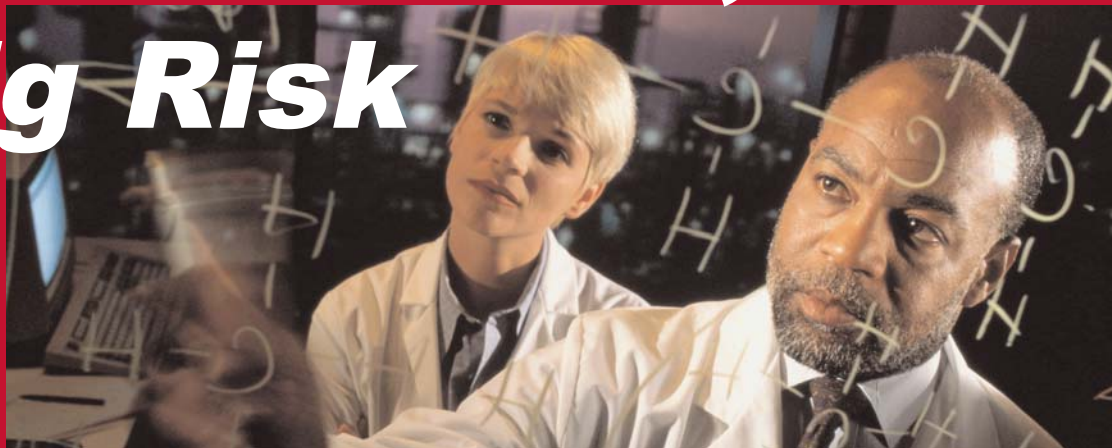


Small Science, Big Risk

*Lessons from the
past for protecting
nanotechnology*

By Chid S. Iyer



Nanotechnology is the science of the small, but its significance in the world of high technology is potentially huge. With all the attention being paid to this rapidly growing field, it is no surprise that it is accompanied by an increased interest in obtaining patent protection.

In the not-too-distant past, a similar phenomenon occurred in the area of business-method patents. Initial euphoria led to an increase in filings, and then to an increase in the number of issued patents whose quality and validity were called into question. The patent office and patent practitioners responded by adopting measures that largely eviscerated the grounds for criticism.

What lessons from the business-methods experience can patent practitioners apply to the emerging field of nanotechnology patents? How can we avoid similar pitfalls?

An Emerging Market

The National Science Foundation predicts a \$1 trillion market for nanotech-

nology by the year 2015, making it a potential technology boom even larger than the information boom of the 1990s.

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For businesses, obtaining patent rights early could be crucial. However, for

practitioners – patent practitioners who prepare patent applications, corporate IP personnel who manage patent portfolios, and the patent officials who examine and issue patents – it is imperative that they apply the lessons learned from the business-methods experience. The last decade saw a surge in BM patents. After the famous State Street decision, there was a rush to file applications. But as the patent office began to issue a large number of BM patents, there followed substantial criticism of their quality. Largely as a result of this criticism, the patent community introduced changes that offer lessons in avoiding similar problems with nanotechnology patents.

The National Nanotechnology Initiative defines nanotechnology as involving research and development at the atomic, molecular or macromolecular levels – the 1 to 100 nanometer range. The technology must have novel properties and functions because of its small size, and there must be an ability to control or manipulate it on the atomic scale.

While the definition of nanotechnology is at best arbitrary, industry is clearly beginning to see its use. Nanomaterials are used in materials applications, pharmaceutical applications, electronics, and elsewhere. Nanotechnology has resulted in significant revenues in areas such as recording tapes, chemical-mechanical polishing, sunscreens, automotive catalysis, microarray chips, conductive coatings and fibers.

The future of nanotechnology is difficult to forecast. Inventions could simply be amalgamated into existing product lines and never see light as distinct “nanotech” products. And converting nanoscience research into usable products may be fraught with engineering challenges making it costly to pursue. Government funding may lessen the risk. More than 40 countries are reported to have set up initiatives in nanotechnology. In the U.S., government interest peaked with passage of the National Nanotechnology Initiative of 2000. The law appropriated \$3.7 billion over four years for funding for various federal nanotechnology initiatives, including creation of the National Nanotechnology Coordination Office. The European Union has earmarked \$1 billion through 2006, while Japan increased funding from \$120 million in 1997 to nearly \$750 million in 2002.

It is clear that this activity will lead to a boom in patenting akin to the surge in business-methods patenting. But there are problems related to nanotechnology patenting, and lessons to be learned from the BM experience.

USPTO Classification

Nanotechnology is a confluence of scientific and engineering disciplines, combining chemistry, physics, biotechnology, electronics, engineering and other fields. This creates problems for the patent office in initially classifying applications. A key purpose of classifi-

cation is to assign an examiner who is knowledgeable in a specific field. Classifying a nanotechnology application into a class and sub-class is an unenviable task.

