SCIENCE CENTRE NEWS LETTER

February 2019
Issue 46

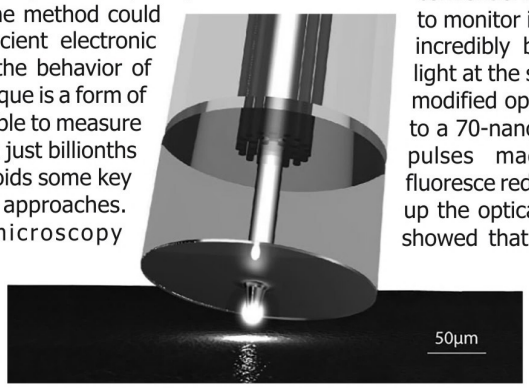
SCIENCE CENTRE

Volume 4, Issue 10

WHAT'S NEW IN SCIENCE

Taking the temperature of the tiniest things

Nanoscale thermometer takes precise heat readings of tiny spots, billionths of a meter wide. An optical fiber, its core tapered to an aperture just 70 nanometers wide, shines light onto fluorescent quantum dots to measure their temperature. The temperature of tiny structures, thousands of times smaller than a grain of sand, can now be measured accurately, thanks to a technique developed by Keio University researchers. The method could help to design more efficient electronic components, or monitor the behavior of individual cells. The technique is a form of nanoscale thermometry, able to measure the temperature at a point just billionths of a meter wide, and it avoids some key problems of previous approaches. Scanning thermal microscopy techniques, which come in direct contact with a sample, have a spatial precision of less than 100 nanometers. But the microscope's probe tip can damage the sample, and heat exchange between the sample and the equipment can affect the temperature measurement. Meanwhile, non-contact methods using lasers have a spatial resolution that is usually limited to half the wavelength of the incoming light, which is typically several hundred nanometers. Yoshihiro Taguchi of Keio University, and colleagues, have invented a non-contact technique called fluorescence near-field optics thermal nanoscopy (Fluor-NOTN), with a spatial resolution of just 70 nanometers. It relies on nanoscale-sized 'quantum dots' made of cadmium selenide, which fluoresce when light shines on them. Crucially, the time it takes for this fluorescence to fade away depends on the quantum dots' temperature. The team coated a silicon surface with the quantum dots, and used a conventional electrical thermometer to monitor its temperature. They shot incredibly brief pulses of blue laser light at the surface through a specially modified optical fiber, its core tapered to a 70-nanometer-wide opening. The pulses made the quantum dots fluoresce red light, which travelled back up the optical fiber to a detector. This showed that the fluorescence lifetime was just over 13 nanoseconds at room temperature. However as the temperature increased to 40 degrees Celsius, the lifetime decreased to about 12 nanoseconds. By measuring the fluorescence lifetime of quantum dots in this way, the researchers hope to study the temperature distribution in minuscule straw-like structures called carbon nanotubes (CNTs). An electrical current causes some CNTs to heat up and emit light, which could be used to generate pulses that carry information in novel forms of computer chips.

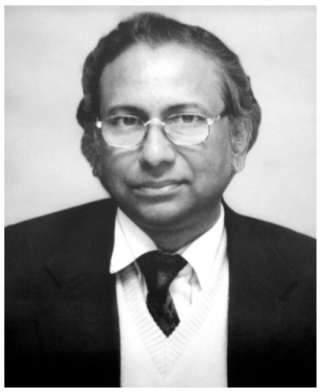


Courtasy : Millennium School, Dandi Road, Surat

SCIENTIST OF THE MONTH

Asis Dutta

Asis Dutta was born on February 2, 1944 at Taki in West Bengal. He did his M.Sc., Ph.D. and D.Sc. from Calcutta University. Then he persued his postdoctoral research from the Public Health Research Institute, New York, from 1968 to 1971 and also from California, in the year 1971-1973. Asis Dutta was a specialist of Molecular Biology and Biotechnology related to human health and agriculture. Further he worked extensively on cloning and characterisation of two novel genes, which gave him international acclaim and exposure for doing research in new field. His other important works include cloning and sequencing of genes, of Amaranthus seeds, which would lead to development of transgenic crops with high nutritional value. His five research findings have been patented in India and abroad. Asis Dutta received the Shanti Swarup Bhatnagar Prize in 1980, G.D.Birla Award for Scientific Work in 1991 and the Padma Shri in 1999. Presently he is the Vice-Chancellor of J.N.U(Jawahar Lal Nehru University), New Delhi.



