

MIT Uncovers Photomolecular Effect: Light Can Vaporize Water Without Heat

It's the most fundamental of processes — the evaporation of water from the surfaces of oceans and lakes, the burning off of fog in the morning sun, and the drying of briny ponds that leaves solid salt behind. Evaporation is all around us, and humans have been observing it and making use of it for as long as we have existed.

And yet, it turns out, we've been missing a major part of the picture all along.

In a series of painstakingly precise experiments, a team of researchers at MIT has demonstrated that heat isn't alone in causing water to evaporate. Light, striking the water's surface where air and water meet, can break water molecules away and float them into the air, causing evaporation in the absence of any source of heat.

The astonishing new discovery could have a wide range of significant implications. It could help explain mysterious measurements over the years of how sunlight affects clouds, and therefore affect calculations of the effects of climate change on cloud cover and precipitation. It could also lead to new ways of designing industrial processes such as solar-powered desalination or drying of materials.

The findings, and the many different lines of evidence that demonstrate the reality of the phenomenon and the details of how it works, are described today in the journal *PNAS*, in a paper by Carl Richard Soderberg Professor of Power Engineering Gang Chen, postdocs Guangxin Lv and Yaodong Tu, and graduate student James Zhang. The authors say their study suggests that the effect should happen widely in nature— everywhere from clouds to fogs to the surfaces of oceans, soils, and plants — and that it could also lead to new practical applications, including in energy and clean water production. "I think this has a lot of applications," Chen says. "We're exploring all these different directions. And of course, it also affects the basic science, like the effects



of clouds on climate, because clouds are the most uncertain aspect of climate models."

The new work builds on research reported last year, which described this new "photomolecular effect" but only under very specialized conditions: on the surface of specially prepared hydrogels soaked with water. In the new study, the researchers demonstrate that the hydrogel is not necessary for the process; it occurs at any water surface exposed to light, whether it's a flat surface like a body of water or a curved surface like a droplet of cloud vapor.

Because the effect was so unexpected, the team worked to prove its existence with as many different lines of evidence as possible. In this study, they report 14 different kinds of tests and measurements they carried out to establish that water was indeed evaporating — that is, molecules of water were being knocked loose from the water's surface and wafted into the air — due to the light alone, not by heat, which was long assumed to be the only mechanism involved.

One key indicator, which showed up consistently in four different kinds of experiments under different conditions, was that as the water began to evaporate from a test container under visible light, the air temperature measured above the water's surface cooled down and then leveled off, showing that thermal energy was not the driving force behind the effect.

Other key indicators that showed up included the way

the evaporation effect varied depending on the angle of the light, the exact color of the light, and its polarization. None of these varying characteristics should happen because at these wavelengths, water hardly absorbs light at all — and yet the researchers observed them.

The effect is strongest when light hits the water surface at an angle of 45 degrees. It is also strongest with a certain type of polarization, called transverse magnetic polarization. And it peaks in green light — which, oddly, is the color for which

water is most transparent and thus interacts the least. Chen and his co-researchers have proposed a physical mechanism that can explain the angle and polarization dependence of the effect, showing that the photons of light can impart a net force on water molecules at the water surface that is sufficient to knock them loose from the body of water. But they cannot yet account for the color dependence, which they say will require further study.

They have named this the photomolecular effect, by analogy with the photoelectric effect that was discovered by Heinrich Hertz in 1887 and finally explained by Albert Einstein in 1905. That effect was one of the first demonstrations that light also has particle characteristics, which had major implications in physics and led to a wide variety of applications, including LEDs. Just as the photoelectric effect liberates electrons from atoms in a material in response to being hit by a photon of light, the photomolecular effect shows that photons can liberate

entire molecules from a liquid surface, the researchers say.

"The finding of evaporation caused by light instead of heat provides new disruptive knowledge of light-water interaction," says Xiulin Ruan, professor of mechanical engineering at Purdue University, who was not involved in the study. "It could help us gain new understanding of how sunlight interacts with cloud, fog, oceans, and other natural water bodies to affect weather and climate. It has significant potential practical applications such as high-performance water desalination driven by solar energy. This research is among the rare group of truly revolutionary discoveries which are not widely accepted by the community right away but take time, sometimes a long time, to be confirmed."

