



Nano Facts

The concept of the extremely small world of nano is difficult to comprehend. Here are some facts to help put this incredible world into perspective!

- If we met for one nanosecond every day (7 days / week, 365 1/4 days / year) it would take about 28,519 years to accrue a total meeting time of fifteen minutes.
- If we made a scale model of the solar system, and chose to make our earth one nanometer across, it would be about .01 (One hundredth) of a *millimeter* away from the sun in our scale model.
- Our sense of smell allows us to experience nano-sized scent molecules that are too small to see with our eyes! The epithelial olfactory receptor cells in your nose are very sensitive and can detect as few as 1 molecule among 10 million.
- "Nano" means one billionth (1/1,000,000,000) in America. Many European countries call the number we call a billion a thousand million, and reserve "billion" for a million million. We call that a trillion.
- If the atoms in your body were the size of golf balls, you would be tall enough to touch the moon!
- Former Manhattan Project physicist Richard Feynman presented a lecture on December 29, 1959 at Caltech titled "There's Plenty Of Room At The Bottom," in which he said, "What would happen if we could arrange the atoms one by one the way we want them?" The talk is considered by many to have been the kick-off of nanoscience.
- If you can jump sixteen inches in the air, you can jump a billionth of the distance from Earth to the Moon.
- One nanoyear passes in just more than three hundredths of a second, about 32 milliseconds.

- The Center for Integrated Nanotechnologies, CINT, building at LANL has a floor area of 36,500 square feet, and a volume of about 730,000 cubic feet. A NanoCINT might have a square footprint only 2.4 *millionths* of an inch long, a floor area of about 6 *trillionths* of a square inch, and a volume of about 1/10 *quintillionth* of a cubic inch. Give or take.
- How much space would a billion grains of salt take up? A cup? A gallon? 5 gallons? A billion grains of salt would fill an entire bathtub!
- If I squeeze my copy of the HANDBOOK OF PHYSICS, I can get the covers within 6 centimeters of each other. The 1484 pages are printed on 742 sheets of paper about 8 thousandths of a millimeter thick. If the pages were a nanometer thick, 125 copies of the text of this book could fit in the thickness of one page of the book as it really is.
- Scientists at Los Alamos National Laboratory have made foils of a single layer of copper atoms and a single layer of niobium atoms. The atomic forces in these structures are so fierce that if we blast a hole through it, say with neutrons in a nuclear reactor or cosmic radiation in space, the films will repair themselves in a matter of picoseconds, or trillionths of a second. Nano implies not only small, but *fast!*
- Researchers are working with nano-membranes that may someday encapsulate colonies of living pancreatic islet cells. Pores are sized to allow sugar to enter and insulin to escape, but hide the cells from a diabetic person's immune system.
- Viruses exist on the edge of life. They don't metabolize, rather, they connect to a specific kind of host cell, inject their genetic material and co-opt the host's metabolism to make copies of themselves. Scientists are using these mechanisms to develop totally new strategies for treating diseases such as cancer.
- DNA is a molecule with an astounding genius for tangling and untangling. LANL scientists are exploring this talent to help them sort and classify nanotubes that have different atomic structures and properties.