

# Protecting Nanotechnology Intellectual Property (“Nano-IP”) in China

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## ABSTRACT

*The decision for many nanotechnology start-ups to patent or not to patent in China is, in many ways, dependent on the broader question of whether the nanotechnology start-up chooses to rely on patent protection or trade secret to protect its IP more generally. While some have criticized China for its seeming lack of IP protection, particularly after China’s recent invalidation of pharmaceutical patents, the long-term trend suggests that nanotechnology start-ups should seriously consider pursuing patent protection in China when considering the decision to out-source manufacturing and other operations in China. China’s developing IP-protection system is still in its infancy and cannot necessarily be expected to perform as well as some of the more established systems, at least in the short-term. Nonetheless, the trends in China regarding nanotechnology development and IP protections, more generally, suggest that nanotechnology start-ups should not overlook the possibility that Chinese nanotechnology patents will provide meaningful protection. While these issues will be discussed in the context of protecting nano-IP, the discussion is applicable to other areas of technology.*

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## INTRODUCTION

This article needs very little introduction—almost everyone knows of the importance of China’s market and the notoriously difficult process of protecting intellectual property in this country. Therefore, this article dives right into the advice offered by our panel of authors on reasons for and methods of protecting nanotechnology intellectual property in China.

### I. SUMMARY OF REASONS FOR FILING A PATENT APPLICATION IN CHINA

#### 1. Exchange Rate Considerations

The Asian markets represent one the largest and most likely the fastest growing markets for domestic companies. However, the lion’s share of opportunity lies in the markets of China with its year after year of double digit growth in Gross Domestic Product (“GDP”) and consumer income. Further, intrinsically built into China’s system is a fiscal policy which is poised to favor future sellers to Chinese markets. Currently, China has in place an artificial peg on its currency against foreign currencies of ¥8.3 to \$1, to make its good relatively cheap versus foreign goods. However, if left to the free market, China with its in excess of \$1 trillion worth of trade imbalance would have a currency which traded at a higher multiple to the U.S. dollar and other world currencies.

However, the pressure from the U.S. and Europe is building for China to revalue its currency to be more in line with free market exchange rates. However, instead of doing as China continues to export more goods to the rest of the world than it imports, the free market exchange rates will increasingly differ vis-à-vis the pegged rates. Then, at some time in the future, either due to market forces or from pressure abroad, China will have to move its exchange rates to be more in line with market forces. When it does, the number of Yuan to U.S. dollars will increase. As the Yuan rises in comparison with the U.S. dollar, goods made in the U.S., such as nanotechnology products, will become cheaper to consumers in China and thus easier to sell there.

#### 2. Nanotechnology Patenting in China

As the last section demonstrated, there are some general economic concerns involving the exchange rate that factor into a nanotechnology start-up’s decision calculus concerning entrance into the Chinese consumer market. Nanotechnology companies, however, may have even stronger additional reasons to consider patenting in China. Beyond pursuing the Chinese consumer market, nanotechnology companies are already seriously considering moving manufacturing operations in China; and several nanotechnology companies are already pursuing joint development deals to tap the enormous Chinese market. In the last few months alone, nanotechnology companies have shifted at least some nanotechnology manufacturing operations to China. Nanotechnology chip-making companies have begun shifting manufacturing operations to provinces in China.<sup>1</sup> In February 2005, a Silicon Valley flash memory products provider also entered the Chinese nanotechnology market by forming a multi-layered technology licensing and foundry relationship with the Chinese company Nanotech.<sup>2</sup> Certain nanotechnology companies involved in manufacturing automotive and consumer goods parts have out-

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<sup>1</sup> *Nanotech Reported to Open 200-MM Wafer Fab in China Soon*, TAIWAN ECON. NEWS, Dec. 8, 2004, available at LEXIS.

<sup>2</sup> *Silicon Storage Tech Cooperates with Nanotech Corporation*, SINOCAST, Feb. 8, 2005, available at LEXIS; *Intel Transfers CMOS Production Technology to Nanotech*, SINOCAST, June 24, 2004, available at LEXIS; GRACE SEMICONDUCTOR MFG. CORP. *Grace and Synopsys Jointly Develop Reference Design Flow*, Jan. 12, 2005, at [http://www.gsmcthw.com/5-1\\_popup10.htm](http://www.gsmcthw.com/5-1_popup10.htm) (last visited February 22, 2005).

sourced manufacturing operations to China over the past year.<sup>3</sup> Overall, many predict greater nanotechnology-based manufacturing operations to shift to China to take advantage of lower labor costs in coming years. This trend is expected to exist in labor-sensitive industries as varied as textile and apparel manufacturing to steel and furniture.<sup>4</sup> “In terms of China’s targeted area, the emphasis is on mass production of nanomaterials and nanostructures.”<sup>5</sup>

In spite of this vast potential for selling to China’s markets and taking advantage of lower manufacturing costs in China, many high tech companies choose to not sell goods directly there for fear of their entering the hands of those wanting to illegally duplicate them. Many recent reports have outlined the problems of IP protection in China and have argued that many nanotechnology start-ups may choose to either forego the Chinese market completely and/or rely more generally on trade secret protection rather than patent protection.<sup>6</sup> At this juncture, it is probably too early to predict with the utmost certainty whether or not China will enforce patents in a way that is universally or generally favorable to foreign nanotechnology companies doing business in China, at least in the short-term. However, certain factors suggest that nanotechnology companies considering entering the Chinese market would do very well to seriously consider nanotechnology patents in China despite the reservations identified elsewhere. In the next sections, we identify some of the factors that the nanotechnology company should consider when evaluating the likelihood of favorable nanotechnology patent protection in China.

