The future of nanotechnology is now

M. Simon

I count several popular science fiction writers as friends. I share a political/whimsey blog [1] with one of them, Sarah Hoyt [2]. I was visiting Sarah's personal blog [3], and the question of the future of nanotechnology — given the upcoming fiscal cliff — came up in the comments. Sarah was of the opinion that the technology would be delayed indefinitely. I was of the opinion that it would merely be slowed down because the cost-benefit ratio was so high and that in fact elements of nanotechnology were being adopted already. Sarah asked me to write it up, and so here I go.

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The State of North Carolina touts its efforts to to promote nanotechnology [4]. They list near-term (1 to 5 years) and long-term (20+ years) prospects. Let's just look at the near-term for a while:

Longer-lasting rechargeable batteries [5]. The work was supported by the Lockheed Martin Advanced Nanotechnology Center of Excellence at Rice
Improved chemical & biological sensors [6]. The work was supported by Purdue and the Purdue Research Foundation
Point-of-care medical diagnostic devices [7]. The work was supported by the Laboratory of Physical Biology, Shanghai Institute of Applied Physics, Chinese Academy of Sciences, Shanghai, China.

If you click on the links, you will find research that is being done in each area (not necessarily in North Carolina). The links are indicative but not exhaustive. There is much more going on than I would have time to look up or space to list. Even on a blog.

Well that is a general look. I have been a big Buckminster Fuller fan [8] for a long time. I lived in his Carbondale Dome [9] for two weeks as a guest of the owner — unfortunately, several years after Bucky had moved on. But when I was wooing the first mate, I did have the opportunity to take her there to impress her. It must have done the trick. We are still together 38 years later. Side note: There is a foundation

trying to save Fuller's only dome home [10], the dome in Carbondale I lived in. You might want to pitch in if you can.

So let's look at Bucky Balls. This article explains how they form in nature [11]. It only hints at possible applications by noting that the researchers used buckyballs that enclosed heavy meal atoms.

Discover Design [12] has some very nice graphics and discusses the potential uses for buckyballs found so far. One of them is lubrication. But I couldn't find any buckyball lubricants for sale. Yet. What I did find was a Buckyball toy [13]. Here is something with potential: crushed buckyballs dent diamonds [14]. A bucky ball with a trapped water molecule can be used to isolate the water molecule for study [15]. The people doing the study say that a dipole (the water molecule) trapped inside a buckyball may have electronic applications.

A close relative of the buckyball is the carbon nanotube. I have written a fair amount about research in that domain. My last look at the subject was: They are bringing back tubes [16].

One thing holding back the use of nanotubes is that they are relatively expensive to make. Not a significant problem for computer chips, but if you want wires five times more conductive than copper, you are going to need kilograms and megatons of the material. Researchers at Rice University [17] believe they have an answer to that problem. A Professor of Chemistry [18] at Northwestern University (just North of Chicago) believes he has a better answer. He has started a company, Nanointegris [19], to explore the possibilities. Right now, they are focusing on carbon nanotube inks. They have also branched out into graphene. That has great potential for replacing the conductive indium tin oxide coating on touch screens. Indium is kind of rare, so this development has great possibilities. And they have actual products for sale.

Well Sarah (and commenter), I hope that has answered your question about the near future of nanotechnology. I think we are in a short pause between Kondratieff Waves [20]. In my opinion, the time between waves is getting shorter, so we will not have too long to wait before the next wave takes off. My estimation is that we will see macro economic results in five to ten years. An eternity if the present economic cycle is causing you a lot of suffering but in historical terms a fraction of an eye blink.

M. Simon's e-mail can be found on the sidebar at Space-Time Productions [21].

Engineering is the art of making what you want from what you can get at a profit.

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[15] http://www.theepochtimes.com/n2/science/buckyball-used-as-nano-lab-to-study-water-molecule-282477.html
[16] http://www.ecnmag.com/blogs/2012/11/they-are-bringing-back-tubes
[17] http://www.technologyreview.com/news/424762/pure-nanotubes-by-the-kilo/
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[20] http://powerandcontrol.blogspot.com/2008/12/secular-decline.html
[21] http://spacetimepro.blogspot.com/