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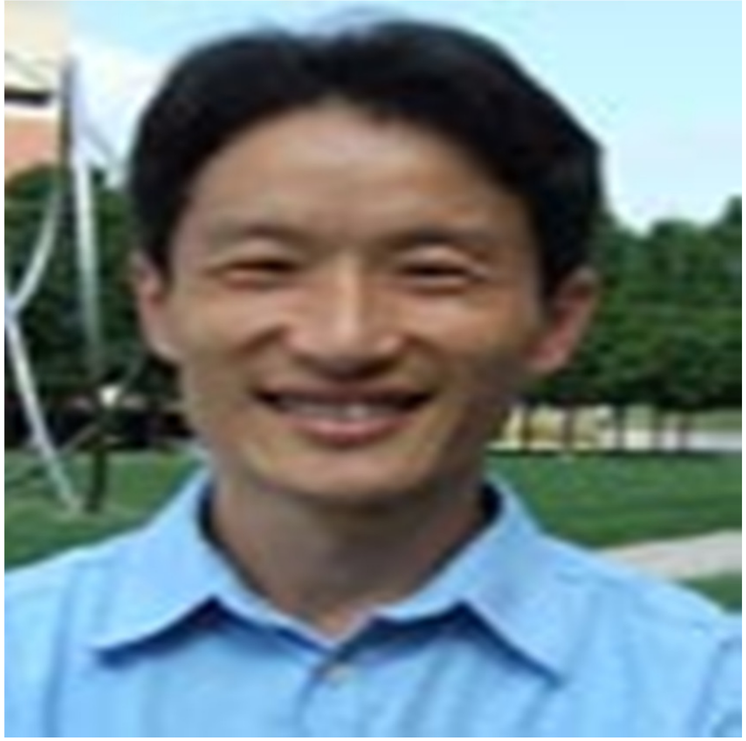


Recently published articles

1. Attenuation of malignant phenotypes of breast cancer cells through eIF2α-mediated downregulation of Rac1 signaling
2. Material properties of the cell dictate stress-induced spreading and differentiation in embryonic stem cells
3. Distinctive Subcellular Inhibition of Cytokine-Induced Src by Salubrinal and Fluid Flow
4. Rac1 Mediates Load-Driven Attenuation of mRNA Expression of Nerve Growth Factor Beta in Cartilage and Chondrocytes

Definition of Nanotechnology

"Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale."

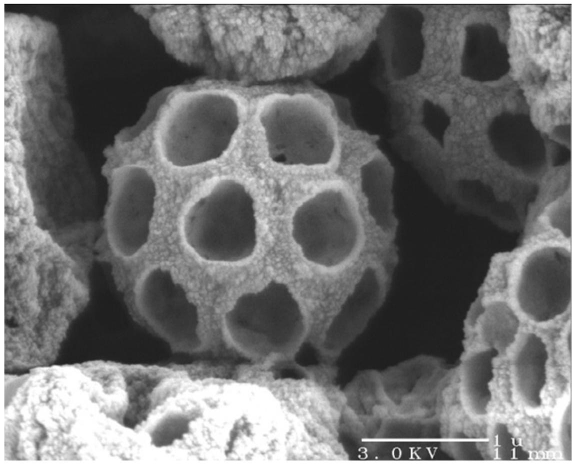
-National Nanotechnology Initiative

Why Nanotechnology?

At the nanoscale, the physical, chemical, and biological properties of materials differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter.

Nanotechnology R&D is directed toward understanding and creating improved materials, devices, and systems that exploit these new properties.