The finding may solve an 80-year-old mystery in climate science. Measurements of how clouds absorb sunlight have often shown that they are absorbing more sunlight than conventional physics dictates possible.

Neutron Scattering: Unlocking the Secrets of Safer, More Powerful Lithium

An international team of scientists found a way to improve battery design that could produce safer, more powerful lithium batteries.

The team used quasi-elastic neutron scattering at Oak Ridge National Laboratory to set the first benchmark, one-nanosecond, or one billionth of a second, for a mixture of lithium salt and an organic polymer electrolyte.

"It all comes down to the study of materials," said Eugene Mamontov, ORNL Chemical Spectroscopy group leader. "And polymer electrolytes won't catch fire the way liquid electrolytes do in lithium batteries."

The team used the neutron



technique to validate computer simulations, ending a long-standing debate about how long it takes lithium ions to break free from tiny cages created by polymer electrolytes. The rate at which ions in any battery break free from such environments, or solvation cages in polymer electrolytes, helps determine how energy flows through the battery. Polymer electrolytes could enable more energy-dense electrodes, like lithium metal, resulting in more powerful lithium batteries.

The findings also open

doors for rapidly screening new battery materials at ORNL. "Neutrons are highly sensitive to hydrogen, which is present in virtually all electrolytes. This allowed us to see how it moved in the system and understand polymer electrolyte dynamics at an unprecedented level of detail. We couldn't have pinned down the time and length any other way," said Naresh Osti, ORNL neutron scattering scientist.

"Naresh and Eugene's interpretation of neutron data from the experiment at ORNL opened our eyes to understanding the extent to which lithium ions are caged in polymer electrolytes. Our findings suggest this general approach will apply to liquid electrolytes," said Nitash Balsara, Charles W. Tobias Professor of Electrochemistry at the University of California, Berkeley.

Office Productivity Takes a Hit in the Afternoon, Particularly on Fridays



A recent interdisciplinary study at the Texas A&M School of Public Health used a novel method of data collection to show that employees really are less active and more prone to mistakes on afternoons and Fridays, with Friday afternoon representing the lowest point of worker productivity. The study, published in the journal *PLOS ONE*, was authored by Drs. Taehyun Roh and Nishat Tasnim Hasan from the Department of Epidemiology and Biostatistics, along with Drs. Chukwuemeka Esomou, Joseph Hendricks, and Mark Benden from the Department of Environmental and Occupational Health. "Instead, we used computer usage metrics — things like typing speed, typing errors and mouse activity — to get objective, noninvasive data on computer work patterns." The team then compared computer usage patterns across different days of the week and times of the day to see what kinds of patterns emerged. "We found that computer use increased during the week, then dropped significantly on Fridays," said Roh, assistant professor in the Department of Epidemiology and Biostatistics.

1, 2017, to December 31, 2018. "Most studies of worker productivity use employee self-reports, supervisory evaluations, or wearable technology, but these can be subjective and invasive," said Benden, professor and head of the Department of Environmental and Occupational Health. "Instead, we used computer usage metrics — things like typing speed, typing errors and mouse activity — to get objective, noninvasive data on computer work patterns." The team then compared computer usage patterns across different days of the week and times of the day to see what kinds of patterns emerged. "We found that computer use increased during the week, then dropped significantly on Fridays," said Roh, assistant professor in the Department of Epidemiology and Biostatistics.

Unlocking the Secrets of Consciousness: New Brain Imaging Study Illuminates Critical Connections

A study recently published in *Science Translational Medicine* by researchers from Massachusetts General Hospital and Boston Children's Hospital, both part of the Mass General Brigham healthcare system, introduces a connectivity map of a brain network. This map, the researchers suggest, is essential for maintaining human consciousness. The study involved high-resolution scans that enabled the researchers to visualize brain connections at submillimeter spatial resolution. This technical advance allowed them to identify previously unseen pathways connecting the brainstem, thalamus, hypothalamus, basal forebrain, and cerebral cortex.

