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SCIENCE CENTRE

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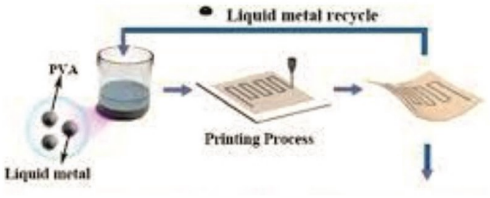
WHAT'S NEW IN SCIENCE?

Liquid metal sticks to surfaces without a binding agent

Everyday materials such as paper and plastic could be transformed into electronic 'smart devices' by using a simple new method to apply liquid metal to surfaces, according to scientists. The study demonstrates a technique for applying a liquid metal coating to surfaces that do not easily bond with liquid metal.



"Before, we thought that it was impossible for liquid metal to adhere to non-wetting surfaces so easily, but here it can adhere to various surfaces only by adjusting the pressure, which is very interesting," said Bo Yuan, a scientist at Tsinghua University, Beijing, China.

Scientists seeking to combine liquid metal with traditional materials have been impeded by liquid metal's extremely high surface tension, which prevents it from binding with most materials, including paper. To overcome this issue, Scientists focused on a technique called "transfer printing," which involves using a third material to bind the liquid metal to the surface. But this strategy comes with drawbacks - adding more materials can complicate the process and may weaken the end product's electrical, thermal or mechanical performance. To explore an alternative approach that would allow them to directly print liquid metal on substrates without sacrificing the metal's properties, Yuan and Scientists applied two different liquid metals (eGaln and BilnSn) to various silicone and silicone polymer stamps and then applied different forces as they rubbed the stamps onto paper surfaces. Scientists found that rubbing the liquid metal-covered stamp against the paper with a small amount of force enabled the metal droplets to bind effectively to the surface, while applying larger amounts of force prevented the droplets from staying in place.

Yuan noted that the Scientists are still figuring out how to guarantee that the liquid metal coating stays in place after it has been applied. For now, a packaging material can be added to the paper's surface, but Scientists hopes to figure out a solution that won't require it. "Just like wet ink on paper can be wiped off by hand, the liquid metal coating without packaging here also can be wiped off by the object it touches as it is applied," said Yuan.

Courtesy - Shree Kanchanlal Mamawala Primary School No.-88

SCIENTIST OF THE MONTH

Dr. S. Venkata Mohan

Dr. S. Venkata Mohan was born on 1st July 1970. He did B. Tech (Civil Engineering) in 1991, M. Tech (Environmental Engineering) in 1993 and Ph. D (Environmental Engineering) in 1998 from Sri Venkateshwara University, Tirupati, Andhra Pradesh.

Dr. S Venkata Mohan is working as a Scientist in CSIR-IICT (Council of Scientific and Industrial Research-Indian Institute of Chemical Technology), Hydrabad since 1998. Dr. Mohan's research majorly intended to understand and respond to the human-induced environment change in the framework of sustainability in the interface of Environment and Bioengineering. His main research interests are the areas of Advanced Waste Remediation, Aciodogenesis, Microbial Electrogenesis, Photosynthesis, CO_2 Biosequestration, Circular Bioeconomy, Self Regenerative System and Biorefinery. He has successfully demonstrated the production of Low-Carbon Hydrogen from waste at pilot scale and established a first of its kind waste biorefinery platform.

Dr. Mohan authored more than 400 research articles, 60 chapters for books, edited 4 books and has 9 patents. Dr. Mohan was recipient of 'National Bioscience Award-2012' by Department of Biotechnology (DBT) in 2012, 'Shanti Swarup Bhatnagar Prize' for the year 2014 in Engineering Science, 'Environment Engineering Design Award 2017' by National Design and Research Forum (NDRF) of Institute of Engineers, India in 2017, 'DBT- Tata Innovation Fellow 2018' by Department of Biotechnology, 'VASVIK Award' for the year 2018 in category of Environmental Science and Technology by Vividhlaxi Audyogik Samshodhan Vikas Kendra, 'Most Outstanding Researcher in the field of Environmental Science in India-2018' by Careers 360.