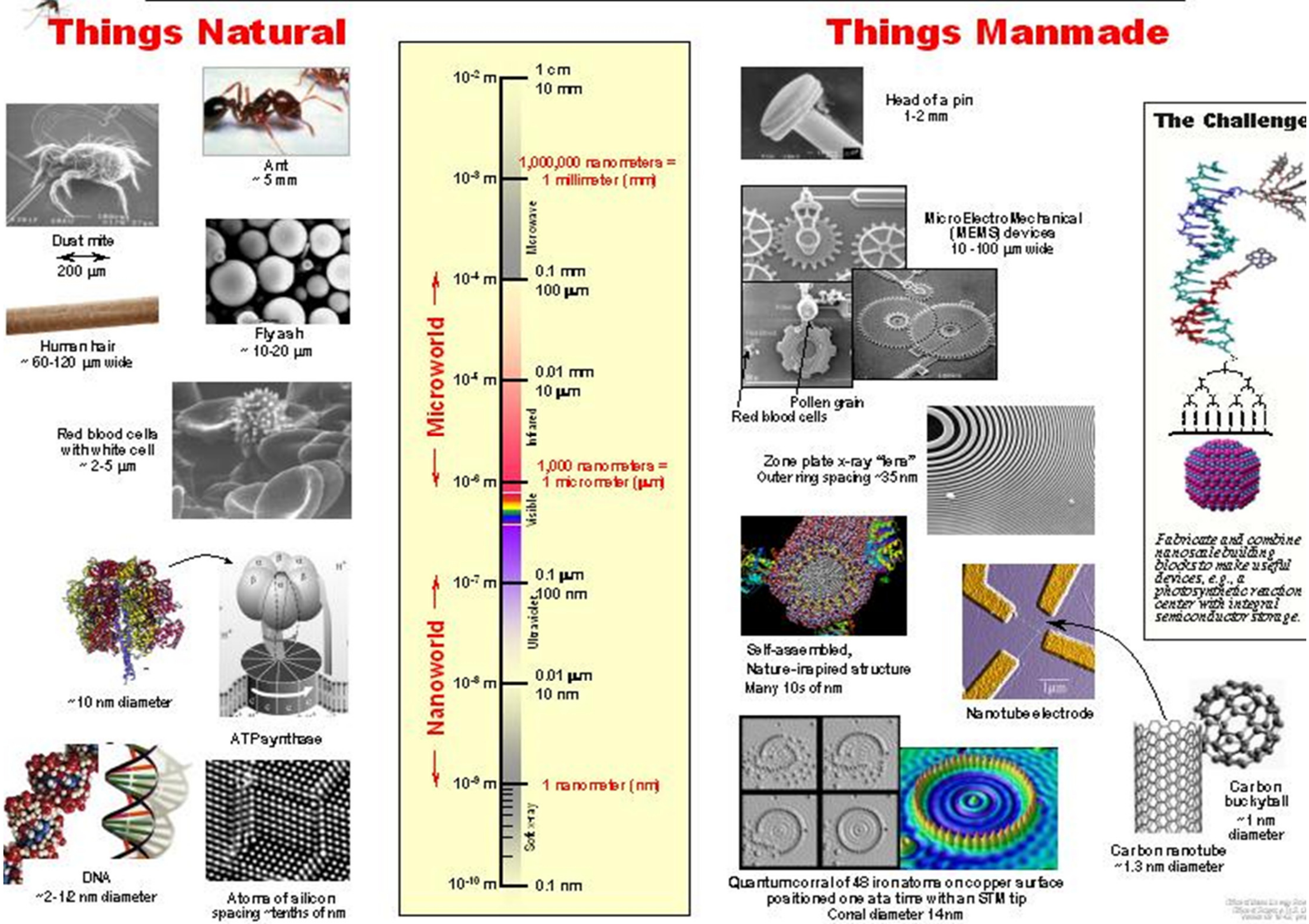
In Other Words….



Small photonic crystals: titanium dioxide micro-sphere 1-50 μm in diameter

Working at the atomic, molecular and supra-molecular levels, in the length scale of approximately 1 – 100 nm range, through the control and manipulation of matter at the atomic and molecular level in order to design, create and use materials, devices and systems with fundamentally new properties and functions because of their small structure.

The Scale of Things – Nanometers and More



Why Now?

Richard Feynman's famous presentation "There's Plenty of Room at the Bottom" was in the 1959 at the American Physical Society. Here he asked:

- Why can't we manipulate materials atom by atom?
- Why can't we control the synthesis of individual molecules?
- Why can't we write all of human knowledge on the head of a pin?
- Why can't we build machines to accomplish these things?