Together, these pathways form a "default ascending arousal network" that sustains wakefulness in the resting, conscious human brain. The concept of a "default" network is based on the idea that specific networks within the brain are most functionally active when the brain is in a resting state of consciousness. In contrast, other networks are more active when the brain is performing goal-directed tasks. To investigate the functional properties of this default brain network, the researchers analyzed 7 Tesla resting-state functional MRI data from the Human Connectome Project. These analyses revealed functional connections between the subcortical default ascending arousal network and the cortical default mode network



that contributes to self-awareness in the resting, conscious brain. The complementary structural and functional connectivity maps provide a neuroanatomic basis for integrating arousal and awareness in human consciousness. The researchers released the MRI data, brain mapping methods, and a new Harvard Ascending Arousal Network Atlas, to support future efforts to map the connectivity of human consciousness.

"Our goal was to map a human brain network that is critical to consciousness and to provide clinicians with better tools to detect, predict, and promote recovery of consciousness in patients with severe brain injuries," explains lead-author Brian Edlow, MD, co-director of Mass General Neuroscience, associate director of the Center for Neurotechnology and Neurorecovery (CNTR) at Mass General, an associate professor of Neurology at Harvard Medical School and a Chen Institute MGH Research Scholar 2023-2028. Dr. Edlow explains, "Our

connectivity results suggest that stimulation of the ventral tegmental area's dopaminergic pathways has the potential to help patients recover from coma because this hub node is connected to many regions of the brain that are critical to consciousness." Senior author Hannah Kinney, MD, Professor Emerita at Boston Children's Hospital and Harvard Medical School, adds that "the human brain connections that we identified can be used as a roadmap to better understand a broad range of neurological disorders associated with altered consciousness, from coma, to seizures, to sudden infant death syndrome (SIDS)."

The authors are currently conducting clinical trials to stimulate the default ascending arousal network in patients with coma after traumatic brain injury, with the goal of reactivating the network and restoring consciousness.

The study was funded by the James S. McDonnell Foundation, the National Institutes of Health, The American SIDS Institute, and a Chen Institute MGH Research Scholar Award.

New Study Challenges Old Theories on Y Chromosome Diversity Loss

The development of patrilineal social systems during the Neolithic period, where children inherit their father's lineage, could be the reason for a notable decrease in Y chromosome genetic diversity globally between 3,000 and 5,000 years ago. In a study recently published in the journal *Nature Communications*, a team of scientists from the CNRS, MNHN, and Université Paris Cité suggest that these patrilineal organizations had a greater impact on the Y chromosome than mortality during conflict. This conclusion was reached after analyzing



twenty years of anthropological field data — from contemporary non-warlike patrilineal groups, particularly from the scientists' own fieldwork carried out in Asia — and modeling various socio-demographic scenarios. The team compared warrior and non-warrior scenarios and

showed that two processes play a major role in genetic diversity: the splitting of clans into several sub-clans and differences in social status that lead to the expansion of certain lineages to the detriment of others. This study calls into question the previously proposed theory that violent clashes, supposedly due to competition between different clans, in which many men died, were at the origin of the loss of genetic diversity of the Y chromosome. The results of this study also provide new hypotheses on human social organization in the Neolithic and Bronze Ages.

ICICI Home Finance Corporate Office: ICICI Home Finance Company Limited ICICI HFC Tower, Andheri - Kurla Road, Andheri (East), Mumbai - 400059, India
Branch Office: 4th Floor, 410, Milestone Vibrant, Opp. Apple Hospital, Udhna Darwaja, Surat- 395002
Branch Office: 4th Floor, Krishan Capital, Near Bank of Baroda, Zanzarda Road, Junagadh, Gujarat- 362001

Notice for sale of immovable assets through Private Treaty
Sale Notice for Sale of Immovable Assets through Private Treaty under the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 read with Rule 8(8)/r/w Rule 9 (1) of the Security Interest (Enforcement) Rules, 2002

