Spongebob's new little cousin: the nanosponge!

Scientists at the University of California, San Diego, are currently developing a new treatment for bacterial infections and venom—the nanosponge. These tiny sponges are designed to "pretend" to be red blood cells and travel through the bloodstream, soaking up toxins such as snake venom and anthrax, and bacteria such as E .coli. In general, poisons cause problems in the body by poking holes in cells, which causes the cells to burst. These little sponges prevent this cell destruction by drawing the toxins into themselves and away from other healthy cells. Sponge treatment can be very useful, because it can potentially save people from many different types of toxins.

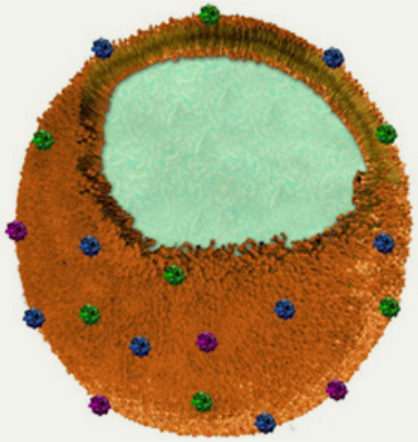

Image by Zhang research lab.

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Physics Brochures Series by Sarah Marie Bruno, '16
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NANOTECHNOLOGY

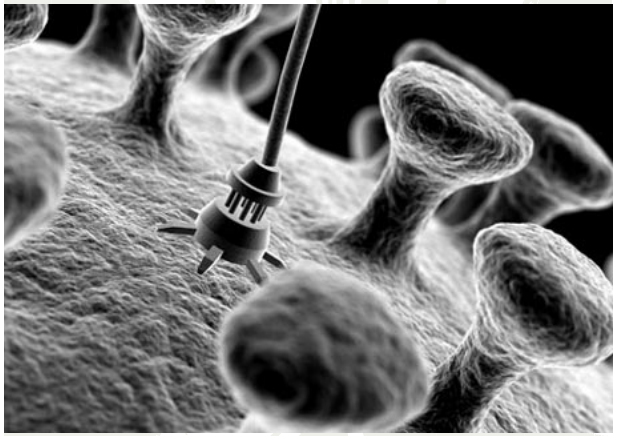


Image by EcoSolargy.

HELPING TO FURTHER

PUBLIC UNDERSTANDING

OF PHYSICS CONCEPTS

From tiny musical instruments to life-saving medical treatments:

No one has small enough fingers to play the world's tiniest guitar! Cornell University Professor Harold Craighead and his nanotechnology research group built a microscopic "nanoguitar" out of crystalline silicon. The guitar is about the size of a red blood cell (10 nanometers long), and has six miniscule strings. Remember that a nanometer is 1/1,000,000,000 of a meter!

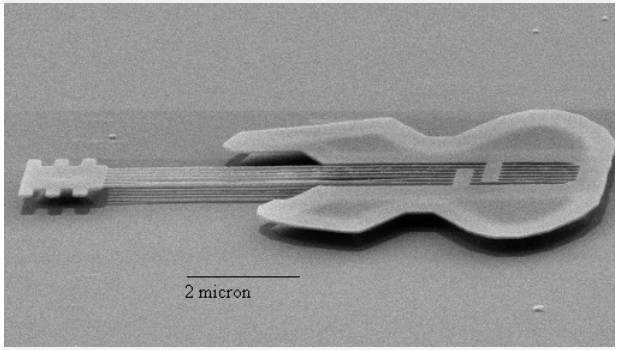
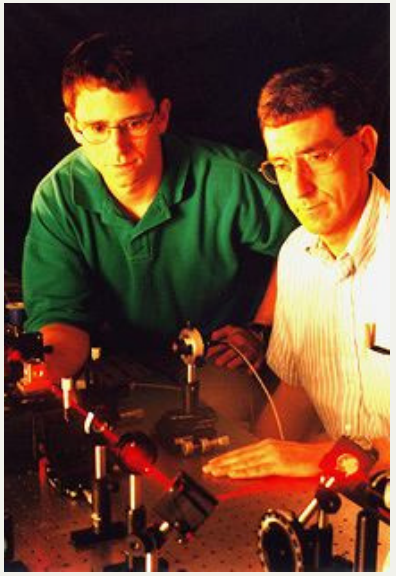


Photo of the nanoguitar taken by a scanning electron microscope. (Photo by D. Carr and H. Craighead, Cornell).

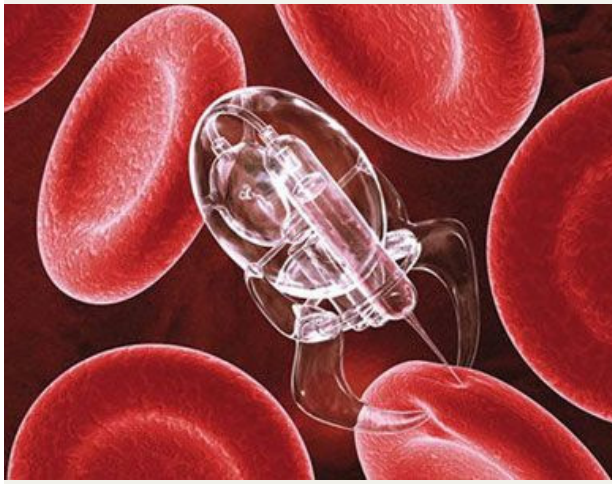
The musician/nanotechnologist must use thin laser beams to pluck the tiny strings! Of course, we can't actually hear the sounds created by such a small guitar, but the tiny instrument can be attached to amplifiers that allow us to hear the "nanomusic."



Professor Craighead (right) with physics graduate student, Dustin Carr (left). (Photo by Charles Harrington).

Professor Craighead's research group built this tiny guitar in order to demonstrate the types of incredible things scientists can do with nanotechnology. For example, nanotechnologists can make probes even smaller than the guitar that can detect the very small motions of individual molecules.

Tiny nano-machines are extremely useful for treating diseases. For instance, patients can swallow pills with nano-cameras inside that take pictures of their entire digestive system, so that doctors can observe these organs. More recently, nanobots have been designed to swim through the bloodstream and destroy cancer cells. Tiny worm-like machines can even repair vital organs such as the heart!



Nanobot attacking a cancer cell in the bloodstream. (Image: Bing Images).

At the University of Missouri, researchers have designed radioactive nanoparticles that can battle lymphoma. Lymphoma is a type of cancer that starts in the immune cells, which are located in what are called the "lymph nodes." Different types of cancers are named for the parts of the body in which they originate, but all cancers can spread from one part of the body to another. If the cancer spreads, it is very difficult for doctors to locate the cancer cells and destroy them. These nanoparticles, however, can find the lymphoma cells and attach to them. The radioactivity kills the cancer cells without hurting the surrounding healthy cells.