### 3. Reliance on Patent Protection Generally

In many ways, the decision facing most nanotechnology companies considering the Chinese market will be determined by their IP strategy more generally. If a nanotechnology company chooses to rely on patent protection in the U.S. or some other country, then it may make sense to pursue Chinese patent protection as well. The reason is fairly obvious. If the technology for the invention is already publicly available in another country, then it may already be easily obtained and copied by others in China and elsewhere. If an individual or company wishing to reverse engineer a product or copy a process can easily obtain the publicly available patent, it could reproduce the technology in China whether or not a company ever enters the Chinese market. This concern has formed the basis for some opinions that nanotechnology companies may pursue a trade secret protection strategy as a general matter—to prevent broad international copying.<sup>7</sup>

No matter what strategy a company decides to pursue in order to safeguard its IP, the discussion above indicates that many nanotechnologies are shifting manufacturing operations to China and even more are considering it.

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<sup>3</sup> See *NanoMuscle doomed by High Costs*, CONTRA COSTA TIMES, Dec. 10, 2004, available at LEXIS (explaining that NanoMuscle was eventually doomed by the high costs of its inventions, but had expanded manufacturing operations to China before losing investors which caused the company to close down).

<sup>4</sup> *More Americans will Compete Directly with Overseas Workers*, THE KIPLINGER LTR., Dec. 17, 2004, available at LEXIS.

<sup>5</sup> Dana E. Nicolau, *Challenges and Opportunities for Nanotechnology Policies: An Australian Perspective*, 1 NANOTECH. L&B 446 (2004).

<sup>6</sup> See, e.g., Charles Q. Choi, *The Rise of Nanotech Secrets*, U.P.I., Nov. 26, 2004, available at LEXIS (discussing the Lux report that highlighted fears of many nanotechnology companies who are considering trade secret protection as an alternative to patent protection in certain markets such as China and India).

<sup>7</sup> See *id.* The topic of whether trade secret law or patent law provides more protection to nanotechnology companies is beyond the scope of this paper, which is tailored to nanotechnology companies more willing to pursue patent protection in China. It should be noted, however, that the broader debate is alive and well in the nanotechnology world. *Id.*

If a nanotechnology company already takes the position that the Chinese market will be valuable to its operations, due to either lower manufacturing costs or potential joint ventures, then it may still make sense to file for patent protection in China despite recent criticisms. Having a patent on an invention in China gives a legal basis against others in China from making, using or selling the invention. While it is quite likely that companies in China will still produce illegally made goods, having a patent gives a right to block them from making these goods in the first place. Without a patent, these goods could be freely made in the country, which increases the likelihood and potential amount of goods entering the U.S. gray market. This threat is particularly likely for companies that have already filed patents in other countries because potential infringers in China and elsewhere could already access the information.

#### 4. Trends in Chinese Nano-IP Protection

The most compelling reason for filing in China may be due to a benefit, which has yet to come to fruition. This is the heightened IP protection, which China will have years from now. Thus, while a Chinese patent has a lifetime of twenty years, it is possible that the latter half of this time frame would cover time during which China affords a more heightened protection of IP rights. Consequently, even if enforcement lags in the short-term behind what nanotechnology companies would like to see, greater enforcement in the later years of a patent's life under Chinese law would still provide valuable benefits to a company which chooses to patent their inventions in China.

##### A. Patent Protection in the Pharmaceuticals Sector

The story of the Pfizer Viagra patent invalidation in China is, by now, virtually old news to those who keep pace of global IP events. The State Intellectual Property Office ("SIPO") of China initially granted Pfizer a patent for its Viagra drug on September 19, 2001.<sup>8</sup> Immediately following SIPO's decision, a broad group of Chinese pharmaceutical companies challenged the patent. Essentially, the group urged two bases for invalidating the patent. Some of the companies claimed that the Pfizer's patent lacked sufficient description of the invention under Chinese law. Others claimed that Pfizer's patent lacked the requisite novelty under Chinese law and that the patent should be invalidated.<sup>9</sup> Recently, SIPO decided to invalidate the Pfizer Viagra patent. SIPO, however, has yet to issue a formal opinion explaining its finding of invalidity.<sup>10</sup>

SIPO's decision regarding the patent for Viagra has led to vast criticism of Chinese patent law in general.<sup>11</sup> Some of the criticism based on the experience of Pfizer in China may be exaggerated.

First, "Viagra is an exceptional case with a complicated history."<sup>12</sup> It should be noted that Pfizer's patent on Viagra was invalidated on novelty grounds in the United Kingdom even before China considered the patent's validity in its own country.<sup>13</sup> Considering the international troubles that Pfizer has encountered, it may be premature to associate this single decision as symptomatic of a much larger patent problem in China that threatens nanotechnology companies.