Courtesy - Shree Kanchanlal Mamawala Primary School No.-88

SCIENCE FACTS JULY 2023

1 July	Birthday of famous Physician and Bharat Ratna Awarded Bidhan Chandra Roy which is celebrated as 'Doctor's Day' in India.
1 July 1929	American Biologist Gerald Edelman (co- winner of the 1972 Nobel Prize in Physiology or medicine for work on the immune system) was born.
1 July 2004	Saturn orbit insertion of Cassini-Huygens begins at 01:12 UTC and end at 02:48 UTC.
2 July 1862	English Physicist William Henry Bragg (co winner of the 1915 Nobel Prize in Physics for their services in the analysis of crystal structure by means of X- rays) was born.
2 July 1938	Chandrakumar Naranbhai Patel (inventor of the Carbon Dioxide Laser) was born.
4 July 2005	Successful collision of NASA's satellite "Deep Impact" with comet into the space was held at the distance 13.04 million km from the Earth.
5 July 1891	American Chemist John Howard Northrop (co- winner of the 1946 Nobel Prize in Chemistry for isolation, crystallization, and study of enzymes, proteins and viruses) was born.
5 July 1996	First Clon Mammal (Genetically identical individuals) 'Dolly' (a sheep) was born.
6 July 1885	Louis Pasteur successfully tests his vaccine against rabies.
6 July 1906	Daulat Singh Kothari (well known Indian physicist) was born.
7 July 1959	14:28 UT Venus occults the star Regulus.
7 July 2018 (First Saturday of July)	International Cooperative Day
9 July 1926	American-born physicist Ben Roy Mottelson (won the 1975 Nobel Prize in Physics for his work on the non- spherical geometry of atomic nuclei) was born.
10 July 1902	German Chemist Kurt Alder (known for Diels – Alder reaction) was born.
10 July 1920	American Physicist Owen Chamberlain (co- winner of the 1959 Nobel Prize in Physics for the discovery of the antiproton, a sub atomic antiparticle) was born.
10 July 1962	Telstar, the world's first communications satellite is launched into orbit.
11 July	World Population Day. (by U.N.)
12 July 1913	American Physicist Willis Lamb (won the 1955 Nobel Prize in Physics for his discoveries concerning the fine structure of the hydrogen spectrum) was born.
12 July 1928	American Chemist Elias James Corey (won the 1990 Nobel Prize in Chemistry for his development of the theory and methodology of organic synthesis, specially retrosynthetic analysis) was born.
14 July 1965	The Mariner 4 flyby of Mars takes the first close-up photos of another planet.
15 July 1921	American Chemist Robert Bruce Merrifield (won the 1984 Nobel Prize in Chemistry for the invention of solid state peptide synthesis) was born.
16 July 1888	Dutch Physicist Fritz Zernike (won the 1953 Nobel Prize in Physics for his invention of the phase- contrast microscope) was born.
16 July 1945	The first detonation with code name "Trinity" conducted by United States at "Los Alamesh" was done on this day. This date is known as the beginning of Atomic Age.
16 July 1969	Successful launching of "Apollo – 11" was done with the help of "Saturn –V" rocket from Kennedy Space Center at Florida.
16 July 1994	Comet Shoemaker – Levy -9 collides with Jupiter. Impacts continue until July 22nd .
18 July	Nelson Mandela International Day for freedom, justice and democracy. (by U.N.)
18 July 1853	Dutch Physicist Hendrik Lorentz (co- winner of the 1902 Nobel Prize in Physics for the discovery and theoretical explanation of the Zeeman effect) was born.
18 July 1980	Launching of Indian satellite "Rohini RS-1" into the Space.
19 July 1814	Samuel Colt (inventor of Revolver) was born on this day.
19 July 1938	Indian astrophysicist Jayant Narlikar was born.
20 July 1822	German Scientist, father of modern genetics Gregor Mendel was born.
21 July 1969	Neil Armstrong and Edwin Buzz Aldrin become the first men to walk on the Moon, during the Apollo 11 mission.
24 July 1969	Successful landing of "Appolo-11" in the pacific Ocean.
25 July 1978	"Louise Joy Brown" – the world's first successful Test Tube Baby was born in Great Britain.
27 July 2018	19th Annual System Administrator Appreciation Day. (Also known as Sysadmin Day).
28 July 1925	American Scientist Baruch S. Blumberg (co-winner of the 1976 Nobel Prize in Physiology or Medicine for his work on the hepatitis B virus) was born.
29 July 1898	American Physicist Isidor Isaac Rabi (winner of the 1944 Nobel Prize in Physics for his discovery of nuclear magnetic resonance) was born.