Courtasy : Millennium School, Dandi Road, Surat

SCIENCE FACTS FEBRUARY 2019

2 Feb	World Wetlands Day (recognized by U.N.).
4 Feb	Bhopal Gas Tragedy.
5 Feb 1971	International Day of persons with disabilities. (by U. N.)
6 Feb	International Day against Female Genital Mutilation.
8 Feb 1834	Dimitri Ivanovich Mendeleiev (Formulator of Periodic Table) was born.
11 Feb1847	Thomas Alwa Edison (Inventor of Dynamo) was born.
12 Feb 1941	Sir Alexander Fleming did first experiment of Penicillin.
13 Feb	World Radio Day (UNESCO)
14 Feb 1929	Devendra Lal (Vise President of Indian Academy of Science and Ex-Director of PRL) was born
15 Feb 1564	Galileo Galilee (Famous Astronomer) was born.
16 Feb 1919	Jyoti Bhushan Chetarjea (Discoverer of Haemoglobin-E) was Born.
18 Feb 1745	Alessandro Volta (Inventor of Electric Battery) was born.
19 Feb1473	Nicolaus Copernicus (Famous Astronomer) was born on this day.
20 Feb	World Day of Social Justice (recognized by U.N.)
20 Feb 1962	John Glenn the first American Astronaut to orbit the Earth.
21 Feb	International Mother Language Day. (UNESCO)
24 Feb 1940	Sengamedu Shrinivasa Badrinath (Specialist in Vitreo Retina Surgery) was born.
25 Feb 1988	First successful test fire of "PRUTHVI - 1 MISSILE" by India was done.
28 Feb	National Science Day is celebrated in India to mark the discovery of the "Raman effect".
	U. N. : United Nations UNESCO United Nations Educational Scientific & Cultural Organization

Ans:- 1. b, 2. b, 3. c, 4. d, 5. a.

Timings

Tuesday to Friday
9.30 am to 4.30 pm

Saturday - Sunday & Public Holidays
11.00 am to 6.30 pm

Address

Science Centre
City Light Road,
Surat - 395 007

Contact

0261 - 2255947
+91 97277 40807

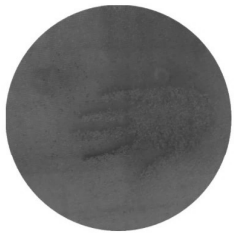
Fax No.
91-261-2255946

E mail
sciencecentre@suratmunicipal.org

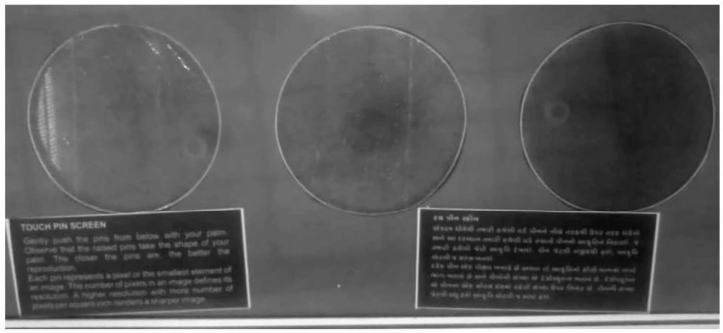
Web Site
www.suratmunicipal.gov.in

KNOW THE EXHIBIT AT FUN SCIENCE GALLERY

Feel the sense of Touching



1. Take your palm near the middle of the circle and put it in upward direction. You will feel the sense of touching. Observe the pattern made by your palm and finger. The feeling of the nerves system of the body. There are certain cells under the skin which sense feelings like touch, pressure and pain. The nerves which are attached with these cell drives the feeling towards the brain. Brain can not understand the pressure of so many pins at the same time. So it gives instruction to hand to take off the hands from it. That is why our body pulls back and our hand from the exhibit in thousand part of a second. Next time when we repeat this experiment, our brain gathers information and gives instruction for not pulling back the hand. So we can enjoy observing the pattern of our palm and fingers.



SCIENTIFIC QUESTION

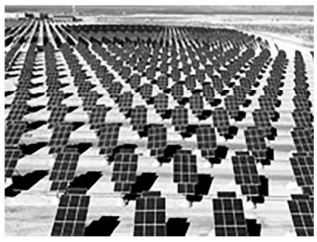
How do we get more energy from sun?

Solar energy is energy from the sun. When the sun's energy reaches the earth in the form of sunlight, it can be converted into other forms of energy.

The sun is a huge ball of gas, mostly hydrogen with a little helium. The gravitational attraction of all that mass makes enormous pressure in the interior that forces the hydrogen atoms to fuse together in a nuclear reaction that creates helium atoms and radiant energy. The radiant energy is carried by packets of light called photons. The photons are bundles whose energy depends on frequency. The radiant energy corresponds to a range of wavelengths on the electromagnetic spectrum, of which visible light is only a small portion.