<sup>8</sup> Benjamin Bai & Helen Cheng, *Are Your Chinese Patents at Risk?*, INTELLECTUAL PROPERTY TODAY, Jan. 2005, at 31.

<sup>9</sup> *Id.*

<sup>10</sup> *Id.*

<sup>11</sup> Choi, *supra* note 6; Peter K. Yu, *Viagra's Upside*, 4 IP L. & BUS. 10 (Oct. 30, 2004).

<sup>12</sup> Yu, *supra* note 12.

<sup>13</sup> *Id.*; Zhu Shen, *Unleash the Dragon: With an Army of Scientists and a Sea of Consumers, China is Poised to Become Pharma's Most Valuable Market and Partner*, 24 PHARMACEUTICAL EXECUTIVE 74 (2004) ("In fact, long before the Chinese court intervention, Eli Lilly, Icos, and Bayer, whose drugs for erectile dysfunction compete with Viagra, successfully overturned Pfizer's patent in Europe, using the same strategy that was used in China.").

Second, many argue that the Pfizer case represents evidence of a much broader trend in China toward the rule of law in IP protection. When Chinese companies sought recourse in Chinese legal bodies to invalidate the Viagra patent, “it was the first time Chinese companies took the legal route to challenge a patent owned by a major foreign company.”<sup>14</sup> This stands in stark contrast to the “old days [in which]] local companies ignored the law and manufactured their own counterfeit versions.”<sup>15</sup> Since the Pfizer decision, many commentators and scholars have noted increasing awareness of IP laws and protection.<sup>16</sup> Others see evidence that China is well on its way in a “fourth wave” of IP development, an “enforcement wave,” in which reliance by companies on the legal system as opposed to copying and the Chinese government’s overall stance on IP enforcement leading up to the 2008 Olympic Games becomes the norm rather than the exception.

While foreign nanotechnology companies understandably harbor some trepidation about the ability of patent law to protect their interests, the Pfizer case may not completely justify throwing the baby out with the bathwater just yet. This article seeks to explain facets of the Chinese patent system in order for nanotechnology companies to make a more informed decision.

### **B. Nanotechnology in China—A Unique Case?**

Although its nanotechnology infrastructure may lag relative to some of its neighbors like Japan and South Korea, China places heavy emphasis on nanotechnology as a means for economic development in the coming years. For example, China led the other Asian countries in its officially launching a National Nanotechnology Initiative (“NNI”) in October, 2001.<sup>17</sup> While China is undoubtedly a powerful manufacturing base in many industrial and technological sectors, China views its ability to impact standards and innovation in areas like nanotechnology as especially important to its economic competitiveness.<sup>18</sup> To this end, “China is currently the second largest producer of technical papers in nanoscience and nanotechnology, even ahead of Japan.”<sup>19</sup>

The increasing emphasis China places on nanotechnology has several implications. First, foreign companies should develop a strong knowledge of the Chinese patent system regardless of whether they decide to pursue nanotechnology manufacturing, investment or joint ventures in China because the technical know-how and publication rate in China is fast-growing. The proliferation of Chinese nanotechnology patents and technical papers can impact patent validity beyond China’s borders. Additionally, companies should develop a greater knowledge of Chinese patent law as it relates to nanotechnology so that they may more effectively safeguard their IP. Additionally, China may develop a greater incentive to fairly and consistently apply and enforce nano-IP protection because of its perceived economic importance to Chinese competitiveness.

## **5. Summary**

While it still may be too early to tell with certainty whether patents will be enforced in China to provide expansive protection to nanotechnology companies, the trend seems to indicate that pursuing patent protection in China may produce benefits to the company in terms of greater nano-IP protection.

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<sup>14</sup> Yu, *supra* note 12.

<sup>15</sup> *Id.*

<sup>16</sup> See, e.g., Ted C. Fishman, *Manufacture*, N.Y. TIMES, Jan. 9, 2005, at 40 (“As the awareness for intellectual property heightens in China, more Chinese companies and individuals are likely to resort to the rule of law to resolve patent disputes. . . . Notwithstanding the political rhetorics [sic] about China’s lack of IP protection, it has strengthened its patent system significantly in recent years.”).

<sup>17</sup> Nicolau, *supra* note 5.

<sup>18</sup> Bruce Einborn, *Master of Innovation?*, BUS. WK, Apr. 14, 2003, at 54.

<sup>19</sup> Ron Hira, Prepared Remarks at the Committee on House Small Business Hearing on the Offshoring of High Skilled Jobs, (Oct. 20, 2003) (transcript available at LEXIS).

In any event, the importance of the Chinese market and expanding foreign nanotechnology activities there make an understanding of the Chinese patent system all the more important for foreign nanotechnology companies. The remainder of this work outlines different strategies that a nanotechnology company may employ to protect its IP, should the company decide to pursue Chinese patent protection.

## **II. CHOOSING ONE OF THE TWO PATHS FOR FILING A PATENT APPLICATION IN CHINA**

### **1. Patent Cooperation Treaty (“PCT”) Filings**

There are two paths to filing a patent application in China. The first route is to file directly in the country. Such individual filings are known as “national filings.” However, the national filings must occur within one year of the first filing in another country, such as the U.S.

