to tap into the issues that are swirling about the domain that we call “nanotechnology.” These issues are 1) regulation, 2) worker health and safety, 3) environment, health and safety, 4) intellectual property, and 5) workforce development. In the following, I have tabulated the ideas, proposals and concerns that rose to the top during the talks, Q&A and panel discussions. I hope the 5 minutes you may spend reading this memo will at least stimulate some discussion. If you would like more details, please contact me.

### **Regulation**

- The EPA is looking to regulate nanotechnology in some shape or form; currently a voluntary pilot program.
- The city of Berkeley, CA has taken action on a local level, with Cambridge, MA not far behind.
- There is increasing realization that nanotechnology is not monolithic, and must be broken down into categories for regulation; one category that has been identified is that of engineered nanoscale materials; a Nanoscale Materials Stewardship Program will roll out in January 2008; Dupont is working with Environmental Defense (as well as MIT, NIOSH and Rice) to develop a Framework for Responsible Development of Nanomaterials (three case studies on the web: CNT, TiO<sub>x</sub>, Fe<sup>0</sup>; framework designed to be comprehensive, flexible and practical; three classes: natural, incidental and engineered).
- Research is needed to inform regulation; there are new commercial opportunities in monitoring/classifying nanoparticles; Materials Safety Data Sheets (MSDS) do not yet reflect the effects of the nanoscale (e.g., nanotubes fall under the MSDS for graphite); evidence is increasing that toxic behavior of nanoparticles is sometimes a result of impurities bound to nanoparticles rather than the nanoparticles themselves.

### **Communication**

- Dilemma: Ignore, Explore, Defend, or Act?; we can learn from the experiences with genetically modified food and stem cell research.

- People care about trust in the information source, sense of benefit, fairness, and options to manage or control; transparency and empathy are key.

### **Government Initiatives**

- The reauthorization of the 21<sup>st</sup> Century Nanotechnology R&D Act is underway; Wyden is proposing a Nanotechnology Prize Fund as part of the Act (like the X Prize for civilian space flight).
- Nanotechnology caucus priorities are 1) commercialization, 2) research and scholarships/fellowships (especially for women), 3) get out in front of ethical issues.
- White House (Marburger) pushing America Competitiveness Initiative; through FY08, NNI investment will total \$8B – mostly bottom-up; obstacles include monolithic view of nano and over-the-top hype.
- Marburger: NIST is vastly underfunded; standards and measurements are significant obstacles to technology development and to effective regulation; increasing funding to NIST is his #1 priority (for standards, not for commercialization).

### **Commercialization**

- Obstacle to commercialization is university interpretation of the Bayh-Dole Act; companies would like universities to reduce licensing fees in exchange for increasing royalties so that the success of inventions is based more on commercial impact than on licensing revenue.
- Much discussion of auctioning IP to promote greater use of university patent portfolios; Universities that are bundling IP at reduced prices with leases for space in university research parks have hit on a formula that may prove successful for attracting technology businesses; Universities mentioned include Missouri State, Georgia Tech, SUNY Albany, and Emory; States that effectively promote new nano companies include New York, Texas (Texas Enterprise Fund) and Pennsylvania (Ben Franklin Fund).
- 3M has reinvented itself around nano; Realistic time-to-impact: ~10 years; e.g., after 12 years of work on nano at H-P, they are close to generating their first revenues in nano through Nanolithosolution, a spin-out company; interesting case studies include Nanosys, Cambrios, Accelergy, and Authentix; industry still nanoparticle focused.

### **Workforce Development**

- Workforce Development; moving from R&D to manufacturing requires factor of 10 increase in number of employees;
- New nano companies workforce in US typically 90% non-US born.
- Challenge: need to bring in a diverse set of disciplines.
- Immigration law must be reformed to encourage those trained in US to stay.
- Need to build in incentives to attract, educate and retain domestic workforce; must portray nano as a vehicle for societal change (climate change, environment, energy, health).