Why Now?

- New tools for atomic-scale characterization
- New capabilities for single atom/molecule manipulation
- Computational access to large systems of atoms and long time scales
- Convergence of scientific-disciplines at the nanoscale

What's the BIG deal about something so SMALL?

Materials behave differently at this size scale.

It's not just about miniaturization.

At this scale---it's all about INTERFACES

Size Matters!

Color depends on particle size

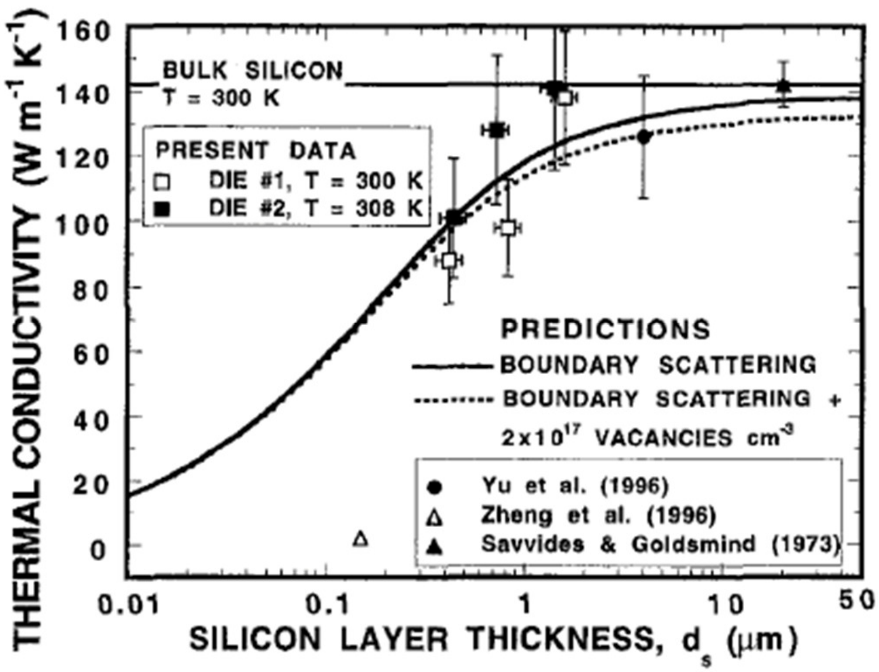
Quantum dots 3.2 nm in diameter have blue emission

Quantum dots 5 nm in diameter have red emission

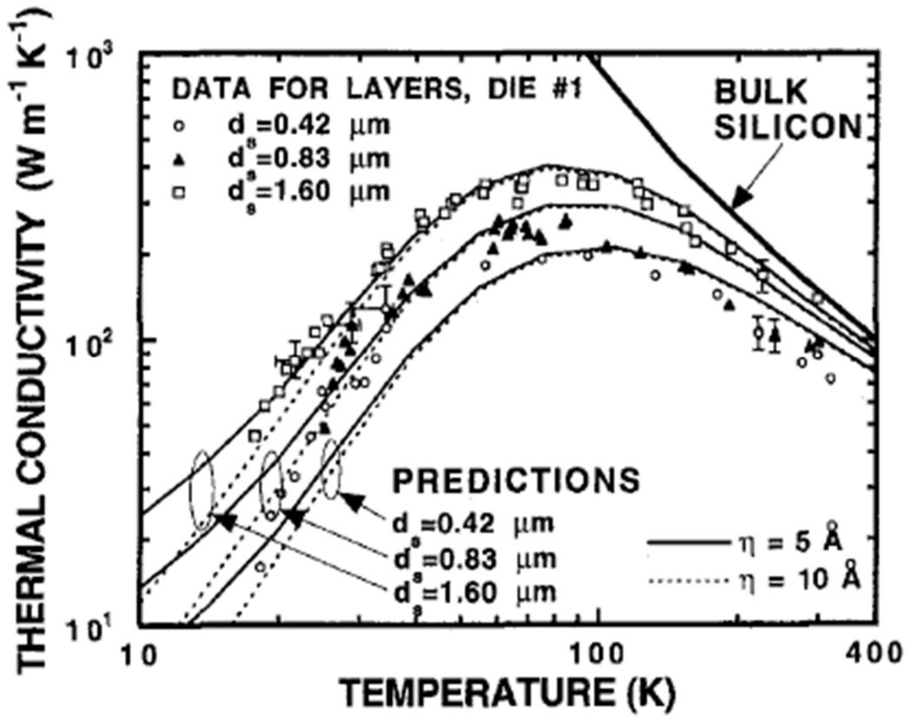
Evident Technologies
evidot Quantum Dots

