



Matthew Murphy, Nanosys, Vice President of Intellectual Property

[5-03-04 Jesse Londin]

Is high tech going small tech? As nanotechnology positions itself to make potentially huge waves in the business and legal worlds, this week's intrepid scientist-turned-nano IP lawyer at cutting-edge Nanosys earns a big Law Star for his work in a not-so-little industry that may just change everything.

Nanotechnology. Things that are incredibly tiny are making big news in high technology. More than a few tech experts predict that materials 1/100,000th the width of a human hair may make up the stuff of the next sizable stock market boom, or at least, bubble. And 21st century tech lawyers prepare to cover new ground as some miniscule stuff we can't see generates excitement that is impossible to miss.

What is the big deal about things that are just a few nanometers in size? We asked this week's Law Star, **Matthew Murphy**, the technology lawyer and science guy who is Vice President of Intellectual Property at Nanosys, the nimble, super-smart Silicon Valley company forging ahead in what may shape up to be a sizable revolution in a world of things that are smaller than most of us can imagine.

Of course, we were not surprised when, in the midst of interviewing this week's Law Star, Nanosys filed for its anticipated IPO. Thus, our Law Star says he endorses nothing we say that resembles "hype" about his company. But industry watchers are entitled to their own opinion about nanoscience and the birth of the small tech revolution.

In fact, top investment houses like Merrill Lynch and Credit Suisse First Boston began covering the nanotech sector in 2003. Big companies like IBM, Intel, GE, Hewlett-Packard and DuPont are investing in this new-fangled arena. And in a vote of confidence and thumbs up for nanoscience researchers and nano start-ups, President Bush enthusiastically signed into law the

\$3.7 billion 21st Century Nanotechnology Research & Development Act. The White House invited Nanosys to represent the industry at the bill signing ceremony.

Is the future arriving? At the nanoscale, molecules exhibit new properties. If scientists working at a billionth of a meter re-jigger building blocks of matter into marketable technologies, the next industrial revolution may be nano indeed. Some nano watchers believe, for example, molecular computers can make silicon chips obsolete, clever nanobots may replace factories, and nanotech breakthroughs may one day transform industries from health care to electronics to energy and beyond.

Our Law Star keeps his head about the fantastic prospects. Mr. Murphy applies his science training and background to the challenges of patent and new millennium intellectual property law. Before joining Nanosys, he honed his IP skills as Vice President of Intellectual Property for Caliper Technologies where he worked, among other things, on microfluidics patents.

For his private law firm experience, Mr. Murphy worked as an associate in the chemical/biotechnology group at Townsend and Townsend and Crew, LLP, where his clients included companies in the biotech and pharmaceutical industries.

Mr. Murphy holds a B.S. in microbiology from the University of California, Davis, and a J.D. from the University of San Francisco. And as we took a little peek into the forward

thinking world of our first nano-ized Law Star, a 21st century lawyer ahead of his time in large and small ways, he warned: No hype, no sci-fi, no market predications. We will have to make up our own minds about the big ideas behind small tech.

Q: Mr. Murphy, we are elated to award you this week's coveted Law Star for your work in the blazing new field of nanotech and as the V.P. of Intellectual Property at Nanosys.

We have heard a lot about Nanosys - the privately held, pioneering nanotech company which has earned more than 200 patents and patent applications as well as much media attention. For tech lawyers, mere mortal lawyers, and would-be nanotech buffs everywhere, can you give us a little background on your cool company, including its core technologies, partners, and plans for the future?

A: As Nanosys has just recently filed its registration statement with the SEC on Form S-1, I am not able to comment about the company. However, I think a lot of this information can be obtained from the S-1, which is publicly available on the SEC's Edgar database.

Q: What does a V.P. of intellectual property do, and, in a nutshell, what are the major IP issues in nanotech as this field emerges? How large is the law group at Nanosys and going forward, how much legal work will you handle in-house versus hand off to outside firms?



A: As V.P. of intellectual property, I am charged with developing and implementing an IP strategy for the company, which includes, among other things, procuring intellectual property, perfecting our rights to that intellectual property, and if and when necessary, enforcing those rights. More specifically, my focus is on the preparation and prosecution of patents and patent applications for the company's inventions, advising on the prosecution of our licensed portfolio, evaluating and potentially licensing additional technologies from outside parties, all in the context of overarching business objectives. Of course, in a company the size of Nanosys, with a proportionately sized legal group, my responsibilities can range a great deal, e.g., from corporate securities issues to collaborative agreements to government compliance. That being said, we currently do not possess the legal bandwidth to internally handle all of the legal issues facing a small high-technology company, and therefore rely upon a collection of experienced attorneys from a number of different firms.

