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NANOTECHNOLOGY PATENTING: LEGAL ASPECTS AND ITS CONNECTION WITH INTELLECTUAL PROPERTY RIGHTS

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ABSTRACT

The manipulation or handling of things at the atomic and molecular level, or nanotechnology, has become a revolutionary area with usages across a variety of sectors, including producing goods, electronic devices, energy, and healthcare. Intellectual property rights (IPR), especially patents, are essential for promoting creativity and safeguarding technical breakthroughs because of their multidisciplinary character and economic viability. The regulatory structure controlling the patenting of nanotechnology is explored in the present article with particular attention paid to issues with patentability requirements, in international legislation, and the Indian statutory. This article emphasises the importance of international agreements and domestic programs like India's Nano Mission, as well as the difficulties of originality, non-obviousness, and industrial usability in nanotechnology technologies. The paper ends with suggestions for bolstering patent frameworks to encourage the advancement of nanotechnology while resolving moral and legal issues.

Keywords – *Nanotechnology, Intellectual property rights, Indian statutory, India's Nano Mission.*

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INTRODUCTION

"Nano" is a phrase that comes from the Greek word meaning "dwarf." According to science, it is equivalent to one billionth of a meter. The manipulation or modification of matter at an atomic or molecular size, usually less than 100 nanometres, is referred to as nanotechnology. In other words, it is a study of matters which is working or revolving around on a certain atomic and molecular level scale. Materials frequently display distinct physical and chemical characteristics at this size. As the technology develops, new problems about intellectual property (IP), especially in relation to patents, have been brought up by it being incorporated across different industries. The word nanotechnology was popularized by the person named K. Eric Drexier. In 1959, a famous speech delivered in the title of "There's Plenty of Room at the Bottom" by the U.S Scientist Richard Feynman, he put forward theories and scientific principals that is behind the functioning of nanotechnology. In his speech he never used the term "nanotechnology", but disseminated the information about the procedure that will modify the natural characteristics of a single molecules and atoms. Since Norio Taniguchi first defined nanotechnology in 1974, it has developed into a multifaceted discipline with uses in electronics (nanochips), medicine (nanodrugs), and energy (solar cells).

IMPORTANCE OF PATENTING IN NANOTECHNOLOGY

An inventor can get a patent, which is a legal privilege that provides protection for a new product or method that has applications in the industry. It also encourages innovation by acting as an open-ended tool as well as an incentive. When it comes to nanotechnology, patents offer the exclusive right to sell and commercialise ideas based on nanotechnology. Patents, as opposed to copyrights or trademarks, demand strong evidence of inventiveness and innovation.
Nonetheless, there are particular difficulties with nanotechnology: - Wide-ranging patent claims might hinder competitiveness. Prior art searches are made more difficult by the absence of standardised terms. The regulatory supervision is required due to ethical and ecological implications. Nanotechnology has a wide range of uses:

- Nano-electronics-very tiny chips and transistors
- Drug delivery methods and diagnostic instruments in nanomedicine
- Nanomaterials-Quantum dots and carbon nanotubes

- Nano-energy-sophisticated fuel cells and solar panels

CRITERIA FOR PATENTABILITY IN NANOTECHNOLOGY

Section 2(1)(j) of the Patent Act,1970 defines an invention,

1. **Newness**- An innovation needs to be brand-new and unpublished in any form anywhere in the world before. Miniaturisation or molecular manipulation are frequently the source of innovation in nanotechnology.
2. **Step of Innovation** (Non-obviousness)- A person with expertise in the subject matter must not be able to provide an answer to that innovation, that is non-obviousness. Because nanotechnology intersects with other technologies, this is very difficult to fulfill these criteria.
3. **Application in the industry** - It should be possible for an industry to employ the invention. This is often met by nanotechnology's uses in electronics, manufacturing, and diagnostics.

Indian law's exceptions

Unless improved effectiveness is demonstrated, new versions of recognised chemicals cannot be patented under Section 3(d) of the Patents Act. A persistent worry has been the ambiguity around whether size reduction to the nanoscale counts as an innovative step.

NANOTECHNOLOGY PATENT TYPES

1. **Product patents** - safeguard final goods, such as carbon nanotubes.
2. **Process Patents** - Manufacturing techniques (such as chemical vapour deposition for nanomaterials).

NANOTECHNOLOGY PATENT CLASSIFICATIONS AND FILING

International Classifications

- India and more than 100 other countries use the International Patent Classification, or IPC.
- The USPTO (The United States Patent and Trademark Office) and EPO (European Patent Office) collaborated to create the CPC (Cooperative Patent Classification), which provides more specificity.

Indian Patent Filing Mechanism

- Governed by the Patents Act, 1970, and handled by the CGPDTM (Office of the Controller General of Patents, Designs and Trade Marks).
- Ordinary, conventional, and PCT (Patent Cooperation Treaty) national phase applications are among the filing types.

