Interview questions

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Ethan Allen

1. What are some developments using nanotechnology in the medical and healthcare field?

Two big categories – diagnostic (ability to detect diseases, changes) by scaling down circuits and machines, they can take a single drop of blood and do multiple analyses on it with a “chip” the size of a credit card, in a few seconds. For example, analyze for viruses, bacteria, chemical compositions. Currently, we need to send drops of blood for 2 weeks to a lab to analyze them. Particularly useful in 3rd world countries, without transportation to labs thousands and thousands of miles away. Current, coming out already.

Therapeutic- treating of diseases. Because nanomaterials have different properties, you can target specific kinds of treatment to go to specific places in body, or bind to specific cells. Now, able to control nanostructures (to some extent), so nanoparticles can have multiple commands. Specifically targeted medicine and treatment of diseases.

Material science- building different kinds of materials. Building biologically compatable implants, like to hold bones together. Before, only able to use titanium, which the bones don’t bond too and don’t react well too. Now, after coating titanium with nanocoating, body reacts differently to titanium, adhering to it.

Carbon nanotubes- lighter, stronger materials. Incorporated into boeing (airliners), tennis rackets,

[website that lists nano products. I THINK I FOUND THAT WEBSITE!! :DDD]

Top down manufacturing- cutting things down from a big chunk of materials.

1. How are nanomaterials made?

Bottom-up- building up from molecules and atoms, grow.

Nature has been doing “nanotechnology” for ions and ions, every living thing is made up of nanotechnology basically

Bottom up- all living things are composed of interlocked systems of nanostructures, made by self assembly, building on eachother from eggs. Dividing cells into cell tissues, finally, the entire body.

Nature has been doing this nanotechnology for ions and ions, way ahead of us. Every living thing on this planet is basically nanoderived

Top-down-

1. What is your job at the Center of Nanotechnology at UW? What exactly does the center do?

Education programs- working with pacific science center, helping grad students teach middle/high school students, give talks, lectures, work with hs teachers, work with nanotech grad program

Center- primarily brings together researchers of nanotech from a huge variety of departments at UW (14) ~300 grad students are brought together by the center and nanotech student association, nanotech user facility: specialized high end equipment, labs, spiffy microscopes, available to lots of people, expensive, so better for people. Help research, education programs.

1. In your email, you mentioned some issues related to nanotechnology, what are they?

Unknowns- don’t know what happens to some of nanostructures/nanomaterials when they are released into environment, ‘what do they do?’ worrisome.

What happens to carbon nanotubes when they are released into environemtn? Do Animals eat? We drink into water? Do we breathe them? They resemble asbestos fibers. Are they harmful-like asbestos?

Lots of work need to be done.

Properties of nano change, depending on specific atoms/molecules that make it up and how they are attached. Electrical,mechanical, because of specific atoms/molecules, electrical, mechanical,

Like sunscreen- used to be white, by taking sunscreen smaller30 nanometers can turn it into clear, do nanopieces of titanium dioxide go into skin cells? Circulate into blood? Harmful?

Evidence that it can get through membranes.

1. What do you think about regulating nanotechnology?

Need to be watched more, more research to determine where potential danger lies, what the dangers are, hazards should be properly regulated.

If nanotubes are really unhealthy to breathe, we should make sure everyone takes the right precautions.

Yes, needs further regulation, but whether that’s done by the people doing nanotech or a regulating agency, I’m not sure.

1. How will nanotechnology change our world in the future? [potential cures, developments?] How far into the future do you think this will happen?

When cellphones first came out, they were really big, chunky heavy things that only call certain phone numbers; similar to the development of cellphones will the development of nanotech be.

20 years from now, capabilities. More and more powerful machines,

Like “smart buildings” that adjust automatically to people, temp, etc. saving energy. Coatings on windows that react to sunlight. Alert engineers if emergency, like structural failures, a building that knows this by itself.

Theory-possibly impractical, fridge that will know what is in itself, and will remind you what you need to buy, like more milk when it’s almost out.

Manufacturing processes will alter by growing own materials and scaling down, different industries, growing materials instead of breaking things down.

Cancer patients- gene expression to find out which drugs most affective. It’s not only this kind of cancer, this kind of drug. It’s also, this kind of gene, this kind of drug. Genetic composition matters when choosing drugs. Personalized medicine.