In terms of IP issues specifically affecting nanotechnology, I know that a number of practitioners are traveling the conference circuit with presentations that, at least from their titles, appear to claim some differential treatment of nanotechnology inventions. However, in my view, there is nothing in nanotechnology inventions that would warrant any special legal consideration different from that which is afforded any other field reflected by those inventions, e.g., chemistry, physics, materials science, etc. Practically speaking, though, increases in the number of nanotechnology inventions passing through the U.S. Patent and Trademark Office (PTO) may require a corresponding adjustment in the Examining Corps, to accommodate a more multidisciplinary technology area. I already have heard some anecdotal evidence that the PTO is working toward this goal.

Q: Some nano industry watchers including Josh Wolfe of Forbes' Nanotech Report warn investors

to "beware of nano pretenders" - companies that add "nano" to their names to sound cool and create market hype but merely add some small modifications and in fact do not operate on a nano scale. Given this current trend in nano-ization - what is your definition of a nanotech company?

A: I believe that the problems highlighted by this warning derive from the many different definitions that have been applied to the term "nanotechnology" in the past. For example, in a broader sense, nanotechnology definitions that speak of "building structures, atom by atom" sound a lot like conventional chemistry. Because they tend to capture a large number of operations that have been going on for years, these definitions allow some companies to adopt what they see as a fresh and potentially lucrative marketing image.

In its narrower sense, there seems to be evolving a relatively standard and accepted definition of "nanotechnology" as the production and application of nanoscale structures that possess some unique properties (other than just being small) because of their dimensions in the nanoscale regime.

While I do not believe that the broader definitions are incorrect, I think it is the more specific definition that people are thinking about when they talk of "nanotechnology" as a new and potentially revolutionary "industry."

Q: Nano seems to be a world of unlimited promise. Already we've learned about products using nanoparticles such as Eddie Bauer stain-repellent Nano-Care™ khakis, or beer bottles and other packaging containing nanocomposites for lighter weight and longer shelf-life. There is even a "Nano Trends Award" for "the most creative innovation within nanotechnology." Can you give

us some examples of current commercial applications of nanotech research?

A: In terms of Nanosys' own product prospects, again, I would direct people to examine our public statements in our Form S-1 for a discussion of potential product opportunities we are pursuing. In terms of other opportunities, I think the widely diverging examples of nanotechnology related products, e.g., biological labels, sunscreen filters, dry adhesives, electronics, optoelectronics, etc. are indicative of the potential broad range of applicability of nanotechnology.

Q: Folks like George Bourianoff of the strategic research group at Intel have been quoted as saying that in the next twenty years, we will see the emergence of "radical" new nanotechnologies. When do you think the much heralded nano products such as nanobots, molecular-scale machines and molecular assemblers will be ready for the big world of high-volume manufacturing?

A: More likely, I think in the next few years, you will begin to see products that look a great deal like products that are currently on the market, but which incorporate one or more nanotechnology components. Most likely, these products will only differ from the more conventional product, in their cost or performance, rather than in their ability to offer some dramatically different function. I think the notion of nanobots and molecular machines will, at least for any foreseeable future be relegated to science fiction.

Q: A recent article on TheStreet.com noted, "Yes, the nanotech bandwagon has proved unstoppable, gaining momentum despite its occasional alarming resemblance to the dot-com bubble that's quickly receding from our collective memory." Is nanotech the next - if you'll excuse the expression - big thing? And applying lessons learned from the dot-com



fiasco, do you see any downside to perhaps entertaining overly large expectations from this new world of the small?

A: I think the question answers itself. Of course, overly large expectations are effectively predestined to be disappointed.

My belief is that the model, if you will, of the dot-com industry is likely to be played out again in the nanotechnology field. Hopefully, it will be to a lesser extent because people should be more skeptical than they apparently were in the mid 90's. What I would expect is that a few companies that truly have a workable business model to sell needed products or services will succeed, while a larger number of companies will come up based purely upon "nano" association, and will quickly fall by the wayside.

If we do see a "hype-bubble" ala the dot com industry, though, I think there is a good chance that we will see the same result; namely that the industry as a whole, good and bad players, will suffer from the backlash.

