

SCIENCE CENTRE NEWS LETTER

August 2023
Issue 89



Published by
Shalini Agarwal
I.A.S.
Municipal
Commissioner

Editor
D.M. Jariwala
Add. City Engineer (Civil)

Sub Editor
Bhamini Mahida
Chief Curator
Divyesh Gameti
Curator (Science)

Co-ordinator
Dr. Pruthul Desai
Principal
P. T. Science College



SCIENCE CENTRE

Volume 8, Issue 5

WHAT'S NEW IN SCIENCE?

Chandrayaan-3

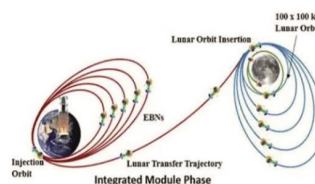
ISRO (Indian Space Research Organization) launched India's third lunar mission Chandrayaan-3 perched on GSLV Mark 3 heavylift launch vehicle, named 'Bahubali' rocket at 2:35 p.m. from Satish Dhawan Space Centre in Sri Harikota, Andhra Pradesh on 14th July 2023.

The Vikram lander of mission is expected to soft land on the surface of the South Pole region of the Moon on around 23rd August 2023. The Chandrayaan-3 consists of an indigenous Lander Module (LM), Propulsion Module (PM) and a Rover Pragyan with the objective of developing and demonstrating new technologies required for inter-planetary missions. The space craft has been effectively placed in the trajectory it will take to reach the Moon. The distance

between Earth and Moon is approximately 3,84,400 kilometers. Choosing the month of July for the launch of the

Chandrayaan-3 is because of the closeness of the Earth and the Moon.

Chandrayaan-3 lunar mission is making steady progress, had successfully completed its fourth orbit-raising maneuver on July 20, 2023. The Indian Space Research Organization (ISRO) had confirmed that the spacecraft is now in a 71351 km x 233 km orbit around Earth. Once the final orbit-raising maneuver will complete, the spacecraft will perform series of Earth orbits and engine will burn to gradually increase its speed and position it for lunar insertion. The spacecraft will enter an Earth-to-Moon transfer orbit, after which the gravity of the Moon will pull it in.



Courtesy - Lourdes Convent High School

SCIENTIST OF THE MONTH

Dr. Shailesh Nayak

Dr. Shailesh Nayak was born on 21 August, 1953 at Billimora, Navsari, Gujarat. He did PhD in Geology in 1980 from M. S (Maharaja Sayajirao) University of Baroda, Vadodara and specialized in Oceanography and Remote Sensing. He became Group Director of Marine and Water Resources in 2001. He served as a Director of Indian National Centre for Ocean Information Service (INCOIS), Hyderabad in 2006, Chairman of Indian Ocean- Global Ocean Observing System (IO-GOOS) from 2006 to 2010. He also served as President in Indian Meteorological Society (IMS) from 2012 to 2014. He is currently Director of National Institute of Advanced

Studies and Distinguished Scientist in the Ministry of Earth Science.

Dr. Nayak provided leadership to set up a state-of-the-art Tsunami Warning Centre. He developed methodology for potential fishing zones for saving fuel and time, Marine GIS (Geographic Information system) techniques for identifying various coastal land forms, mangroves plant communities as well as high tide line and low tide line.

Dr. Nayak is recipient of Hariom Ashram Prerit Inter- University Smarak Trust Prize for the year 1981-82 for Geology, National Mineral Award-2005 (Applied Geology) of Ministry of Mines, Government of India in 2005, Golden Medal of Indian Geophysical Union in 2009, Bhaskara Award in 2009 and Vikram Sarabhai Memorial Award in 2012.