- Initial filing is done using forms such as Form-1.
- Applications may be full or provisional.

Patent Phases in India

Patent filing often involves:

1. Fundamental Research-Research should be useful for the society and technological advancements
2. Prior Art Search (Google Patents, InPASS, EPO, USPTO)
3. Filing & Examination
4. Monitoring of Grants and Post-Grants

IMPORTANT AGREEMENTS AND RULES

- The Prior Informed Consent (PIC) process governs dangerous nanomaterials under the **Rotterdam Convention**.

- The second convention, the **Stockholm Convention**, deals with persistent organic pollutants (POPs), which may include Nano chemicals.

- The **Basel Convention** regulates the travel of hazardous waste, including nanoparticles, across international borders.

Efforts to Standardise

- **ISO/TS 80004**: Specifies terms related to nanotechnology.
- **IEEE-NANO**: Encourages moral investigation and intellectual property safeguarding in nanoelectronics.

GOVERNMENT INITIATIVES IN INDIA

National Developments

India has made significant strides through:

- ✓ **DST's Nano Mission** (2007) with a ₹1000 crore budget.
- ✓ **INUP (**Indian Nanoelectronics Users Program**)**
- ✓ Centers of Excellence **(IISc, IIT-Bombay)**
- ✓ Nano Science and Technology Consortium **(NSTC)**

Timeline of Initiatives

- ❖ **1980s**- IRHPAS (Intensification of Research in High Priority Areas)– initial R&D support.
- ❖ **2001**-Launch of NSTI (National Skill Training Institute).
- ❖ **2006**-Establishment of National Knowledge Commission

- **2007-2016**: Nano Mission structured in 11th and 12th Five Year Plans.
- **2020**: AWSAR scheme launched to support 20,000 Ph.D. scholars.

NANOTECHNOLOGY CASE LAWS

Diamond v. Chakrabarty (1980)- Patenting of Microorganisms- The US Supreme Court established a precedent for bio-nano patents by upholding the patentability of genetically engineered organisms.

Orica Australia v. BASF- focusses on technological development and creative innovation, which are essential for breakthroughs at the nanoscale.

SmithKline Beecham Biologicals v. Wyeth (2003)- provides examples of how to analyse previous art and identify novel molecules in biotech and nanotech interfaces.

THE DIFFICULTIES OF NANOTECHNOLOGY PATENTING

Lack of a Clear Definition- Nanotechnology's regulation is made more difficult by the lack of a standardised legal definition.

Technology Overlap- Nano advancements frequently expand upon preexisting technology, posing concerns about originality and creative leap.

Section 3(d) Lack of Clarity - It is challenging to demonstrate "enhanced efficacy" for nano-versions of current medications in India.

Environmental and Ethical Concerns- Safety and nano-waste are still mostly controlled. Bioethical issues are not adequately addressed by patent law.

COPYRIGHT AND NANOTECHNOLOGY

Although patents account for the majority of nanotechnology IPR, copyrights are also important:

I. **Software Tools**- Nano-design simulations and algorithms are protected by copyright.

II. **Journals-** Strict editorial and licensing guidelines apply to nanotech publications.

III. **Education**- Materials and lectures must adhere to copyright regulations.

SUGGESTIONS AND PROSPECTS FOR THE FUTURE

1. **Building Capacity of the Officers** -Nanotechnology-specific training for patent examiners.
2. "**Unified definitions**"- Harmonisation of nanotechnology terms across jurisdictions.

3. **Public - Private Partnerships**- Promote cooperation between business and academics.
4. **Balanced Regulation**- Make sure that innovation doesn't jeopardise ethics or safety.
5. **Data Repositories**- Create patent databases with an emphasis on disclosures pertaining to nanotechnology.

IP as a Business Asset- Nanotech patents draw investment and increase the value of organisations. Common commercialisation strategies include collaborative ventures, franchising, and licensing.

From Researchers to entrepreneurs- Thanks to government subsidies and IP protection, more academic entrepreneurs in India are turning nano-research into products.

Global Competitiveness Scenario - The US and China are at the forefront of nanotechnology innovation. To be competitive, India has to encourage ecosystems and simplify its patent procedures. If the legal system changes to accommodate the needs of this innovative industry, India has the potential to become a global leader in nanotechnology.

CONCLUSION

Driving innovation depends on nanotechnology patenting, but it also need for flexible legal systems to handle its special difficulties. India's Nano Mission and international treaties offer a basis; nonetheless, there are gaps in ethical supervision, regulatory control, and examiner experience. Development of responsible nanotechnology depends on cooperative efforts among governments, businesses, and academics. One frontier science with great power to change economies is nanotechnology. But the legal terrain controlling its protection especially with regard to patents remains complicated. Although Indian patent law offers a basic framework, it needs more sophisticated interpretation and change to fit the special character of nanotech innovations. To strike public welfare against innovation, international collaboration, standardising, and ethical monitoring are just as vital.

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