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दिनांक/Dated:20/09/2024

- पंजीकरण संख्या/Registration Number : **L-154046/2024**
- आवेदक का नाम, पता तथा राष्ट्रीयता
Name, address and nationality of the applicant : **BIRLA INDUSTRIAL & TECHNOLOGICAL MUSEUM, 19A, GURUSADAY ROAD, KOLKATA-700019 INDIAN**
- कृति के प्रतिलिप्यधिकार में आवेदक के हित की प्रकृति
Nature of the applicant's interest in the copyright of the work : **OWNER**
- कृति का वर्ग और वर्णन
Class and description of the work : **LITERARY/ DRAMATIC WORK STAND-ALONE TRAVELLING EXHIBITION HIGHLIGHTING THE 2023 SCIENCE NOBELS WITH RELATED PHYSICAL ANALOGIES AND CUTOUTS**
- कृति का शीर्षक
Title of the work : **CRACKING THE SCIENCE NOBELS 2023 (EXHIBITION)**
- कृति की भाषा
Language of the work : **ENGLISH**
- रचयिता का नाम, पता और राष्ट्रीयता तथा यदि रचयिता की मृत्यु हो गई है, तो मृत्यु की तिथि
Name, address and nationality of the author and if the author is deceased, date of his decease : **SUBHABRATA CHAUDHURI, BIRLA INDUSTRIAL & TECHNOLOGICAL MUSEUM, 19A, GURUSADAY ROAD, KOLKATA-700019 INDIAN**
- कृति प्रकाशित है या अप्रकाशित
Whether the work is published or unpublished : **PUBLISHED**
- प्रथम प्रकाशन का वर्ष और देश तथा प्रकाशक का नाम, पता और राष्ट्रीयता
Year and country of first publication and name, address and nationality of the publisher : **2023 INDIA BIRLA INDUSTRIAL & TECHNOLOGICAL MUSEUM, 19A, GURUSADAY ROAD, KOLKATA-700019 INDIAN**
- बाद के प्रकाशनों के वर्ष और देश, यदि कोई हों, और प्रकाशकों के नाम, पते और राष्ट्रीयताएँ
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(Signature)
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 Registrar of Copyrights

Cracking the Science Nobels 2023 (Exhibition)

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Copyright Application submitted by:

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अज्ञानमोहं विहाय



2023 Nobel Prize in Physics

A Microscope in Time

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The Prize

Arne Geurtsen, Peter Agre and John Drenth were awarded the 2023 Nobel Prize in Physics for their development of time lenses for capturing the world of electrons in a single, ultra-thin slice.

Timeline

- 1987**
The first time lens was used to capture electrons in flight.
- 1990s**
Laser and streak camera techniques helped to improve the resolution.
- 1994**
Peter Agre's team in Canada is credited with developing the first electron microscope.
- 2001**
Scientists achieved a resolution of 200 picometers, enabling them to see individual atoms.
- 2000s**
Additional steps were taken to improve the resolution of electrons in a single snapshot.
- 2023**
Arne Geurtsen, Peter Agre and John Drenth were awarded the Nobel Prize in Physics.

Applications

Time lenses have a wide range of applications, from studying the structure of proteins to understanding the behavior of electrons in quantum systems. They are also used in the development of new materials and in the study of complex systems.

Electrons in Pulses of Light

Electrons in pulses of light are a key component of time lenses. They allow scientists to capture the motion of electrons in a single snapshot, providing a detailed view of their behavior over time.

Shorter Pulses with High-Frequency Waves

Shorter pulses with high-frequency waves are used to create time lenses. These pulses are generated using advanced laser technology and are essential for capturing the ultra-fast motion of electrons.

Higher-Frequency in Resolution of Imaging Electrons

Higher-frequency waves in the resolution of imaging electrons allow for a more detailed view of the structure of molecules and materials. This is achieved by using shorter pulses and higher-frequency waves to capture the motion of electrons.