Courtesy - Lourdes Convent High School

SCIENCE FACTS AUGUST 2023

1 August 1885	Hungarian Chemist George de Hevesy (winner of the 1943 Nobel Prize in Chemistry for his key role in the development of radioactive tracers) was born.
1 August 1924	Ukrainian-born Physicist Georges Charpak (winner of the 1992 Nobel Prize in Physics for his invention and development of particle detectors) was born.
2 August 1932	The positron (antiparticle of the electron) is discovered by Carl D. Anderson.
5 August 1930	Neil Alden Armstrong (First person to set foot upon the moon) was born on this day.
6 August 1881	Prof. Alexander Fleming (discoverer of Penicillin) was born.
8 August 1901	Ernest Lawrence (inventor of Cyclotron) was born.
8 August 1902	English Physicist Paul Dirac (co-winner of the 1933 Nobel Prize in Physics for the discovery of new productive forms of atomic theory) was born.
9 August 1911	American Physicist William Alfred Fowler (co- winner of the 1983 Nobel Prize in Physics for his theoretical and experimental studies of the nuclear reactions of importance in the formation of the chemical elements in the universe) was born.
10 August 1902	Swedish Chemist Arne Tiselius (won the 1948 Nobel Prize in Chemistry for his research on electrophoresis adsorption analysis, especially for his discoveries concerning the complex nature of the serum proteins) was born.
10 August 1913	German Physicist Wolfgang Paul (co-winner of the 1989 Nobel Prize in Physics , who co-developed the non-magnetic quadrupole mass filter which laid the foundation for what is now called an ion trap) was born.
11 August 1926	Lithuanian-born Chemist Aaron Klug (winner of the 1982 Nobel Prize in Chemistry for his development of crystallographic electron microscopy and his structural elucidation of biologically important nucleic acid-protein complexes) was born.
12 August 1887	Austrian Physicist Erwin Schrodinger (co-winner of the 1933 Nobel Prize in Physics for the formulation of the Schrodinger equation) was born.
12 August 1919	Well known Indian Scientist Dr. Vikaram Ambalal Sarabhai was born on this day.
13 August 1872	German Chemist Richard Willstatter (who studied the structure of plant pigments) was born.
13 August 1913	Harry Brearley invented stainless steel.
15 August 1892	French Physicist Louis, 7th duc de Broglie (winner of the 1929 Nobel Prize in Physics for the wave-like behaviour of matter was first experimentally demonstrated in 1927) was born.
16 August 1845	French Physicist Gabriel Lippmann (won the 1908 Nobel Prize in Physics for the invention of a method for reproducing colours by photography, based on the interference phenomenon) was born.
17 August 1870	Frederick Russell (inventor of first successful typhoid fever vaccine) was born on this day.
23 August 1931	American microbiologist Hamilton O. Smith (co-winner of the 1978 Nobel Prize in Physiology or Medicine for discovering type II restriction enzymes) was born.
25 August 1900	German Physician and biochemist Hans Adolf Krebs (co-winner of the 1953 Nobel Prize in Physiology or Medicine for his discovery of the citric acid cycle) was born.
26 August 1906	Albert Sabin (inventor of oral polio vaccine) was born on this day.
29 August	International Day against Nuclear Tests. (by U.N.)
30 August 1852	Dutch Physical and Organic Chemist Jacobus Henricus van't Hoff (The first winner of the Nobel Prize in Chemistry) was born
U. N. : United Nations	
WHO -World Health Organization	
UNESCO - United Nations Educational Scientific & Cultural Organization	



Timings

Tuesday to Sunday
& Public Holidays
9.30 am to 4.30 pm

Address

Science Centre
City Light Road,
Surat - 395 007

Contact

0261 - 2255947
+91 97277 40807

Fax No.

91-261-2255946

E mail

sciencecentre@suratmunicipal.org

Web Site

www.suratmunicipal.gov.in



Answers: 1) b, 2) d, 3) b, 4) a, 5) c, 6) a, 7) c

SCIENTIFIC QUESTION

What is Nanophotonics?

Nanophotonics is the study of understanding and engineering light at a very, very small scale or also known as a nanometer scale. One nanometer is a metric unit of length equal to one thousand-millionth of a metre. On the other hand, the word photonics in nanophotonics basically refers to photons, the building block of light. Nanophotonics is how these photons behave on a nanoscale.

We can start controlling and manipulating interactions, giving rise to ingenious inventions, such as a better way for cancer imaging or a potential solution for room temperature Quantum Computers. Researchers and Scientists have been studying how once light is squeezed down into a nanometer scale, odd behaviours can occur and completely challenge the way we perceive our physical world. By demystifying these odd behaviours, we can have the power to break the limits of current technology and create superior photonics devices.

Another exciting example for photonic nano materials is Quantum Dots (QDs). As the name implies, think of Quantum Dots incredibly small matter that is concentrated in a single dot. They are composed of semiconducting materials such as silicon or Cd

(cadmium) meaning that they are neither strictly an insulator nor a conductor but chemically behaves like devices.