Since this requires a tremendous amount of lead-time and expense to prepare separate filings, the World Intellectual Property Organization (“WIPO”) in Switzerland came up with the PCT. While this treaty did not form a global patent office, in which an applicant makes one filing for the world, it did move towards internationalizing the patent process.

According to the terms of this treaty, which has been adopted by 124 countries to date, including China, an applicant can file a single patent application known as a PCT application, within one year of filing the original priority application, and declare the intent to file in foreign countries at a later date. This provides the applicant with an option of filing in these foreign countries within one year or foregoing filing without incurring any penalty for doing so. Additionally, where the PCT receiving office is the same office as where the priority application was filed, then the PCT document’s invention specification can be provided by merely checking off a box on the PCT request form. The PCT receiving office in the U.S. is located in the same building as the U.S. Patent & Trademark Office (“PTO”) in Alexandria, Virginia.

Therefore, the applicant can obtain a priority date in foreign countries without having to file all the individual applications up front with their individual filing fees. This is important because many foreign countries award a patent to the applicant who is the “first-to-file” versus the U.S.’s standard of the “first-to-invent.” Therefore, the inventor can designate on the PCT application the countries in which it intends to file a patent application. The company can then use the next twelve months to determine if the invention is worth pursuing. If the company concludes that it is, then the applicant must file applications in the designated countries within one year from the original application.

Additionally, filing a PCT, e.g., in the U.S., has the following advantages: (1) it needs to be filed in only one patent office, in the U.S. Receiving Office of the PTO; (2) it needs to only be in a single language, English, versus filing individual national applications in the official language of each country; (3) the search and examination of prior art is in English; (4) the international preliminary examination of the PCT application can be handled by a U.S. patent attorney; and (5) the initial assessment of the application for patentability made by the PCT governmental office is often persuasive in each of the countries where patent protection is sought, resulting in more consistent examination of the application by each of the individual countries. These advantages explain why about 90% of the foreign patent filings are done as PCT applications.

#### **A. Beginning Stage of Processing a PCT Patent Application (“PCT Chapter 1”)**

Currently, the cost of filing a typical PCT application is about \$3,000. The initial phase of filing a PCT application is known as Chapter I. In Chapter I, all potential countries in which the applicant may file must be designated. Also, in order to be complete, a PCT application must contain: (1) an abstract of

the invention; (2) a description of the invention; (3) at least one claim; and (4) any drawings that are necessary to describe the invention. If a U.S. application has been filed in the PTO, such application can be used as the PCT application in the U.S. Receiving Office. In this scenario, the PCT application can include a request for the prior filing date of the U.S. application if the PCT application is filed within one year of the U.S. application.

Once a PCT application has been filed, which meets the above requirements, an International Searching Authority ("ISA") performs an international prior art search on the application and issues an International Search Report ("ISR") which lists all prior art references that are considered relevant to the patentability of the PCT application. The international search is considered to be of high quality due to the following characteristics: (1) only certain countries with experienced patent offices have branches of the ISA wherein specially trained staff search for prior art; (2) the prior art search is very thorough, including a broad search of patents and printed publications; and (3) the search covers documents in the most popular languages in which patent applications are filed. This type of high quality search is important to nanotech patent applications, which tend to cover complex, multi-disciplinary inventions which only the most skilled examiners can handle.

The ISR is issued either approximately four to five months after the filing date of if a priority claim was made to a previously filed application; then the ISR is issued about sixteen months after this priority date. When it issues, the ISR includes a listing of each of the cited references along with an explanation of their relevance to the issues of novelty of the invention as well as non-obviousness. This is because in order for something to be patented, the invention must have the following: (1) novelty, i.e., it must be sufficiently different from anything already made or described in a printed publication; (2) non-obviousness to a person having knowledge in the field of endeavor; (3) utility, i.e. its use is of benefit to the public; (4) an adequate description, i.e., the claims must possess enough detail to show that the inventor actually knows how to make and use the invention; and (5) enablement, i.e., the claims provide enough detail to show a person in the field how to make and use the invention in the best manner known to the inventor. While novelty may tend to be less of an issue to discoveries in the burgeoning field of nanotechnology, enablement may be a difficulty, as only an application which provides enough detail for one to make and use a nanotechnology invention, no matter how complex, will suffice. If the patent ever ends up in a lawsuit, the defendant-infringer will look for any grounds to challenge the patent's validity; and, for nanotechnology patents, the defendant will most likely raise lack of enablement.

Upon obtaining the ISR, the applicant has the ability to amend the claims in an attempt to overcome problems cited in the ISR, such as those regarding novelty or obviousness. However, if the cited references disclose what is, in essence, the applicant's invention, then the applicant has the option of withdrawing its PCT application. If this occurs prior to eighteen months from the applicant's priority date, then the application will not be published. Otherwise, all applications are published eighteen months after their priority date.

After twenty months from the priority date or eight months from the PCT filing date, the prosecution of the PCT application under Chapter I is finished. Then, unless the applicant indicates an intention of entering Chapter II, the PCT application is sent to the patent offices of the originally designated countries. If the applicant chooses this route, then individual filing fees must be paid to each country in which protection is sought.

