



Patenting nanominerals

A sponge used for filtration made from nanomaterials. Courtesy Stratum Resources.

Increasing development in nanominerals, explains *Yury Colton* of Stoel Rives LLP, has prompted serious consideration in creating efficient intellectual property strategies designed to realise the maximum commercial benefit for inventors and investors alike

NANOTECHNOLOGY IS THE application of science and technology at the nanoscale, from 1 to 100 nanometres. The USA's Nanotechnology Research and Development Act of 2003 authorised \$3,700m. in US federal funding from 2005 through 2008 for the support of nanotechnology research and development.

The influx of federal funding has quickened the pace of nanotechnology development in areas as diverse as cosmetics, materials science, mechanical engineering, pharmaceuticals, and petrochemicals. Developments in nanotechnology also include novel methods and uses of nanoscale industrial minerals, or nanominerals, in a number of new applications.

Nanominerals are important because they are exceptionally strong and ductile and resist wear, erosion, and corrosion. Furthermore, nanominerals outperform their conventional counterparts because of their superior chemical, physical, and mechanical properties.

Specific applications of nanominerals include the use of nanoscale bentonite as a filler in plastics to make them lighter, stronger, and more resilient to heat. Nanoscale talc may be added into a variety of coating formulations, including acrylic, polyurethane, epoxy, and polyester to provide increased wear resistance, impact resistance, and

corrosion resistance. Similarly, the higher surface area and smaller particle size of nanoscale calcium carbonate improve paints, pigments, and polymers.

As nanomineral research and development continues, it will become increasingly important to develop efficient intellectual property strategies designed to realise the maximum commercial benefit for both inventors and investors.

The scope of this article focuses on US federal law, although the principles discussed may be applicable in other jurisdictions.

Nanotechnology patents

Nanotechnology intellectual property includes patents and trade secrets. Contrary to a common public misconception, a patent is not a right to practice or use an invention. Rather, a patent grants the right to exclude others from making, using, selling, offering for sale, or importing the patented invention for the term of the patent.

A patent is, in effect, a limited monopoly that the government offers to inventors in exchange for their agreement to share the details of their inventions with the public.

Like any other property right, a patent may be sold,

licensed, mortgaged, assigned or transferred, given away, or simply abandoned. Although there are differences among the various patent systems used around the world, generally a patent may be granted for a device, method, process, or composition of matter that is new, inventive, and useful or industrially applicable.

Applicants filing for nanotechnology patent protection will need to address a number of potential challenges during the prosecution of the patent application. For example, patent claims reciting a nanoscale device or material that has already been developed in macroscale will often be rejected as being anticipated by the larger-scaled prior art. Submitting a smaller version of a known structure would not be considered patentable without additional utility or novelty.

More particularly, the US Court of Appeals for the Federal Circuit held that when the only difference between the prior art and the newly submitted claims is a recitation of relative dimensions of the claimed device, and a device having the claimed relative dimensions would not perform differently than the prior-art device, the claimed device is not patentably distinct from the prior-art device. *Gardner v. TEC Sys., Inc.*, 725 F.2d 1338, 1345-46 (Fed. Cir. 1984).

However, size-based patentability may exist if there is at least one clear functional difference between the physical properties of the nanoscale device and the prior-art. As such, it is necessary when drafting a nanotechnology patent application to include in the description a discussion of how the invention's smaller size may include novel properties that can provide solutions to new problems, thereby achieving significantly different results than its macroscale counterpart.

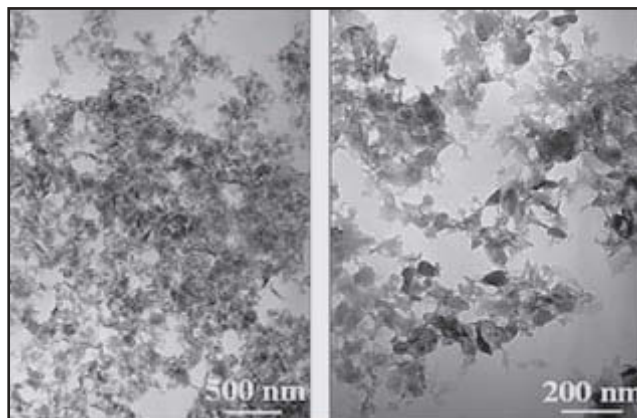
In addition to size-based anticipation, patent examiners may determine that the prior art inherently anticipates the applicant's invention. A prior-art reference may inherently anticipate a claimed invention even if every element of the invention is not expressly disclosed.

To establish inherency, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teaching of the applied art." *Ex parte Levy*, 17 U.S.P.Q.2d (BNA) 1461, 1464 (B.P.A.I. 1990).

For example, if a prior-art reference did not mention the exact size of silica particles used as an additive in a paint formulation, a patent examiner might consider the reference to have inherently described nanoscale silica particles.

As such, it will be imperative that nanotechnology patent applicants and their patent attorneys explain in their patent applications that the novelty of the invention is not based merely on a reduced scale or what may be inherent characteristics of known materials and methods. The patent application should discuss how and why the nanotechnology composition or device has different functionality or gives a different result than the macroscale prior art.

Another complication may be that a nanotechnology invention may be obvious in view of the prior art. For example, despite the different size, functionality, and composition of a nanotechnology invention, the examiner may reject the claims because the differences are obvious. Similar to a size-based anticipation rejection, it is likely



Nanosize grades of talc. Courtesy Stratum Resources.

that an examiner would find it obvious to just change the size relative to an already disclosed macroscale device or composition.