To assist in classification, the patent office extracts keywords. In the case of nanotechnology, this could be challenging because of its broad definition. An inventor may describe his invention as nanotechnology, hoping to jump on

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the nanotech bandwagon, when the invention may not strictly belong to the field. Other inventors may omit the term, instead describing their contributions as “quantum dots,” or “MEMS.”

The patent office faced similar problems with BM inventions, which likewise frequently cross disciplines. They often involve the software/business aspect of the invention as well as intri-

cacies of the domain field to which the business method is applicable.

For BM patents, the patent office created a new class 705 devoted to “apparatus and corresponding methods for performing data processing operations, in which there is a significant change in the data or for performing calculation operations wherein the apparatus or method is uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data.”

BM applications are assigned to this group. Examiners in this group acquire expertise in the field of BM enabling them to conduct a thorough examination.

The Japanese Patent Office recently introduced new classes for nanotechnology applications. The USPTO should follow suit and create new classes and subclasses for classification of nanotechnology applications. One approach would be to create a new class for nanotechnology, with subclasses for quantum dots, MEMS, etc. A better approach might be to create classes for each of the major sub-areas in nanotechnology, such as nanomaterials, nanoelectronics and nanobiotechnology, each containing further sub-classes. Having classes dedicated to nanotechnology would also mean that, over time, personnel in the group would build up expertise in the field and enhance institutional knowledge.

Two-tier Examinations

A major criticism of BM patents was that they were poorly examined. The patent office took the criticism seriously and implemented corrective measures. In part, the problem was alleviated as examiners acquired institutional expertise in the area. Additionally, the patent office started using a two-tier system of examination for some BM

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applications. After an examiner prepared an Office Action, some would be reviewed by a set of senior examiners, particularly in cases related to whether the subject matter was patentable.

The patent office should consider a similar two-tier review for nanotechnology applications. After the examination, the Office Action should be sent to a group of senior examiners for review. While the examiner in charge of the application may be specialized in one area, it is likely that the reviewing group will include examiners trained in other disciplines.

Examination of nanotechnology applications by untrained examiners can lead to improper rejection simply because the examiner does not understand the technology. This shifts the burden to the

applicant to educate the examiner and get a reasonable set of claims allowed. On the other hand, overbroad claims could also issue if the examiners do not understand the nuances of the technology. Overly broad patents may improperly exclude competitors from entering the market. This could cause inventors to lose faith in the overall patent system.

Practitioners can attempt to educate the PTO on nanoscience by opting for personal interviews during patent prosecution. They should participate in various customer partnership meetings held at the PTO. Additionally, PTO officials should be invited to present at major small tech conferences and seminars. Further, patent applicants should employ language in patent applications whose meaning is well recognized in the technology.

Searching Prior Art

Another concern with nanotechnology is that the process of searching for prior art is complicated. By definition, nanotechnology covers a broad class of materials and systems. The fact that the classification systems are neither sufficiently defined nor descriptive enough to account for the unique features of nanotechnology further complicate the searching process. An invention based on a general idea may lead to several patent applications covering many products or markets.

While the domain of prior art is the sum total of publications by the scientific community, an overwhelming percentage of cited prior art consists of issued U.S. patents or published U.S. applications. This is of concern because pub-

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lished applications and patents that are nanotechnological in nature may not use any specific nano-related terminology. It poses a significant challenge to find truly nanotechnology related patents using a judicious set of key words and class codes.

BM patents presented similar challenges. Because of nonavailability of U.S. patent prior art, the patent office turned to other sources. One that they relied on heavily was the Internet. With the backlash from the issuance of weak patents, the patent community undertook efforts to obtain prior art. In one instance, a patent attorney started a Web site, BountyQuest.com, offering rewards for information leading to invalidation of patents. Other similar sites soon appeared. This enabled the public to present the PTO with prior art,

and it created a disincentive to apply for obvious BM patents.

For much the same reasons, it is imperative that the patent office build a database of patent prior art as well as publications from various journals related to nanotechnology. Practitioners and corporate attorneys can assist in the process by submitting related publications to the patent office in the form of invention disclosure statements. The patent office should make it a regular practice to add the submitted publications to their database. This will allow the patent office to collect a sizeable number of prior art references within a relatively short time frame.

Patents can be effective tools for fostering innovation. In the case of BM patents, initial euphoria led to the

issuance of a large number of invalid patents that could instead have stymied innovation. Thanks to corrective measures adopted by the PTO and the patent community, BM patents today are no longer subject to criticism.

Nanotechnology practitioners need to pay attention to the lessons offered by the BM experience and cooperate in creating a patent regime that fulfills its intended purpose of fostering innovation. ■

Chid S. Iyer is an associate in the Washington, D.C., office of Sughrue Mion PLLC

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