#### ***B. Intermediate Stage of Processing a PCT Patent Application ( "PCT Chapter II")***

However, to avoid paying individual fees to each country designated under PCT Chapter I, most applicants continue prosecuting their application under the PCT by filing a "Demand for Entry into Chapter II." Upon entry into Chapter II, the applicant is given an additional ten months in which to

commit to filing completely in these countries. During this additional time, it is likely that the prosecution of the “parent” application, which was earlier filed in the U.S., will be complete. This will provide the applicant with an idea of the breadth of the claims of the application as well as the advantage of the additional time since first filing the PCT application to gauge the potential market success for the product in the foreign countries. This is of big importance to nanotechnology companies, because IP costs often are the second biggest budget expense next to the costs of the company’s labor expenses. Excess legal fees and filing costs can lead to the demise of an upstart before it has the ability to become profitable.

Also inherent in the Demand for Entry into Chapter II is a request made for the PCT office to perform an International Preliminary Examination (“IPE”). This is conducted for a fee by an International Preliminary Examining Authority (“IPEA”). The IPEAs have similar expertise and experience to the ISAs, and they examine the application on the basis of the ISR. The IPEA in turn issues a patent patentability opinion which evaluates the patentability of the invention based on the following factors: (1) novelty; (2) inventive step; and (3) the degree of industrial applicability of the invention.

In response to the patentability opinion, the applicant can file amendments to the claims with the IPIA. This is a similar process of submission of amendments and arguments in response to the ISR. Also, because the applicant has ten months from entering Chapter II, the applicant can make an assessment during this time of the following, prior to incurring the substantial fees charged by each country to file: (1) whether the invention meets the requirements to obtain a patent; and (2) whether the device has a sufficient foreign market to justify the costs of pursuing these individual foreign filings.

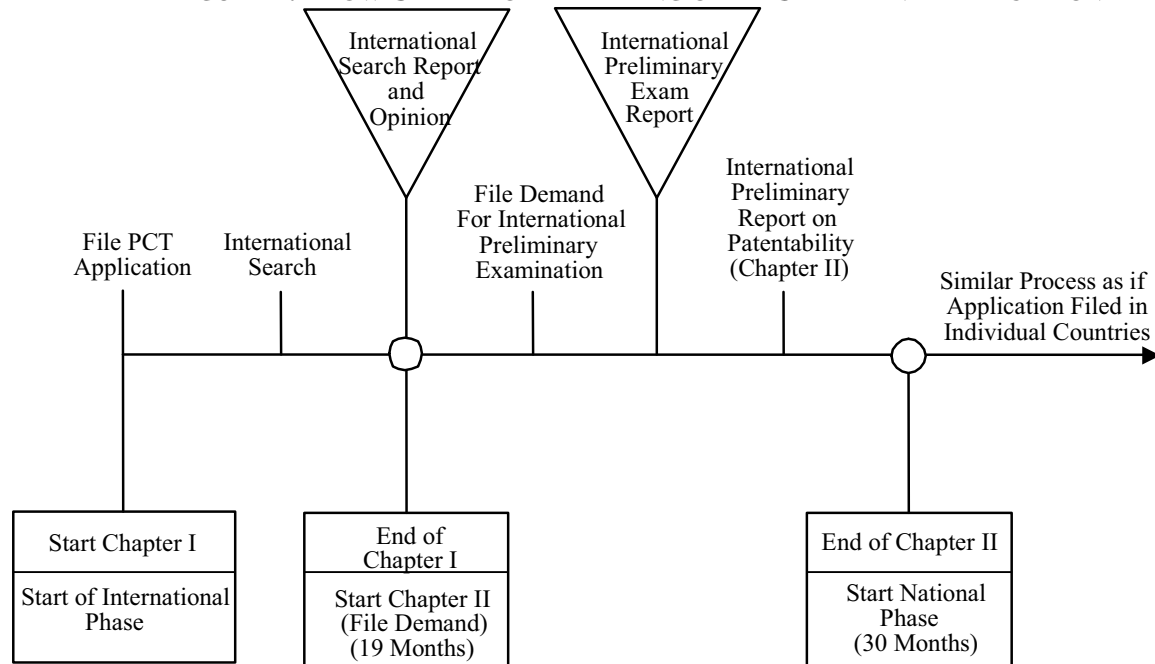
### ***C. Final Stage of Processing a PCT Patent Application ( “National Stage” )***

At the conclusion of Chapter II, which, in most countries, occurs about thirty months from the priority date or eighteen months from the PCT filing date, the applicant enters the national phase, wherein the patent application is submitted to each country in which patent protection is sought. In the national stage, payment of the filing fees must be made to each of the countries in which a patent application is submitted. In addition, translations of the application, as amended, may be necessary for countries wherein English is not the primary language, such as China. Service fees may also be required such that foreign associates in each of the respective countries can attend to the national stage prosecution of the application.

In the national stage, certain formalities must be followed similar to those described in the below sections covering the filing requirements in each of the countries. An example is the requirement of payment of official fees for filing and prosecuting a national stage application. However, the prosecution of the application in each of the national patent offices is streamlined by the use of the following, which are previously generated: (1) ISR; (2) IPE; and (3) the previously made amendments and arguments to the claims. In terms of time, it typically takes a minimum of three years to obtain patent protection in these foreign countries from the time of initially filing the PCT application. However, in the end, an applicant who has chosen to file PCT-originated national applications receives the same level of protection as if an individual had originally filed patent applications in each of the foreign countries.