Q: Many lawyers love science. "Thinking like a lawyer," as we are taught to do in law school, is similar to thinking like a scientist. With your degree in microbiology, what made you decide to go into law? Which do you think is more rewarding and fun: practicing as a lawyer in a cutting-edge science, or actually working in research science itself, and why?

A: My first job out of college was as a biochemist working at the bench of a mid-sized biotechnology company in the Bay Area. While it was a pretty good job, it did not take me long to realize that I lacked the disposition and attention span to be a very good scientist. I also came to realize that any advancement in the industry likely required me to return to graduate school

to get a Ph.D. While I was pondering my potential future in science, and probably within two or three days of each other, I had three separate people mention to me that I should consider looking into a career in patent law. This struck me as a relatively interesting career, and had the added benefit of requiring only three years of additional school, as opposed to four or more years of grad school followed by additional post-doc years...again, the short attention span gets in the way. As it turns out, as a career it was a pretty good fit for my personality. As a patent lawyer, I was given the opportunity to dabble in a wide variety of different technologies, while not spending all of my time on any one of them. For a wannabe technology geek with a short attention span, it was just about perfect.

Q: Every technological revolution appears to carry a myriad of unintended consequences. In Michael Crichton's latest thriller, Prey, a nanotech experiment goes awry as self-reproducing, intelligent and deadly microrobots escape from the laboratory and turn on humans. Of course, the idea of a future filled with killer nanobots is pure sci-fi and absurd. Or is it? How safe is nanotechnology and what unexpected blowback do you imagine, if any?

A: I think for anyone to claim that a particular technology is absolutely risk-free would demonstrate arrogance beyond belief. At the same time, I think the notion of killer nanobots is, again, pure science fiction. Of course, any new industry, if it is to be prepared to move forward, must be prepared to deal with any questions about safety, whether those questions are based upon real risks or science fiction. Failure to do this could result in public backlash, and in some cases, unwarranted government regulation based largely on imagined risks. We have already seen the results of public opinion on government regulations in a number of industries,

such as the restrictions on importation of genetically modified foods in European and Asian countries, and in past government statements relating to the patenting of genetic material.

Q: President Bush has enthusiastically signed the 21st Century Nanotechnology Research and Development Act, committing billions to new nanoscience. Selected to represent the whole industry at the bill signing, Nanosys must have been doubly thrilled. What are the implications of federal dollars pouring into nanotechnology research? Is the government stepping in because private investors have yet to be convinced their funding will yield any return in the near term? What will the federal money do?

A: Government funding provides valuable opportunities to advance any technology that may require a longer development timeline. The funding generally allows technology to develop without forcing it into someone's idea of the appropriate commercialization timeline. Of course, there is no such thing as a free lunch, and government funding does come with its own set of requirements, which can impact all aspects of a company, including intellectual property, finance, facilities, manufacturing and human resources, all of which require some measure of legal involvement.

Q: What advice would you share with law students and young practitioners who are excited by nanotech and interested in pursuing work with nanotech clients either in-house or at a law firm? Is it necessary to have a B.S. in science? How much of an interest or background in patent law would you recommend?

A: I think to increase your chances of getting into nanotechnology from the legal side, you should focus on getting into practice areas



that are most in demand in the field, such as patent law, and technology transactions, and probably plan to locate in those areas that are more focused on nanotechnology, such as the Boston area and Silicon Valley. The transactional opportunities probably provide an easier avenue as they are less likely to require an advanced degree in a relevant technology arena, e.g., chemistry, physics, materials science, etc. I don't believe that patent law experience is a requirement of being a "nanotechnology" lawyer, but as with any rapidly developing, high-technology field, a keen understanding

of intellectual property principles and how those are exploited in business probably is a requirement.

Q: Lastly, who are your personal Law Stars and gurus?

A: If I had to cite the people who most influenced my legal path, first it would have to be Peg Horn, who is one of the top attorneys at Genencor International, Inc. Peg gave me my first opportunity in the patent field as a 1L, and provided the training that allowed me to land my first

"big firm" job. The second person would be Vern Norviel who currently leads the patent group at Wilson, Sonsini, Goodrich and Rosati. I worked a great deal with Vern both while he was a partner at Townsend and Townsend and Crew, and while he was General Counsel at Affymetrix, Inc. He gave me opportunities to prove myself early on, and at the same time, taught me that a patent lawyer needs to be a business lawyer and not merely a highly paid technical writer. I think that is something that is missed by a lot of the members of the patent bar.