HOT TOPICS IN NANOTECHNOLOGY

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Nano this, nano that. What's all the fuss about making things small? Under the traditional rules of patent practice changing the "size" of an invention does not make any difference in terms of patentability. The three criteria of (1) novelty, (2) utility and (3) non-obviousness—are all that matter. Simply making a known thing smaller does not create anything new. In the nano world, these criteria still rule; however, making things on the nano-scale often changes how one must view the obviousness of a given invention. At the nano-scale, a change that might seem obvious can provide unexpected results, making an invention surprisingly non-obvious. Nano-scale versions of old materials can often have very different properties than their macro-scale counterparts. For instance, some are better at conducting electricity. Some are better at conducting heat. Some are stronger. Some have different magnetic properties. Some reflect light better or change color as their size is changed. In addition, nano-scale materials typically have far larger surface areas than similar volumes of macro-scale materials which means that more interactions with other materials may be possible at the nano-scale. Thus, reactions carried out at the nano-scale can often work much differently than comparable macro-scale reactions.

Tiny Technologies = Big Solutions

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DEFINITION OF THE NANO-SCALE:

When we talk about nanotechnology, we are typically talking about the understanding and manipulation of matter at dimensions falling in the nano-scale range; namely, from about 1 to 100 nanometers, where unique phenomena often enable novel applications. A nanometer is one-billionth of a meter (10^{-9} m). To better grasp the nano-scale, here are a few examples: a typical sheet of photocopy paper is about 100,000 nanometers thick; from biology—the protein hemoglobin, which carries oxygen through the bloodstream, is about five nanometers in diameter; and from chemistry—a single atom of gold is about 1/3 of a nanometer in diameter.

Nanotechnology thus encompasses nano-scale science, engineering, and technology. Nanotechnology involves imaging, measuring, modeling, and manipulating matter at this length scale.

While many definitions for nanotechnology exist, the National Nanotechnology Initiative, a U.S. Government research and development program (www.nano.gov) established to coordinate the efforts of 23 federal agencies in nanotechnology, defines it as follows:

- Research and technology development at the atomic, molecular or macromolecular levels, in the length scale of approximately 1–100 nanometer range; MORE▸

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- Creating and using structures, devices and systems that have novel properties and functions because of their small and/or intermediate size; and/or
- Ability to control or manipulate on the atomic scale.

Nanotechnology research and development is taking place worldwide. In the United States, nanotechnology efforts are currently conducted in over 1200 companies, universities, and government laboratories, in all 50 states. The top four states with nanotechnology efforts are California, Massachusetts, New York and Texas. Major regional nano-centers are found in the greater Boston metropolitan area, the Bay Area of California, and the Dallas-Austin-Houston regions of Texas.

NANOTECHNOLOGY APPLICATIONS

Some nano-scale materials are made in a top-down manner and others are made in a bottom-up manner. Top-down processing refers to the formation of smaller and smaller features starting from larger materials. Examples include semiconductor processing, whereby smaller and smaller patterning is used to fabricate precise nano-structures. Bottom-up processing takes the opposite approach, building organic and inorganic nano-structures on an atom-by-atom or molecule-by-molecule basis. Carbon nanotubes and buckeyballs are common examples of this type of nanofabrication.

Other applications include the following:

- Nano-scale materials are currently used in drug delivery devices, including dendrimers—nanomolecules that permit targeted drug delivery.
- Nano-scale materials are currently used in air and water filtration devices.
- Nano-films and nano-materials are currently used for catalysts, adhesives, water-repellency; anti-reflective coatings, self-cleaning coatings, anti-fogging, ultra-violet resistance; and/or infra-red resistance coatings.
- Nano-scale materials are currently used to increase mechanical strength of other materials—including sports equipment (tennis racquets, baseball bats), vehicle parts, and aircraft parts.
- Nano-scale materials currently used in electronic devices, including transistors, nanowires, semiconducting nanotubes, and quantum processors.
- Nano-scale materials are currently used in alternate energy applications, including solar cells made with nanorods created by atomic layer deposition, and fuel cells made with nano-polymers.

Research continues and more and more applications of nano-scale materials are created every day. Future projects could include one or more of the following; new electronic devices; alternative energy devices; new materials; and new medical applications. For example, research is being conducted on anti-terror uses of nano-sensors, e.g., for explosives and bioweapons detection. Medical research includes nano-biosensors for disease detection, particularly early detection of specific cancers. Research is being conducted on nano-materials for use in high capacity batteries that could be fully charged in minutes. Research is being conducted on lightweight nano-materials stronger than steel, and/or more conductive than copper.

The field of nanotechnology continues to grow. New discoveries continue to be made. New applications are constantly being found, and old technologies are constantly being improved.

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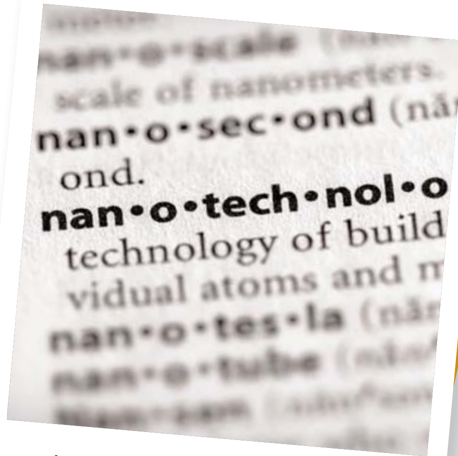
Look to the past to predict the future. A Google® search of the two words "nanoscale" and "patent" had over 1.6 million hits—indicating patent activity in this field is very active. Searching the term "nano" in the USPTO database for published applications (2001–2009) yielded over 38,000 published applications containing this term. The same search in the USPTO database of patents (1976–2009) yielded over 19,000 issued patents containing this term. Patent activity in the nanotechnology field is strong, and as research continues, more filings will be made. ■



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On September 18, 2009, Banner & Witcoff hosted the firm's 10th corporate IP seminar at the University of Chicago's Gleacher Center. Topics included:

- **What's Next for Intellectual Property Law?**
- **The Impact of *In re Bilski***
- **Challenges Facing Patent Litigators**
- **Strengthening Your License Agreements to Survive Bankruptcy**
- **Copyright Law: An Audio/Visual Study**
- **Design Patents Post-*Egyptian Goddess***
- **Trademarks in Cyberspace**
- **Your Assets in the Virtual World**

Thank you to all of our attendees for your time and participation. Plans are under way to host similar programs in cities near you.

If you were unable to attend, printed and electronic copies of the presentation are available, and an audio recording will also be available soon. Please contact Chris Hummel (chummel@bannerwitcoff.com) for more information.