**FIGURE 1: FLOW CHART FOR THE FILING OF A PCT PATENT APPLICATION**



## 2. Filing a Nanotechnology Patent Application in China

In order to gain entrance into the World Trade Organization (“WTO”), on August 25, 2004, China made substantial modifications to its patent laws, including the adoption of the Patent Cooperation Treaty (“PCT”). These changes, which came into effect on July 1, 2001, give China a patent system that is in many ways similar to those in existence in economically developed nations. Nanotechnology is considered to be a type of invention-creation and falls under China’s Patent Law regulations. Accordingly, a potential patent applicant must follow specific guidelines in order to be granted approval of the patent in China.

According to China’s patent law, a patent can be granted for each of the following categories: (1) inventions; (2) utility models; and (3) industrial designs. Most nanotechnology inventions will fall under the definition for an “invention,” which is defined as any new technical solution relating to a product, a process or an improvement thereof. “Utility models” include new technical resolutions relating to the shape or structure of a device, which, in turn, relates to its practical usage. Finally, “designs” include any new applications in terms of shape, pattern or color of a product which creates an aesthetic feeling for an industrial application.

### A. Requirements for Inventions and Utility Models

If an application is classified as an invention or a utility model, then it must possess the following: (1) novelty; (2) inventiveness; and (3) practical applicability. Novelty means that, before the date of filing, no identical invention has been described in publications anywhere in the world, or has been publicly used or made known to the public by any other means in China. Further, China has a national patent information database to ensure that novelty exists vis-à-vis prior publications. However, there are special circumstances under which novelty would not be lost if, within six months before the date of filing of the patent, one of the following events occurred: (1) the invention was first exhibited at

an international exhibition sponsored or recognized by the Chinese Government; (2) the invention was first made public at a prescribed academic or technological meeting; or (3) the invention was disclosed by any person without the consent of the applicant.

“Inventiveness,” also known as “inventive step,” means that, as compared to the technology existing before the date of filing, either: (1) the invention has prominent substantive features and represents a notable progress; or (2) the utility model has substantive features and represents progress. “Practical applicability,” also called “industrial application,” means that the invention or utility model can be made or used in China’s industries and can produce effective results. “Effective results” refers to any economic, technical or social results that can be expected by a person skilled in the art on the date of filing the patent application.

In addition, China denies patent protection for the following: (1) inventions that are contrary to the laws of the country, to social morality or detrimental to public interest; (2) scientific discoveries separate from a technical solution; (3) rules and methods for mental activities; (4) medical treatments and diagnostic methods; (5) plant and animal varieties, as opposed to a process used in producing plants or animals; and (6) substances obtained by means of nuclear transformation, as opposed to a device for implementing such transformation or the use of the substance

### ***B. Requirements for Designs***

Any design for which a patent right may be granted must not be identical with nor similar to any design which, before the date of filing, has been publicly disclosed in publications in China or other countries or has been publicly used in China. In addition, the design for which a patent is sought must not be in conflict with any prior right of any other person.

### ***C. Required Contents for a Patent Application***

In filing a patent application with the Chinese Patent Office, the application must be prepared in Chinese and include: (1) a written request; (2) a description; (3) an abstract; and (4) claims. Further, the written request must include, among other things: (1) the title of the invention; (2) the name of the inventor or creator; and (3) the name and address of the applicant. The description must set forth the invention in a manner sufficiently clear and complete so as to enable a person skilled in the art to carry it out. The description must also include drawings, where necessary. The abstract must briefly state the invention’s main technical points and cannot exceed 300 Chinese words. Finally, the claims must be supported by the description and need to state the extent to which patent protection is requested.

Of these requirements, special attention should be given to the description to make sure it completely enables the making of the invention, especially when the application is for a foreign entity. For example, as explained above, last year China invalidated Pfizer’s patent for Viagra on the basis that the patent application did not adequately describe the “technological” uses of sildenafil citrate, a key Viagra ingredient. While Pfizer said it would appeal the ruling, fake versions of the anti-impotence drug abound in China.

### ***D. Fees and Costs***

The costs associated with filing a patent application for an invention can be divided into two parts. One part consists of the official fees charged by the Chinese Patent Office, while the other part consists of the service fees charged by a patent agent who provides legal service for the applicant. The Chinese Patent Office’s fees include: the filing fee and the printing fee for publishing the application in conformity with Chinese patent law. More specifically, these fees include the following, all in U.S. dollar amounts: (1) an application filing fee (including publication) in the amount of \$120; (2) an additional charge for a specification including drawings in excess of thirty pages in the amount of \$7 per page, and, for patents in

excess of 300, it is \$14 per page; (3) an additional charge for claims in excess of ten pages in the amount of \$20 per claim; (4) the filing request for the substantive examination in the amount of \$315; (5) the surcharge for late national phase entry within the grace period in the amount of \$150; (6) annuities for the 1<sup>st</sup> to 3<sup>rd</sup> years in the amount of \$120, which rise progressively each year to \$150 for the 4<sup>th</sup> to 6<sup>th</sup> years, \$250 for the 7<sup>th</sup> to 9<sup>th</sup> years, \$500 for the 10<sup>th</sup> to 12<sup>th</sup> years, \$750 for the 13<sup>th</sup> to 15<sup>th</sup> years and \$1000 for the 16<sup>th</sup> to 20<sup>th</sup> years. Further, there are some additional minor costs incidental to those described above.

