
ANTENNA



Issue 16 – 2004



Well here we are again, this issue we will be treading the fine line between reality and fiction. We are going to be talking about <Fanfare> Nanites. <Applause> what is a nanite? Read on young scientist and find out how a star trek item of common use my one-day become a reality.

I'll have mine hot with marshmallows.

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The basics: What is a nanite?

Just how small? Note the dot under the question mark, 1000 nanites could fit in that dot. Nanotechnology is an umbrella term that covers many areas of research dealing with objects that are measured in nanometers. A nanometer (nm) is a billionth of a meter, or a millionth of a millimeter. Thus the name Nanite derives from this.

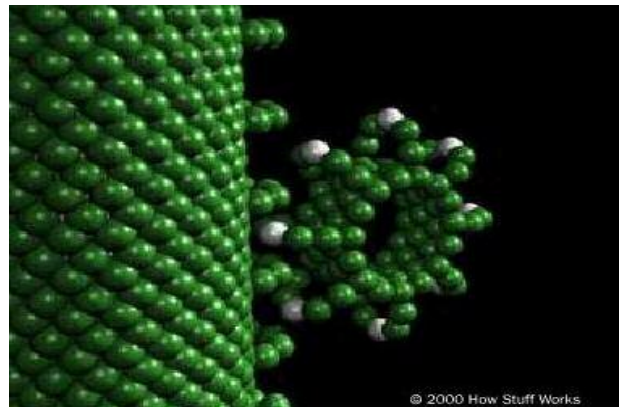
Building with Atoms

Atoms are the building blocks for all matter in our universe. You and everything around you are made of atoms. Nature has perfected the science of manufacturing matter molecularly. For instance, our bodies are assembled in a specific manner from millions of living cells. Cells are nature's nanomachines. Humans still have a lot to learn about the idea of constructing materials on such a small scale. Consumer goods that we buy are made by pushing piles of atoms together in a bulky, imprecise manner. Imagine if we could manipulate each individual atom of an object. That's the basic idea of nanotechnology, and many scientists believe that we are only a few decades away from achieving it.

Nanotechnology is a hybrid science combining engineering and chemistry. Atoms and molecules stick together because they have complementary shapes that lock together, or charges that attract. Just like with magnets, a positively charged atom will stick to a negatively charged atom. As millions of these atoms are pieced together by nanomachines, a specific product will begin to take shape. The goal of nanotechnology is to manipulate atoms individually and place them in a pattern to produce a desired structure. There are three steps to achieving nanotechnology-produced goods:

Scientists must be able to **manipulate individual atoms**. This means that they will have to develop a

technique to grab single atoms and move them to desired positions. In 1990, IBM researchers showed that it is possible to manipulate single atoms. They positioned 35 xenon atoms on the surface of a nickel crystal, using an **atomic force microscopy** instrument. These positioned atoms spelled out the letters "IBM."



Nanogears no more than a nanometer wide could be used to construct a matter compiler, which could be fed raw material to arrange atoms and build a macro-scale structure.

The next step will be to develop nanoscopic machines, called **assemblers**, that can be programmed to manipulate atoms and molecules at will. It would take thousands of years for a single assembler to produce any kind of material one atom at a time. Trillions of assemblers will be needed to develop products in a viable time frame.

In order to create enough assemblers to build consumer goods, some nanomachines, called **replicators**, will be programmed to build more assemblers.

There is a downside though manufacturing would cease to exist, and the world's economy could fail, or it would bring in a truly egalitarian society where everyone could have what they needed, at little or no cost. Something to think about perhaps.

Consider now the applications in the (far) future, you carry your lunchbox, open it and inside is nothing, but say 'Chicken roll' and before your eyes a chicken roll appears as if from nowhere. Now you can't have a roll without something to drink, a nice chocolate milk would go down well, but it's cold outside so I'll have mine hot with marshmallows.

Links

Issue related

Grey Goo:
<http://www.xs4all.nl/~mke/graygoo.htm>

It's a small, small, small world:
<http://www.actionbioscience.org/newfrontiers/merkle.html>

The usual stuff

How Stuff Works:
<http://www.howstuffworks.com>

Brainpop:
<http://www.howstuffworks.com>

Top 10 things that would happen if the BORG assimilated a nanite culture.

1. Borg ships the size of softballs.
2. Borg ships with the power output of a 30W light bulb.
3. Borg assimilation of tricorders and hand phasers becomes a real annoyance for Starfleet.
4. Borg gets massacred by Packleds.
5. Ferengi discover that a trashcan with a Borg cube in the bottom never has to be emptied.
6. Borg endangered by felines playing with their cubes.
7. The Borg scout cubes are found to be the advance over the Swiss Army knife that the Boy Scout knife wasn't.
8. Borg cubes make a great substitute for bricks.
9. Borg space heaters.
10. Borg Hockey!

Upcoming in future issues

- I finally will have a co-editor, assuming all goes well there will be two names and/or pictures at the header of future editions.
- What would you like to know about? Any science-based question can be answered here. I'll get the best and answer them here – or maybe over there.

So you think you can crack a language?

If only you had a rosetta stone

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Things Nanotech might used for in the future

1. Landfill, any unwanted refuse could be recombined into something useful
2. Curing diseases
3. Instant lunches, complete with hot chocolate and marshmallows
4. Replacing the Ozone in the Ozone layer
5. In home recycling centre
6. Making items as needed
7. Abolish world hunger
8. Keeping up with the joneses, who then have to keep up with you, you then have to keep up with them again ...
9. If a cd burning session fails you can recycle the old one into a fresh one and you can try again.
10. Get the above language puzzle put it in on of these → . ← to make it really challenging.

Upcoming events nationally

Science Week 2004 - 14th -- 22nd August 2004
Youth ANZAAS 2004 – Date and location soon

Feedback

What would you do with Nanotech? Send in your ideas to pjt2@ihug.com.au and I'll add the best to the next issue of ANTENNA. Be creative, think outside the square so to speak, the wilder the idea the more likely it will be published.

Till next time take care and don't let the nanobots bite.