

UW Center for Nanotechnology

www.nano.washington.edu



- 85 Faculty
- 10 Departments
- 3 Colleges
- 40 PhD Students
- 5 Centers
- 3 International Partnerships
- \$\$ UW, NSF, NIH, DOE, Non-Federal

Acting Director: Francois Baneyx Education and Outreach: Ethan Allen
Associate Director: Dong Qin NT PhD Program: Marjorie Olmstead

"Standard" Ph.D. Process



"Standard" Ph.D. > "Standard Job"

- Basic Research
- Perhaps Teaching (though often not part of training)
- Everything else gets learned on the job



What Do Nanotechnologists Do?



Frontiers in Nanotechnology



Dual Degree in Nanotechnology

1. Thesis in Nanoscale Science or Technology
 - Approved in quality by home department
 - Approved as “nano-relevant” by NT Standards Committee
 - Advisor + at least one other committee member in the Center for Nanotechnology
2. Core course *Frontiers of Nanotechnology*
 - Student joint projects across disciplines
 - Discuss societal impact as well as science & technology
3. Research Rotation
 - ≥ 1 quarter research *outside* advisor’s home department
4. Nano-relevant Course Work
 - ≥ 3 courses, ≥ 2 of which are *outside* home department
5. Nanotechnology Seminar
 - Attend $\geq 80\%$ of seminars, ≥ 4 quarters
6. Home department Ph.D.
 - Fulfill all requirements for Ph.D. in one of 10 participating departments

“Optional” Essentials

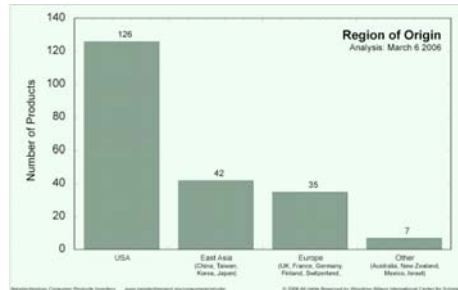
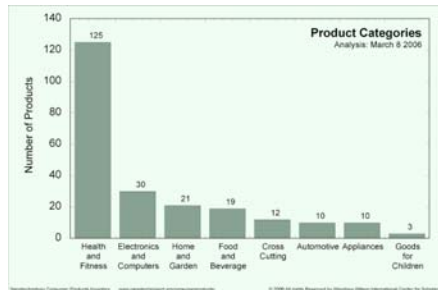
- Communication amongst disparate groups
 - Nanoscience & Nanotechnology Student Association
 - Student-Run Seminar Series
 - Annual Workshop
 - Quarterly Symposia with Brief Presentations and Longer Social Hour
- Outreach and Recruitment for Diversity
 - Individual PLUS Coordinated Efforts
- Career Planning
 - Mentorship and Internship Programs
 - Bring Non-academics to Campus
- Fellowship Program
 - Proposal writing experience
 - Bias toward Interdisciplinary Collaborations
 - JIN, IGERT, UIF, hopefully more.
 - Research Rotation Fellowships (New this year)
- User Facility
 - Students are Trained Users AND become “Trainers” of Others

Questions for Discussion

- **WHAT IS NANOTECHNOLOGY?**
- **WHAT IS ITS CURRENT IMPACT?**
- **WHAT IS ITS FUTURE IMPACT?**

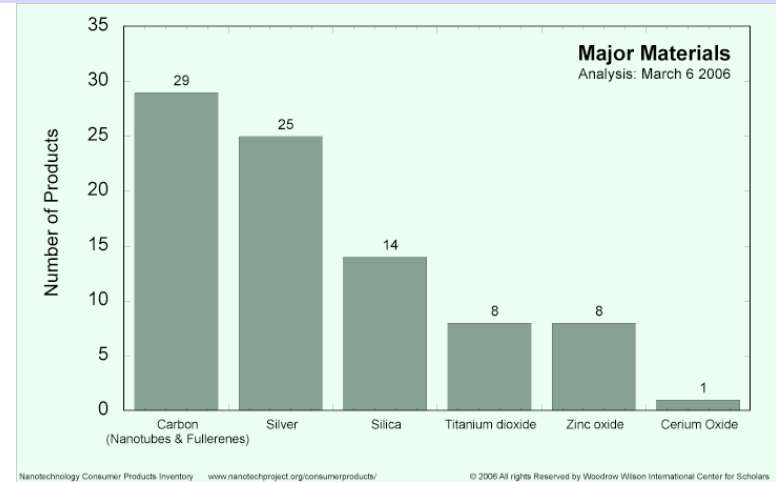
Some current “Nano” Products

- Collected from Project on Emerging Nanotechnologies
- Nanotechnology Consumer Products Inventory
- <http://www.nanotechproject.org/index.php?id=44>