The service fees charged by one of China's more than 5,000 patent agents, vary from case to case and largely depend on the specific translation work involved. However, the service fees largely include the following fees, all in U.S. dollar amounts: (1) \$500 for filing an application; (2) \$150 for filing a request for substantive examination; (3) \$60 for claiming single convention priority and \$40 for each additionally claimed priority; (4) a translation fee, for translating the documents from English to Chinese, which is \$16 per 100 English words. For translation from Chinese to English, it is \$22 per 100 Chinese characters; (5) an hourly fee for preparing a response to each Office Action, with the hourly fee being based on the patent agent's or patent attorneys' expertise and experience. Further, there are some minor additional service fees. Also, there is the preliminary cost of preparing the initial documents to be filed in China. Whether a U.S. attorney prepares documents to be filed in China as a national application or the U.S. attorney prepares a PCT application, these fees are in the ballpark of \$10,000.

#### ***E. Additional Requirements for a PCT Patent Application***

If the patent application is a PCT patent application with China designated as one of the countries for filing, then the applicant must go through the following formalities with the Chinese Patent Office within thirty months from the priority date:

##### **i. Written Statement of Entrance into China's National Phase**

Upon entry of a PCT application into China's national phase, the applicant must submit a written statement stating each of the following: (1) the international application number; (2) the kind of patent protection sought; (3) the title of the invention; (4) the applicant's name; (5) the address of the applicant; and (6) the inventor's name. Further, this information needs to be in Chinese and must conform to the requirements of China's International Bureau of Recording.

##### **ii. Submission of Information in Chinese**

When an international application is filed in a language other than Chinese, then the following must be submitted in Chinese to China's patent office: (1) the Chinese translation of the description; (2) the textual matter of the drawings; and (3) the abstract of the initial international application.

##### **iii. Drawings**

If an international application contains drawings, then a copy of the drawings must be furnished. Also, words are not generally permitted on a drawing unless it represents a flow chart. Instead, numbers are used, like in the U.S., to indicate the various parts of the invention and these numbers are referenced in the specification and sometimes in the claims.

##### **iv. Time for Filing**

If the PCT applicant fails to meet the above requirements within thirty months from its priority date, then the application is deemed to be withdrawn. However, if the applicant wishes to proceed with the application after thirty months from priority, then he or she may do so if fewer than thirty months from priority have lapsed. The PCT applicant accomplishes this by paying a late entry fee which puts the application back on track for processing.

#### **v. Time for Examination**

Within three years of the filing date or the earliest date of priority, whichever occurred first, the applicant can make a request to have the Chinese Patent Office proceed with the substantive examination of the application.

#### **vi. Appointment of a Registered Chinese Patent Agent**

Any individuals or organizations which are foreign to China, that is, those individuals or organizations who have no habitual residence or business office in China, must appoint a registered Chinese patent agent to file a patent application.

#### **vii. Length of Patent Term**

Once a patent on an invention issues, its term lasts twenty years from the date of filing. Under no circumstances will this time be extended. Currently, worldwide, China ranks third, after the U.S. and Japan, in terms of the number of granted patents covering nanotechnology-related inventions. While their patents covering nanomaterials approximate the level of those in the U.S., they lag behind in terms of medicinal inventions incorporating nanotechnology. This fact stems largely from China's graduating a number of scientists and engineers equal to or greater than those graduated in the U.S. Further, China currently possesses more than 50 universities, 25 institutes and 500 enterprises engaged in research and development of nanotechnology in China.

### **III. EXAMINATION OF THE PATENT APPLICATION**

#### **1. Application Process**

According to Chinese Patent Law, a patent application for an invention is examined as to substance before it can be granted a patent right. To initiate the examination procedure, the applicant must request examination within three years from the Chinese filing date or the priority date, if priority is claimed. If it is based on the priority date of domestic priority, then it must be done within twelve months from the priority.

In addition to having to provide the examiner all known relevant prior art, during the examination, the examiner may additionally require of the applicant a prior art search report and/or an examination report made by a foreign patent examination authority. Further, China has, like most countries other than the U.S., adopted a first-to-file system. Thus, where two or more applicants file applications for the patent of an identical invention/creation, the applicant who is awarded the patent is the one who first filed the application.

Also, while amendments to a patent application are allowed, such amendments must not exceed the scope of the original disclosure contained in the description and in the claims. Furthermore, the patent applicant should make voluntary amendments at the time in which the examination is requested, or within three months after the receipt of the official notification informing the applicant that the application has entered the substantive examination stage. However, if the opportunity for making voluntary amendments has been missed, then mandatory amendments must follow and must meet the requirements raised in the Chinese Patent Office's action.

If the patent application passes the substantive examination without rejection, then the Chinese Patent Office will grant a patent, which involves: (1) issuing a patent certificate; (2) registering the patent; and (3) publicly announcing the patent.

## **2. Appealing a Decision of the Patent Examiner**

If a patent application for an invention is rejected by the examiner because it is in violation of the Chinese patent laws, then this decision may be appealed to China's Patent Re-examination Board; and any decision made by the Re-examination Board can be even further appealed to a special court in Beijing.