However, if the prior art does not enable one of skill in the art to make a nanoscale version of an existing product or composition, the nanoscale invention should not be obvious even if the only difference is one of scale. *In re Hoeksema*, 158 U.S.P.Q. (BNA) 596 (C.C.P.A. 1968).

For example, in regard to a nanomineral invention, a prior-art reference must provide an enabling disclosure of how to make a claimed nanomineral or nanomineral composite in order for the claimed nanomineral or nanomineral composite to be obvious.

Similarly, a claimed nanomineral may be found nonobvious based on size alone if the prior art at the time of the application did not enable one of skill in the art to make the claimed nanomineral on a nanoscale.

Broad nanotechnology claims also could be rejected because of an alleged lack of enablement. A patent application must include a written description that is detailed and sufficient enough to enable a person skilled in the art to make and use the claimed invention without undue effort and experimentation.

The best way to satisfy this requirement is to provide experimental evidence and a detailed description for each of the claim elements. If an examiner believes the scope of the claims is too broad relative to the description in the patent specification, a rejection may be issued.

Many of the first nanotechnology patents were issued with relatively broad patent claims. However, as was the case with biotechnology patents, the scope of these broad nanotechnology patent claims may be challenged because of a lack of support in the patent specification. Therefore, it is very important to seek nanotechnology patent claims — whether they be broad or narrow in scope — that are clearly supported by the patent disclosure.

Despite the challenges that may be faced while patenting nanotechnology, a creative patent strategy should provide valuable patent protection. Depending on the invention, claims directed toward methods of manufacture or methods of use should be included in a patent application.

For example, methods of manufacturing a composite comprising a nanomineral and/or methods of using a

nanomineral can be used. Similarly, claims can be directed toward composites and plastics produced by a particular method of manufacture comprising the use of nanominerals. The patent strategy might also include claims reciting nanoscale materials used to make a desired product, such as composites or plastics.

Patenting nanotechnology may also be complicated by its multidisciplinary nature, which incorporates fields such as material science, biology, physics, chemistry, electronics, engineering, and computer science. As such, preparing a comprehensive patent application can require expertise across diverse disciplines.

Moreover, because of the breadth of nanotechnology and the legal hurdles of nanotechnology patent prosecution, the quality and value of an issued patent will at least partly depend on employing qualified patent counsel who understand a broad range of technologies and are very familiar with the peculiarities of nanotechnology patents.

Classification of nanotechnology patents

In October 2004, the US Patent and Trademark Office (USPTO) announced that it had created a new classification for nanotechnology patents — Class 977 — that would serve as a cross-reference to help examiners, among others, search prior art.

Before Class 977 existed, examiners relied on keyword searches to find relevant information and related patents. However, many nanotechnology patents do not use nano-related language and may often be overlooked during a prior-art search. Therefore, inventors and examiners may overlook prior art that is relevant to the patent application. The development of Class 977 should help decrease that risk.

As used in Class 977, the term “nanostructure” is defined to mean an atomic, molecular, or macromolecular structure that (a) has at least one physical dimension of approximately 1 to 100 nanometers, and (b) possesses a special property, provides a special function, or produces a special effect that is uniquely attributable to the structure’s nanoscale physical size. Class 977 provides for disclosures related to

- i. Nanostructure and chemical compositions of nanostructure;
- ii. Devices that include at least one nanostructure;
- iii. Mathematical algorithms, eg., computer software, etc., specifically adapted for modeling configurations or properties of nanostructure;
- iv. Methods or apparatus for making, detecting, analysing, or treating nanostructure; and
- v. Specified particular uses of nanostructure.

Major subclasses of Class 977 include 700 – nanostructure; 839 – mathematical algorithms, eg., computer software, specifically adapted for modeling configurations or properties of nanostructure; 840 – manufacture, treatment, or detection of nanostructure; 902 – specified use of nanostructure; and 963 – miscellaneous.

Despite the creation and development of Class 977, the USPTO still has not created a nanotechnology examination group with trained examiners specifically trained for the unique issues of nanotechnology patent prosecution.

As such, patent applications with claims directed at nanoscale elements may be examined by individuals lacking the knowledge of the prior art necessary for a good examination. Furthermore, it is believed that, because of the breadth of nanotechnology disciplines, untrained and inexperienced patent examiners may grant overly broad claims that may prove difficult to defend in subsequent litigation.

Therefore, as discussed previously, it is critical that nanotechnology patent claims are well described and supported in the patent application.

It should be noted that in the European Patent Office, the Y01N classification for nanotechnology has been available since January 2006. This should facilitate the search for related nanotechnology prior art in the European Patent Office. The Y01N classification includes the following subdivisions:

Y01N2 – Nanobiotechnology.

Y01N4 – Nanotechnology for information processing, storage, and transmission.

Y01N6 – Nanotechnology for materials and surface science.

Y01N8 – Nanotechnology for interacting, sensing, and actuating.


Y01N10 – Nanotechnology for optics.

Y01N12 – Nanomagnetism.

Conclusion

The number of nanotechnology patent applications worldwide will continue to rise as the understanding and development of nanoscale technologies increase. The issues unique to nanotechnology patent prosecution make it important to carefully consider the pursuit and management of intellectual property in order to protect the value of new nanotechnology inventions. Therefore, applicants and patent counsel will need to understand the technology and the law in order to efficiently navigate patent prosecution and ensure the best patent protection.

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