212 products currently in inventory

Materials in Use



- 15 products ingested
- 56 products applied to skin

Nanoelectronics

- **XBOX 360® by Microsoft®**
- Country of origin: USA
- **What Others Say:**
- “At Fall Processor Forum in San Jose, California today, IBM announced the custom designed microprocessor built for Microsoft’s Xbox 360 console is in production at the company’s East Fishkill, N.Y. fab and at Chartered Semiconductor Manufacturing in Singapore. Together, IBM and Chartered’s common platform offers Microsoft a unique dual source capability that provides the highest level of manufacturing redundancy and flexibility.”
- “The chip features a customized version of IBM’s industry leading 64-bit PowerPC core. The chip includes three of these cores, each with two simultaneous threads and clock speeds greater than 3 GHz. **It features 165 million transistors and is fabricated using IBM’s 90 nanometer Silicon on Insulator (SOI) technology to reduce heat and improve performance.**”
- (Source: http://www-03.ibm.com/chips/news/2005/1025_xbox.html)

Nano Air Filters

- **NanoBreeze™ Car Air Purifier by NanoTwin Technologies, Inc.**
- Country of origin: USA
- **What They Say:**
- “**The nanotechnology in NanoBreeze rips apart dangerous airborne molecules to create benign ones.** The NanoBreeze decomposes allergens and mold spores; kills bacteria and viruses; reduces exhaust fumes and vapors. The patented NanoBreeze was developed by a national government laboratory.”
- **The NanoBreeze uses a UVA light tube to energize a photocatalyst embedded in a glass fiber web** while oxygen and water from room air drive oxidation and reduction reactions that destroy many thousands of different airborne pollutants.
- (Source: <http://www.nanotwin.com/index.html>)

Non-stick Paint

- **Deletum 5000 Anti-graffiti paint by Victor Castaño**
- Country of origin: Mexico
- **What Others Say:**
- **“Deletum 5000's special ingredient is silica. It is loaded with particles of the stuff that are but a few nanometres (billionths of a metre) across. These particles have had both oil-repellent and water-repellent molecules attached to their surfaces.** Both are necessary, since the materials used by graffiti artists may be oil-based or water based. However, if merely mixed together, the two would end up repelling each other, and thus separating. By attaching them to the silica, this mutual loathing can be overcome and, as the paint dries, the changes that take place force the oil-and-water-proofing to the surface. The result is that most agents used by graffiti artists will not stick to that surface—and what does stick can be washed or brushed off easily.”
- (Source: http://www.economist.com/science/PrinterFriendly.cfm?Story_ID=2173232)

Nano Chocolate

- **Nanocentials™ Slim Shake Chocolate by RBC Life Sciences®, Inc.**
- Country of origin: USA
- **What They Say:**
- “The natural health benefits of cocoa have been combined with RBC’s NanoCluster™ delivery system to give you CocoaClusters a technologically advanced form of cocoa that offers enhanced flavor without the need for excess sugar.”
- **“The natural benefits of cocoa have now been combined with modern technology to create CocoaClusters. RBC’s NanoClusters are tiny particles, 100,000th the size of a single grain of sand, and they are designed to carry nutrition into your cells.*** During the process of creating NanoClusters, pure Cocoa is added to the “Cluster” formation to enhance the taste and the benefits of this treasured food.”
- (Source: <http://813312.royalbodycare.com/Products.aspx?ItemID=38>)

Clothing

- **Hoggar Nano-Tex® Pants - Men’s and Women’s by Jack Wolfskin®**
- Country of origin: Germany
- **What They Say:**
- “The NANO-PEL treatment gives these fully featured, highly robust trekking pants a significant value-added performance bonus: **the modified structure of the material delivers lasting resistance to water, dirt and unpleasant odours without adversely affecting the intrinsic performance** spec of the OXFORD NYLON fabric. When you are out in the back country with limited access to washing facilities and spare clothing, we think you will appreciate the trouble we have taken!”
- (Source: http://www.jack-wolfskin.com/docs/ohne_marginalie_produk.asp?id=18494&aktion=&m1=18109&m2=18490&m3=18496&m4=&m5=&m6=&sp=E&domid=1027&offset=&offsetY=&pid=15015&uebersicht=18496&offset=0&sid=HUCBHETTGBPYYTTWVUSCJKAUHONIKIBOL)

Baby Wipes

- **NANOVER™ Wet Wipes by GNS Nanogist**
- Country of origin: Korea
- **What They Say:**
- **“The nano-silver inhibits multiplication and growth of those bacteria and fungi which cause infection, odor, itchiness and sores.”**
 - “Safe to use for children’s toys
 - Soft like cotton, protect babies’ frail skin
 - Low irritative natural ingredients protect and moisturize your skin, and prevent skin trouble
 - Cleans hands and around lips
 - After using NANOVER(™) Water Tissue, not sticky”
- (Source: <http://www.gnsnanogist.com/>)