## **IV. ENFORCING A NANOTECHNOLOGY PATENT IN CHINA**

### **1. Protection of Patents is Tepid but Improving**

While obtaining a patent in China is not such a difficult process, individuals and organizations face much greater difficulties in their enforcing their patents at the present time. While the central government of China has taken a tougher stance on enforcement in recent years, the enforcement is weak at best at the local level. The municipalities and provinces tend to look away from local pirating efforts.

That is why the Bush administration is increasing its pressure on China to bring about reform in its IP enforcement or face offsetting U.S. tariffs on Chinese goods imported into the U.S. The annual estimate of counterfeited goods made in China is in the billions of dollars and growing annually at double-digit percentage rates. For example, close to 90% of the software used in China is pirated. Further, the U.S. is putting together evidence to bring an international trade case against China before the WTO. By joining the WTO in 2001, China adopted on the WTO's IP obligations, which require all member countries to protect patents regardless of "the place of invention, the field of technology, and whether products are imported or locally produced in all forms of technologies."

However, as demonstrated by the discussion in Part II, some have suggested that patent protection is growing as evidenced by the Pfizer case. Even though the Chinese patent office invalidated the patent, many say this is the first time that Chinese companies have gone to court to attempt to invalidate a patent. Traditionally, they have just ignored patents. Thus, some conclude that the Chinese companies are beginning to see the need to work through the patent laws as opposed to just ignoring them. This trend augurs for greater respect of the rule of law and patent protection. In addition, China's national stance on nanotechnology indicates that it may have internal incentives to ensure that patent law is consistently enforced with regard to nanotechnology in particular.

### **2. Initial Efforts to Get Infringer to Cease and Desist Pirating**

For the first twenty-four months, upon actual or constructive notice of infringement of the patent, the patent owner can take one of two tracks (judicial or administrative) for enforcement to get the infringer to cease and desist from infringing the patent: (1) make a request with the administrative authority for patent affairs to order cessation of infringement and award damages; or (2) file an action with the People's Court. However, only the patent holder or an exclusive licensee has standing to sue for infringement. Therefore, any nonexclusive licensing agreement *must* contain a provision that the patent owner will commit to defend the patent against infringers. Also, as in the U.S., the patented products must bear a patent notice to the public in order to bring an action for damages.

### **3. Patent Infringement is a Violation of Civil and Criminal Law**

China, like other Asian countries, such as Korea, has laws which declare patent infringement to be both a civil and criminal offense. Therefore, criminal proceedings can be instituted in parallel with the civil proceedings and are initiated by the patent owner's filing a complaint with either of the following: (1) China's public security department; (2) a procurator; or (3) a Chinese court. As for the filing of the civil action for patent infringement, the patent owner needs to file this in the Intermediate People's Court

which has geographic authority over the defendant's residence. Appeal from this court is to the Higher People's Court, which is the appeal court for the province. The decision of this court is final; although, in rare instances, this court overturns its own decisions.

Also, civil practice in China differs in some respects from that in the U.S. For example, China has no discovery procedure in which documents are requested from the other side. Instead, the court itself does the fact-finding, including requesting documents and inspecting the parties' facilities. Further, there is no complete full-blown trial in China as there is in the U.S. Instead, parties submit arguments in writings to the court and there are a series of hearings before a judge in which arguments are made and factual findings are resolved. Also, civil law in China places a great emphasis on conciliation rather than litigating the matter to the end. Therefore, once litigation has been initiated, the parties may choose to replace the litigation with conciliation at any time prior to the final determination of the case. Conciliation resembles arbitration in the U.S. Also, a party cannot assert a defense of invalidity to a claim of infringement of the Chinese patent. The unavailability of this defense in Chinese proceedings results from the fact that the only way to invalidate a Chinese patent is to initiate nullity proceedings with the Chinese Patent Office. In the event that nullity proceedings with the Chinese Patent Office are ongoing, then the court has the right to stay its proceedings until the Patent Office concludes the nullity proceedings. However, unlike the granting of automatic stays of proceedings pending the outcome of a nullity proceeding for utility models or designs, Chinese bodies rarely grant stays for invention patent cases.

If a finding of patent infringement is made, then the potential remedies include injunctive relief and/or damages. Damages in China can take one of the following three forms: (1) plaintiff's economic loss; (2) a defendant's profits; or (2) a reasonable royalty. Further, the court can grant "advance execution," which is similar to a preliminary injunction in the U.S. Also, patent infringement trials in China typically take about three years and cost approximately \$100,000 per party. Finally, while the patent law does not provide for the triumphant party to be awarded costs of suit, the parties usually include these costs in their actions for damage claims.

## **V. CONCLUSION**

Nanotechnology and the emergence of China as an economic powerhouse may represent the two biggest trends for the next century. Therefore, how companies and individuals protect nano-IP represents the crossroads of these subjects and will only grow in importance exponentially along with concomitant changes in the paradigm of protection for nano-IP in China. Thus, while the authors take the view that protecting nano-IP in China will be increasingly valuable over time, the particular advice given in this article most likely will be less cogent over time. Therefore, any formal IP decisions by a company should be made with the assistance of competent legal counsel whose advice is taken in near real-time, as the company navigates the Chinese market and legal system.