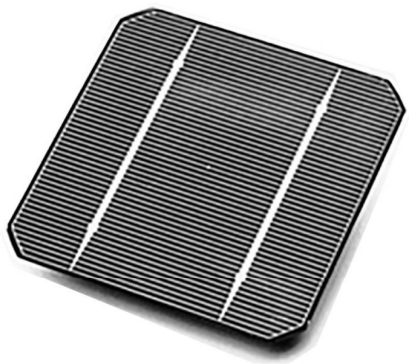
Centuries ago, people used magnifying glasses to focous sunlight on wood. This caused the wood to catch fire In the 1800s and early 1900s, scientists began experimenting with solar collectors, devices that could absorb sunlight to collect heat. In the 1950s, scientists at Bell Labs, generated a measurable electric current with the first silicon solar cell. During the 1960s, the space industry established reliable, less expensive solar power. Today, solar energy is one of the most promising renewable energy sources. This means that we can use the sun's energy today, because the sun will shine again tomorrow. To be useful, however, solar energy must be collected, converted and stored.

Collecting:



Since sunlight is not concentrated in one place, solar energy needs to be collected. Solar power plants can capture a lot of energy since their collection devices are laid out over large, flat, open, sunny areas.

Converting:



On a small scale, sunlight can be used in its original form for heating a room. If converted to electricity, solar energy becomes useful on a large scale. Photovoltaic cells and solar power plants convert sunlight into electricity.

Storing: There's no sunshine at night, so solar energy needs to be stored. Solar power plants can store the sunlights heat-sometimes in liquid salt tanks-and use it later to boil water into steam that spins a turbine to generate electricity.

Courtasy :
Millennium School, Dandi Road, Surat

EXHIBITION

KITE

Considering the upcoming festival of 'Uttarayan' (Kite Festival) an exhibition was organised from 8th to 18th January, 2019 on the first floor of Art Gallery. In this exhibition kites from different countries, history of kite, Science behind Kite, preparation of kite, international kite festival were exhibited.

SCIENCE QUIZ

1. The fuse in our domestic electric circuit melts. when there is a high rise in?

a. Inductance b. Current c. Capacitance d. Resistance

2. Why pure water is bad conductor of electricity?

a. Not-volatile b. Feebly ionized c. A very good solvent d. A non-polar solvent

3. Which action dried the damp clothes in spin dryers?

a. Central forces b. Centripetal force c. Centrifugal force d. Non central forces

4. Which one of the following is a conductor of electricity?

a. Rubber b. Benzene c. Pure water d. Salt water

5. Which speed of sound is unaffected by change in?

a. Presure b. Volume c. Humidity d. Temperature

SCIENCE CENTRE

Science Centre forms the main part of the entire complex; it displays thematic galleries in the field of Science and Technology. The ground floor of Science Centre showcases 3D Theatre and Souvenir Shop. The first floor of Science Centre showcases Planetarium, Fun Science Gallery and Power of Play Gallery and second floor of Science Centre showcases Diamond Gallery, whereas Entering into Space, Textile Gallery, Cosmos Gallery and Polar Science Gallery are under development.

3d Show	Tuesday to Friday (Time)	Saturday, Sunday & Holidays (Time)
English	09:15, 11:20, 12:00, 02:40, 04:00	11:20, 12:00, 02:40, 04:00
Hindi	10:00, 10:40, 12:40, 01:20, 02:00, 03:20	12:40, 01:20, 02:00, 03:20, 04:40, 05:20, 06:00

Science Centre + Planetarium + Museum + Diamond Gallery	
Above 18 Years	Rs. 100
3 Years to 18 Years	Rs. 65
Science Centre + Museum + Diamond Gallery	
Above 18 Years	Rs. 60
3 Years to 18 Years	Rs. 40
Science Centre + Planetarium + Museum + Diamond Gallery + 3D Show	
Above 18 Years	Rs. 120
3 Years to 18 Years	Rs. 80
Planetarium	
Above 18 Years	Rs. 50
3 Years to 18 Years	Rs. 40
3D Show	
Above 18 Years	Rs. 60
3 Years to 18 Years	Rs. 40

Planetarium

Tuesday to Friday		Saturday, Sunday & Public Holidays	
09:30 to 10:20	English	11:30 to 12:20	Gujarati
10:30 to 11:20	Gujarati	12:30 to 01:20	English
11:30 to 12:20	Gujarati	01:30 to 02:20	Hindi
12:30 to 01:20	English	02:30 to 03:20	Hindi
01:30 to 02:20	Hindi	03:30 to 04:20	Gujarati
02:30 to 03:20	Hindi	04:30 to 05:20	English
03:30 to 04:20	Gujarati	05:30 to 06:20	Gujarati