U. N. : United Nations

WHO -World Health Organization

UNESCO - United Nations Educational Scientific & Cultural Organization

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

Timings

Tuesday to Sunday
& Public Holidays

9.30 am to 4.30 pm

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बहुजनहिताय बहुजनसुखाय

SCIENTIFIC QUESTION

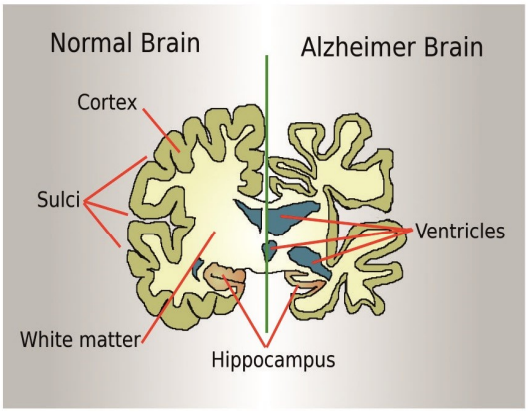
What is Alzheimer's disease?

Alzheimer's disease is a brain disorder that gets worse over time. It's characterized by changes in the brain that lead to deposits of certain proteins in the brain. Alzheimer's disease causes the brain to shrink and brain cells to eventually die. Alzheimer's disease is the most common cause of dementia — a gradual decline in memory, thinking, behaviour and social skills. These changes affect a person's ability to function. The early signs of the disease include forgetting recent events or conversations. Over time, it progresses to serious memory problems and loss of the ability to perform everyday tasks.

Symptoms: Memory loss is the key symptom of Alzheimer's disease. At first, someone with the disease may be aware of having trouble remembering things and thinking clearly. Brain changes associated with Alzheimer's disease lead to growing trouble with the following:

•**Memory**: Everyone has memory lapses at times, but the memory loss associated with Alzheimer's disease persists and gets worse. Over time, memory loss affects the ability to function at work or at home. People with Alzheimer's disease may lead the following :

- Repeat statements and questions over and over
- Forget conversations, appointments or events
- Misplace items, often putting them in places that don't make sense
- Get lost in places they used to know well
- Eventually forget the names of family members and everyday objects
- Have trouble finding the right words for objects, expressing thoughts or taking part in conversations.



• **Thinking and reasoning:** Alzheimer's disease causes difficulty in concentrating and thinking, especially about abstract concepts such as numbers. Doing more than one task at once is especially difficult for them.

• **Judgments and decisions:** Alzheimer's disease causes a decline in the ability to make sensible decisions and judgments in everyday situations. For example, a person may make poor choices in social settings or wear clothes for the wrong type of weather. It may become harder for someone to respond to everyday problems. For example, the person may not know how to handle food burning on the stove or decisions when driving.

• **Planning and performing familiar tasks:** Routine activities that require completing steps in order becomes struggle. This may include planning and cooking a meal or playing a favourite game. Eventually, people with advanced Alzheimer's disease forget how to do basic tasks such as dressing and bathing.

• **Changes in personality and behaviour:** Brain changes that occur in Alzheimer's disease can affect moods and behaviours. Problems may include the following:

- Depression
- Loss of interest in activities
- Social withdrawal
- Mood swings
- Distrust in others
- Anger or aggression
- Changes in sleeping habits
- Wandering
- Delusions, such as believing something has been stolen.

Preserved skills: Despite major changes to memory and skills, people with Alzheimer's disease are able to hold on to some skills even as symptoms get worse. Preserved skills may include reading or listening to books, telling stories, sharing memories, singing, listening to music, dancing, drawing, or doing crafts.

Diagnosis: An important part of diagnosing Alzheimer's disease includes being able to explain symptoms. Input from a close family member or friend about symptoms and their impact on your daily life helps. Tests of memory and thinking skills also help diagnose Alzheimer's disease.

Tests: Diagnosing Alzheimer's disease would likely include the following tests:

Physical and neurological exam:

- Muscle tone and strength
- Ability to get up from a chair and walk across the room
- Sense of sight and hearing
- Coordination
- Balance.

Lab tests: Blood tests may help rule out other potential causes of memory loss and confusion, such as a thyroid disorder or vitamin levels that are too low.

Brain imaging: Images of the brain includes Magnetic Resonance Imaging (MRI), Computerized Tomography (CT), Fluorodeoxyglucose (FDG) PET (Position Emission Tomography) imaging, Amyloid PET imaging and Tau PET imaging.