Thermal Conductivity

Si phonon thermal conductivity: Bulk vs. Microscale



Room-temperature thermal conductivity data for silicon layers as a function of their thickness.



Thermal conductivities of the silicon device layers with thicknesses 0.42, 0.83, and 1.6 μm.

Benefits of Nanotechnology

"The power of nanotechnology is rooted in its potential to transform and revolutionize multiple technology and industry sectors, including aerospace, agriculture, biotechnology, homeland security and national defense, energy, environmental improvement, information technology, medicine, and transportation. Discovery in some of these areas has advanced to the point where it is now possible to identify applications that will impact the world we live in."

-National Nanotechnology Initiative

Understanding the Challenges of the Nanoscale

There are many length and time scales that are important in nanotechnology.

- Length scale goes from 10 Å to 10^4 Å ---- this corresponds to 10^2 to 10^{11} particles
- Time scales ranging from 10^{-15} s to several seconds

The temporal scale goes linearly in the number of particles N, the spatial scale goes as (NlogN), yet the accuracy scale can go as high as N^7 to N! with a significant prefactor.

Challenges of this Size Scale

A critical issue for nanotechnology is that components, structures, and systems are in a size regime about whose fundamental behavior we have little understanding. They are:

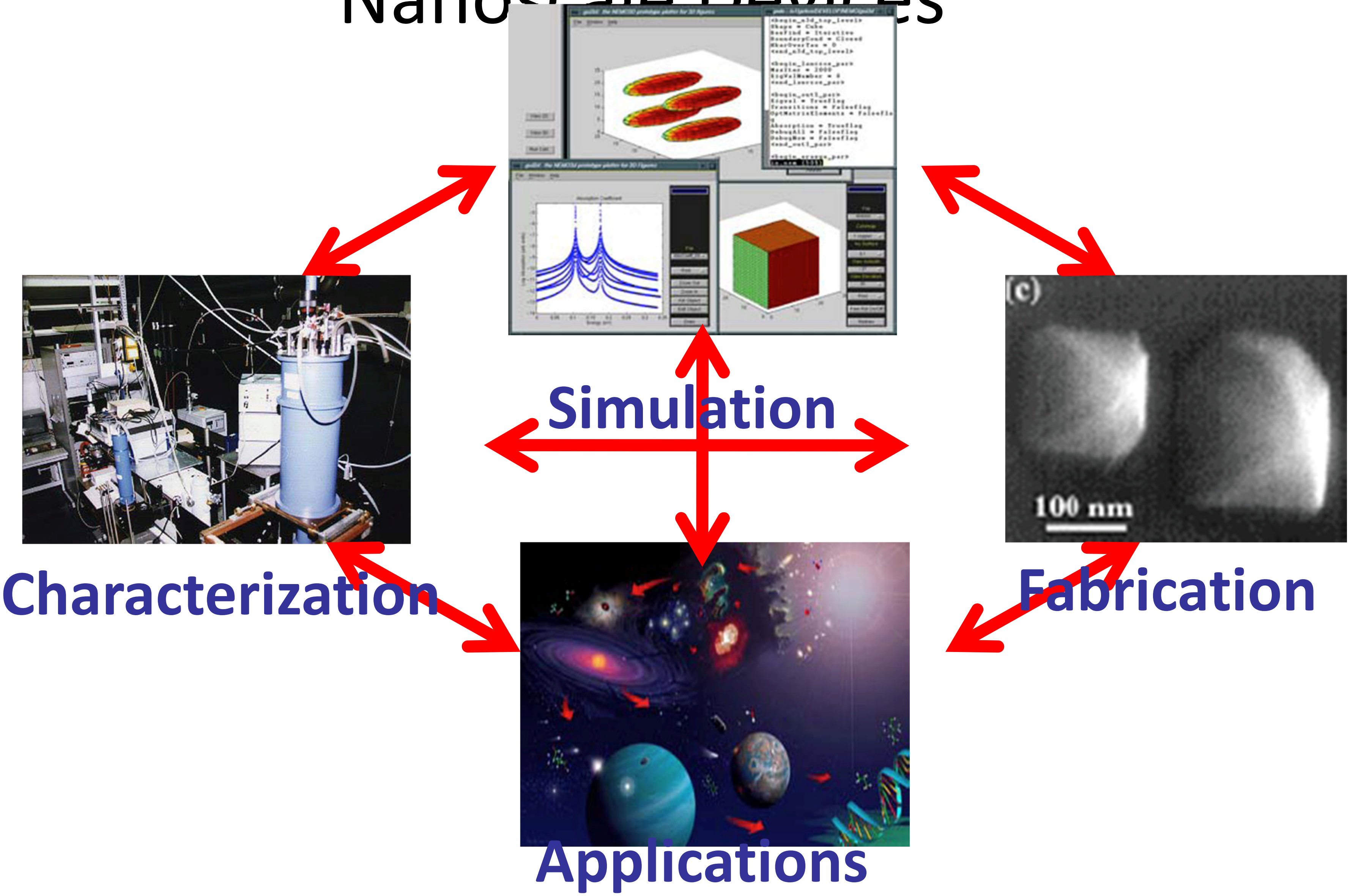
•too small for direct measurements

•too large to be described by current rigorous first principle theoretical and computational methods

•exhibit too many fluctuations to be treated monolithically in time and space

•too few to be described by a statistical ensemble.

Modeling, Characterization and Fabrication are Inseparable for Nanoscale Devices