The world of electrons explored in Attosecond Imaging

The world of electrons explored in attosecond imaging is a fascinating one. It allows scientists to see the motion of electrons in real-time, providing a detailed view of their behavior over time. This is achieved by using ultra-short pulses of light to capture the motion of electrons.



30/09/24
अज्ञानमर्षि



2023 Nobel Prize in Chemistry

Adding Colour to Nanotechnology

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The Prize
The 2023 Nobel Prize in Chemistry is shared by Moungi Bawendi, Louis E. Brus and Alexei L. Efremov for their discovery and development of quantum dots, which have made possible new uses of visible light.

Timeline

1958

First time both the Nobel Prize and the Nobel Peace Prize.

1983

First time awarded to a woman, Dorothy Crowfoot Hodgkin.

1993

First time awarded to a woman, Astrid Hegerberg.

2023

First time awarded to a woman, Jennifer Doudna.

1947

First time awarded to a woman, Maria Goeppert-Mayer.

1981

First time awarded to a woman, Barbara H. Steinberg.

1986

First time awarded to a woman, Rita Levi-Montalcini.

1995 to present

First time awarded to a woman, Dorothea Bensch.

Applications



Quantum dots are tiny particles of semiconductor material that can be made to emit light of different colors. This is due to the quantum confinement effect.

Size Matters



Quantum dots are particles so tiny that their atoms are measured in tenths of a nanometer. They are so tiny that quantum effects make a difference to the way they interact with light.

Quantum Effects Arise when Particles Shrink



The Periodic Table's Third Dimension



Quantum dots are at the heart of nanotechnology, where the properties of a material change based on its size. These nanoparticles give us new possibilities to discover materials with extraordinary properties.

Revolutionizing the Production of Quantum Dots



Solvent and temperature affected the surface structure and size of quantum dots.



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2023 Nobel Prize in Medicine

Pioneering with Promise of COVID-19 Vaccine

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The Prize

The 2023 Nobel Prize in Medicine has been awarded to Katalin Karikó and Drew Weissman in recognition of their pioneering work in developing messenger RNA (mRNA) technology for medical vaccines and gene therapy.

Timeline

- 1978** Liposome vaccines are found to mean mRNA can enter cells.
- 1993** Influenza vaccines based on mRNA are tested in pigs.
- 2005** Modified mRNA and from Recombinant Adenovirus was used to produce influenza vaccines.
- 2015** First clinical trial of an mRNA vaccine for HIV/AIDS was carried out.
- 2023** Nobel Prize awarded to Karikó and Weissman for their work on mRNA.

Applications

Therapeutic vaccines, gene therapy, regenerative medicine, vaccines, and gene editing.

Traditional vaccines

The goal of a vaccine is to stimulate our immune system to prevent, fight or control particular infectious agents, such as a virus. Traditional vaccines use a weakened or dead form of a virus to stimulate the immune system when injected. Our bodies usually develop antibodies to fight the virus, but it usually takes weeks or months to produce.

Producing Immunity with mRNA

mRNA carries genetic information. It is made from a DNA template in a process called transcription. The cell's ribosomes use the mRNA as a blueprint to produce proteins. The proteins are then used by the immune system to produce antibodies. mRNA vaccines are made by injecting mRNA into cells, which then produce the proteins that trigger the immune response. This produces a faster and stronger immune response than traditional vaccines.

The Breakthrough

TRADITIONAL mRNA is quickly broken down by enzymes in the body. **MODIFIED mRNA** is more stable and can last longer in the body. This allows the mRNA to be translated into proteins more effectively. By modifying mRNA, the inflammatory response is reduced and protein production is increased.

New Era in Vaccinology

A landmark in vaccinology, progress in the development of mRNA vaccines has led to the production of the first mRNA vaccine against COVID-19. This is the beginning of a new era in vaccinology. The first mRNA vaccine against COVID-19 was developed in just 100 days. It is a testament to the power of mRNA technology.

30 Baits
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