Treatment:

Medications: Alzheimer's medicines can help with memory symptoms and other cognitive changes. Two types of drugs are currently used to treat symptoms:

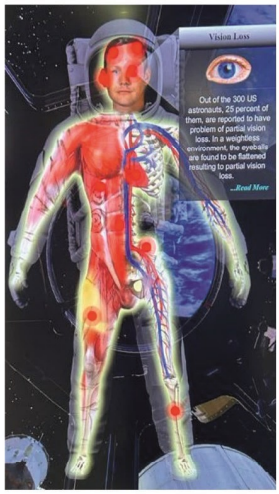
Cholinesterase inhibitors: These medicines work by boosting levels of cell-to-cell communication. The medicines preserve a chemical messenger that is depleted in the brain by Alzheimer's disease.

Memantine (Namenda): This medicine works in another brain cell communication network and slows the progression of symptoms with moderate to severe Alzheimer's disease.

Courtesy - Shree Kanchanlal Mamawala Primary School No.-88

KNOW THE EXHIBIT

Health in Space – Vision loss



Few Astronauts have developed serious, permanent vision problems from their time in space. The longer the mission, the greater the chance of change in vision loss problem. Of the 300 U.S (United States) Astronauts examined since 1989, vision problems developed in 29 percent of those on two-week missions and a whopping 60 percent of those who spent several months on the International Space Station. Doctors at the University of Texas performed brain scans on 27 Astronauts who'd been in space for over a month. In over 25 percent of them, the back of one or both eyes had flattened. This shortened the affected eyeball, making the person more farsighted. Again, Astronauts stay longer in space, the more severe and more likely the problem. Scientists believe this may be another effect of the rise of fluid that occurs in a person's body in a weightless or microgravity environment. In this case, the pressure seems to build inside the skull from the increase flow of cerebrospinal fluid (it is a clear, colourless body fluid within the tissue that surrounds the brain and spinal cord of all vertebrates) into the head. The fluid can't expand the bone, so it flattens the eyeballs instead. Researchers don't know if this effect will diminish or intensity for Astronauts in space longer than six months. But it's critical to find out before sending a crew on a Mars mission that could last at least one year. If the problem is caused by intracranial pressure (it is the pressure exerted by fluids such as cerebrospinal fluid inside the skull and the brain tissue), one possible solution is to create artificial gravity for about eight hours each day by spinning the space ship while the Astronauts sleep. But it's too soon to tell if that will work. "This is one problem that we don't yet have a good handle on and it can be a showstopper for long-duration missions", said NASA Scientist Mark Shelhamer.

BONSAI PLANT WORKSHOP AND EXHIBITION

On the occasion of World Environment Day- 05/06/2023, workshop and exhibition of "Bonsai Plant" was organised at Science Centre Surat in the collaboration with Krishi Vigyan Kendra, Surat, in which Dr. N. M. Chauhan, Extension Education Chairman, Agricultural University and Smt. Purnimaben Dawle, Cultural Commity Chairman, Surat Municipal Corporation, Surat were remained present. In this workshop, Bonsai expert Mr. Ravibhai Baria, Bardoli gave training about Bonsai plant. In the exhibition, Bonsai plants like Zapota (Achras Sapota), Banyan (Ficus Benghalensis), Chor Amblo (Adansonia Digitata), Malfijia (Malpighia Emarginata) and pipli (Ficus Amplissima) of Mr. Alpeshbhai Patel and Mr. Kulinbhai Sorathia were displayed. The age of these plants were upto 30 years and their height varies from 1 to 2 feet. This exhibition was opened for the public between 05/06/2023 to 07/06/2023.

QUIZ

1. The amount of light entering in the eye can be controlled by what?

a) Iris b) Pupil c) Cornea d) Ciliary muscles

2. Why one can't see through the fog?

a) Refractive index of the fog is very high b) Light suffers total reflection at droplets

c) Fog absorbs light d) Light is scattered by the droplets

3. What is the use of reflector in the solar cooker?

a) Decrease efficiency b) Create green house effect c) Increase efficiency d) None of these

4. What is the working fluid in Ocean-Thermal power plant?

a) Volatile liquid like ammonium b) Petrol c) Charcoal d) Liquified Petroleum gas

5. What is the major problem in harnessing nuclear energy?

a) Split nuclei b) Sustain the reaction

c) Dispose of spent fuel safely d) Convert nuclear energy into electrical

6. Which of the following is non-biodegradable?

a) Wool b) Nylon c) Animals bones d) Tea leaves

7. In the Garden Ecosystem, which of the following are producers?

a) Insects b) Snacks c) Grasses d) Rabbits