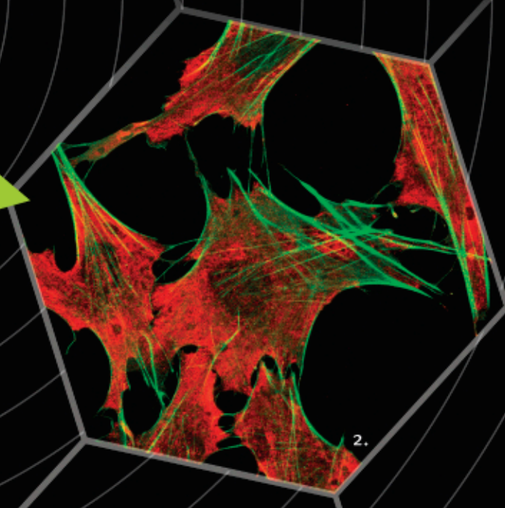
The Promise of NANOTECHNOLOGY

Right Now

Nanocrystals illuminate smaller cell features

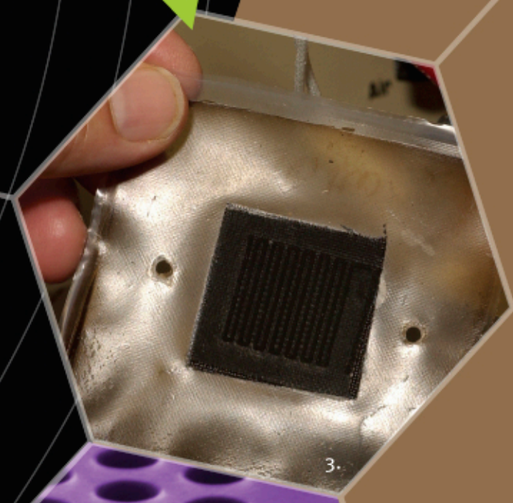
Nanocrystal-based fluorophores are now being used to fluoresce proteins, cells and viruses at much higher resolution than previously possible with traditional fluorophores.



2.

New fuel cell technologies

New nano-fabrication techniques will soon boost production of heteropolyacid-based membranes that will allow for highly efficient, very compact fuel cells.



3.

Nanoimprint gives lift to Moore's law

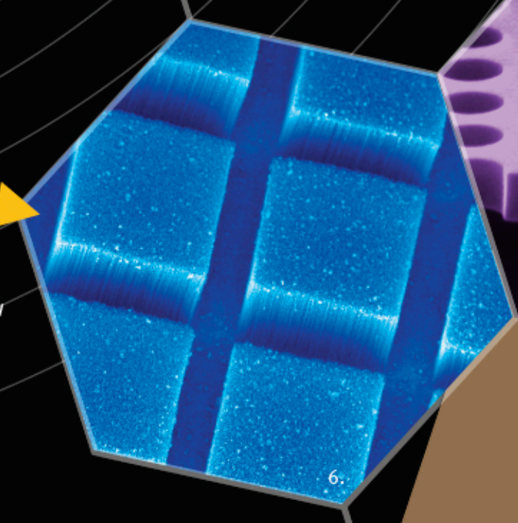
Many of the tools used in nano-scale R&D already enjoy wide use in the semiconductor industry, where nanoimprint lithography is enabling atomic-scale chip features and micromechanical arrays.

1.

The Near Future

Carbon nanotubes and energy efficiency

Polymer-nanotube composites may enable highly-efficient pv applications and usher in new durable, low power lighting applications.



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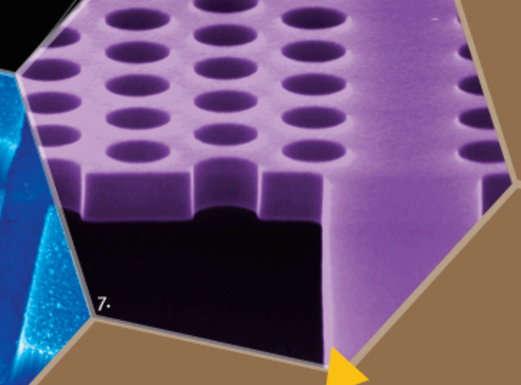
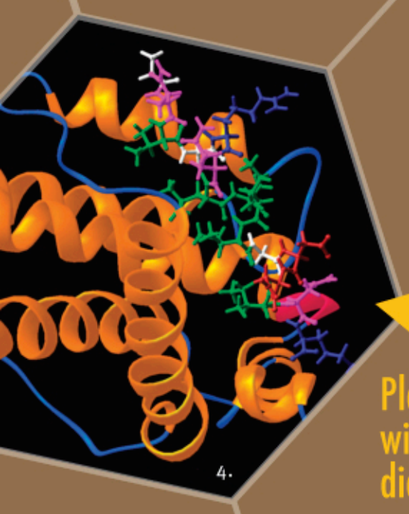


7.