Economic Impact of Nanotechnology

According to "The Nanotechnology Opportunity Report (NOR)," 3rd Edition Cientifica Ltd., published in June 2008

"The market for products enabled by nano-technologies will reach US$ 263 billion by 2012."

"The highest growth rates will be in the convergence between bio- and nanotechnologies in the healthcare and pharmaceutical sectors."

Forbes Top 10 Nanotech Products--2003

1. High Performance Ski Wax
2. Breathable Waterproof Ski Jacket
3. Wrinkle-Resistant, Stain Repellent Threads
4. Deep Penetrating Skin Cream
5. World's First OLED Digital Camera
6. Nanotech DVD and Book Collection
7. Performance Sunglasses
8. Nanocrystalline Sunscreen
9. High Tech Tennis Rackets
10. High-Tech Tennis Balls

Forbes Top 10 Nanotech Products--2004

1. Footwarmers
2. Washable Bed Mattress
3. Golf Balls and the "Nano" Driver
4. Nano Skin Care
5. Nanosilver Wound Dressing for Burn victims
6. Military-Grade Disinfectants
7. BASF Superhydrophobic Spray
8. Clarity Defender Automotive-Glass Treatment
9. Flex Power Joint and Muscle Pain Cream
10. 3M Dental Adhesive

Forbes Top 10 Nanotech Products--2005

1. iPod Nano
2. Canola Active
3. O'Lala Foods Choco'la Chewing Gum
4. Zelens Fullerene C-60 Face Cream
5. Easton Sports Stealth CNT Bat
6. Casual Apparel-Nanotex
7. ArcticShield Socks- odor and fungus resistant
8. Behr NanoGuard Paint
9. Pilkington Active Glass
10. NanoBreeze Air Purifier

Journal of Nanomedicine & Biotherapeutic Discovery

- Journal of Nanomaterials & Molecular Nanotechnology
- Journal of Nanomedicine & Nanotechnology
- Nano Research & Applications

For more details on Conferences Related Journal of Nanomedicine & Biotherapeutic Discovery please visit: http://www.conferenceseries.com/nanotechnology-meetings

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