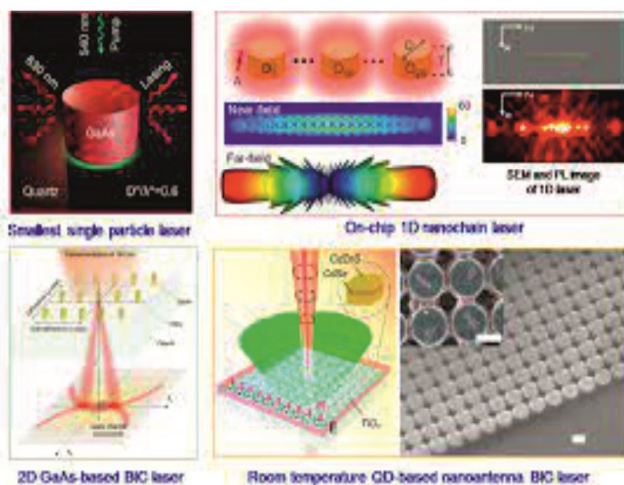
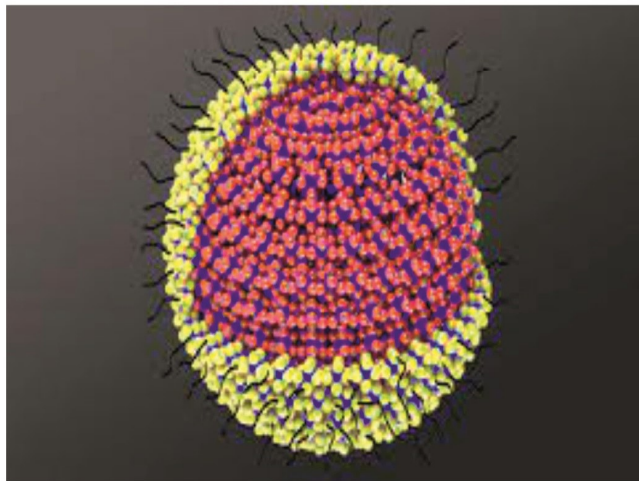
How Nanophotonics can impact our World?

- One promising application of QDs is that they can revolutionize the way we diagnose and treat cancer today. Cancer patients can be injected with a cocktail of QDs that would “label” cancerous cells. Once they are gathered at the tumor site, the positions emitted from the QDs could be imaged with PET (Position Emission Tomography) scanner which would indicate the presence and location of a tumor.

- An “optical barcode” of the different coloured Q dots could help Doctors identify tumor type and stage by allowing them to see differing levels of various tumor markers. QDs imaging can potentially replace the lengthy and costly process of how we are currently treating cancer today.

In classical mechanics, light is described as coupled electric and magnetic fields propagating through space as a travelling wave. However, this wave theory is not sufficient to explain the properties of light at very low intensity or at a nanoscale. As light behaves as both waves and particles, Physicists have merged these two classical theories together

and introduced a more comprehensive one, often known as Quantum Electrodynamics (QED).



KNOW THE EXHIBIT

Health in Space – Hearing loss

Studies have shown that even one shuttle mission could cause a substantial temporary hearing loss and a lesser permanent hearing loss, usually at the higher frequencies involved in hearing speech. Crews aboard the Soviet Salyut 7 and the Russian Mir Space Stations also registered temporary and permanent hearing losses after they returned.

On the International Space Station, Astronauts initially had to wear ear plugs all day. But NASA developed ways to reduce the noise levels with acoustic padding for the walls and quieter fans, among other measures.

Besides the noise levels, other factors that may contribute to hearing loss in space includes atmospheric contaminants, higher intracranial pressure and greater carbon dioxide levels.

In 2015, NASA studied how to prevent hearing loss during a one- year mission to the International Space Station with two crew members. They went to see how much hearing they can preserve for these individuals and determine an acceptable risk for hearing loss. Ultimately, they want to figure out how to minimize hearing loss over an Astronaut's life time, not just one mission.

This exhibit is situated at “Entering Space Gallery” between Fun Science Gallery and Power of Play Gallery at the first floor of Science Centre.



QUIZ

- A full length of a distant tall building can definitely be seen by using _____.
 - A concave mirror
 - A convex mirror
 - A plane mirror
 - Both concave and plane mirror
- In which of the following medium a ray of light incident obliquely at same angle would bend the most?
 - Kerosene
 - Water
 - Mustered Oil
 - Glycerine
- Light travel fastest in _____.
 - Water
 - Air
 - Glass
 - Diamond
- Oxidation is a process which involves _____.
 - Addition of oxygen
 - Addition of hydrogen
 - Removal of oxygen
 - Removal of hydrogen
- What type of chemical reactions take place when electricity is passed through water?
 - Displacement
 - Combination
 - Decomposition
 - Double displacement
- The process of digestion is completed by _____.
 - Intestinal juice/liquid
 - trypsin
 - pepsin
 - bile juice/liquid
- Which is the first enzyme to mix with the food in the digestive tract?
 - pepsin
 - Cellulose
 - Amylase
 - trypsin