New applications for nanophotonics

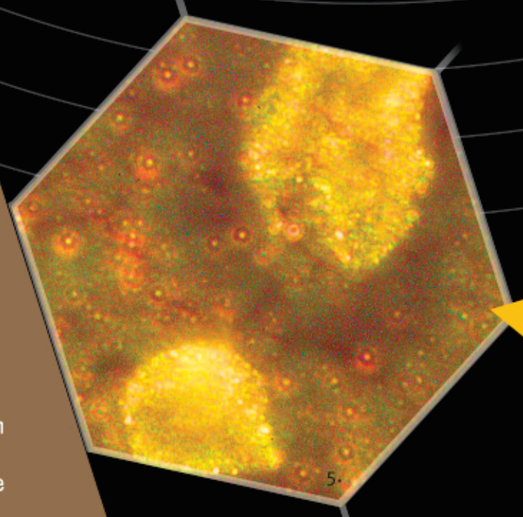
Current research in photonic crystals will lead to production of a host of nano-scale optoelectronic components of very high capacity and sensitivity.



4.

Plasmonics will revolutionize diagnostics

Plasmon-based nanoscale optics will soon enable quick, very finely detailed spectroscopic identification and characterization of peptides, proteins, and viruses in their native environments.



5.

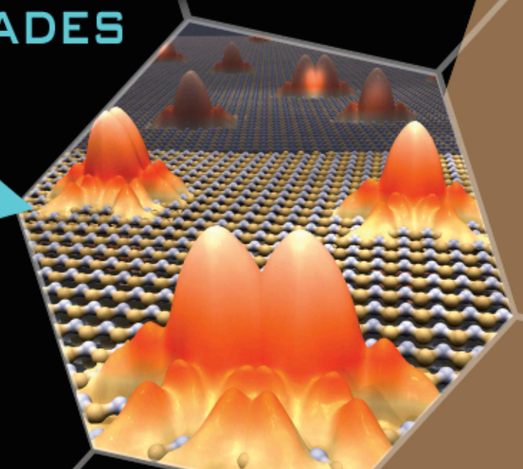
Gold will unlock novel cancer therapies

Binding gold nanoparticles to a specific antibody for cancer cells could allow clinicians to detect, diagnose and treat soft tissue cancers in a single visit, with few side effects.

The Coming Decades

Quantum computing

Spintronics and other quantum effects could exponentially increase the computing power and flexibility of future electronic devices while dramatically reducing their power consumption.



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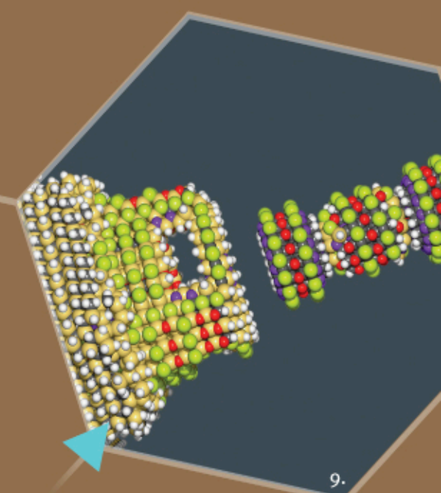

9.

True nano-assembly

Coming advances in computing, chemistry, biology and physics could usher in the "bottom-up" approach first articulated by Richard Feynman in 1959.

The outcome? Functional nano-scale devices that could radically change the way we do research, practice medicine, engineer and mass produce goods, and interact with our physical environment.

10.

Implications of nanotechnology

While the benefits of nano-scale characterization and assembly have been widely articulated, the health risks and environmental impacts of nanotechnology are not well understood.

Much work needs to be done to properly assess and articulate the risks, benefits, and ethical implications of nanotechnology.

Nanotechnology in nature

The iridescence of a butterfly wing derives from the nanophotonic properties exhibited by its scales.

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