ICICI Home Finance Company Limited (ICICI HFC) conducted several Auctions for the sale of the mortgaged property mentioned below, however, all such e-Auctions failed. Now, an interested buyer has approached ICICI HFC with an offer to purchase at Reserve Price (Please refer below table). Notice is hereby given to the public in general and in particular to the Borrower(s) and Guarantor(s) that the below-described immovable property mortgaged/charged to the Secured Creditor, the **Physical Possession** of which has been taken by the Authorized Officer of ICICI Home Finance Company Ltd., will be sold on "As is where is", "As is what is", and "Whatever there is", by way of Private Treaty as per the brief particulars given hereunder;

Sr. No.	Name of Borrower(s)/ Co Borrowers/ Guarantors/ Legal Heirs. Loan Account No.	Details of the Secured Asset(s) with known encumbrances, if any	Amount Outstanding	Reserve Price Earnest Money Deposit	Date and Time of Property Inspection	Date & Time of Auction
(A)	(B)	(C)	(D)	(E)	(F)	(G)
1.	Khan Akram Akbar (Borrower) Shaziya Akram Khan (Co-Borrower) Loan Account No. LHSUR00001356892	House on Plot No. 82/A, Megha Diamond, R S No. 34/2, Block No. 41, Near Baleshwar Gam, Palsana, Bardoli Gujarat- 394317	Rs. 11,01,820/- June 04, 2024	Rs. 5,59,000/- June 04, 2024	June 18, 2024 11:00 AM 03:00 PM	June 26, 2024 02:00 PM 03:00 PM
2.	Sirasath Vishwas (Borrower) Sirasath Jayshri (Co-Borrower) Loan Account No. LHSUR00001351861 & LHSUR00001351862	House constructed on R S No. 83/1 known as "Radhika Residency" Paikri Plot No. 444, Village Kareli, Sub Dist. Palsana Dist. Surat, Surat - 394310	Rs. 10,65,765/- June 04, 2024	Rs. 4,50,000/- June 04, 2024	June 18, 2024 11:00 AM 03:00 PM	June 26, 2024 02:00 PM 03:00 PM
3.	Mukeshbhai Z Bagthalia (Borrower) Kajalben Mukeshbhai Bagthalia (Co-Borrower) Sivkurban Zaverbhai Bagthalia (Co-Borrower) Loan Account No. NHJGH00001276126 & NHJGH00001276127	House on Final Plot No. 55, Part Survey No. 527 Part, House No. 55 Part, Om Narayan, Anand Nagar, Street No. 5, Chakkargadh Road, Amreli.	Rs. 22,91,669/- June 04, 2024	Rs. 13,50,000/- June 04, 2024	June 18, 2024 11:00 AM 03:00 PM	June 26, 2024 02:00 PM 03:00 PM
4.	Bulu Biswal (Borrower) Kuni Biswal (Co-Borrower) Loan Account No. LHSUR00001325738	House on Plot No. 174, Megha Diamond 2, R S No. 13, Block No. 12, Nr. Baleshwar Gam, Baleshwar Tundi Road, Meja Baleshwar, Tal Palsana, Dist-Surat, Gujarat	Rs. 14,70,260/- June 04, 2024	Rs. 4,00,000/- June 04, 2024	June 18, 2024 11:00 AM 03:00 PM	June 26, 2024 02:00 PM 03:00 PM

The online auction will be conducted on website ([URL Link- https://BestAuctionDeal.com](https://BestAuctionDeal.com)) of our auction agency **GlobeTech**. The Prospective Bidder(s) must submit the Earnest Money Deposit (EMD) RTGS/ Demand Draft (DD) (Refer Column E) at ICICI Home Finance Company Limited, 4th Floor, 410, Milestone Vibrant, Opp. Apple Hospital, Udhna Darwaja, Surat- 395002 on or before June 25, 2024 before 04:00 PM. The Prospective Bidder(s) must also submit a signed copy of the Registration Form & Bid Terms and Conditions form at ICICI Home Finance Company Limited, 4th Floor, 410, Milestone Vibrant, Opp. Apple Hospital, Udhna Darwaja, Surat- 395002 on or before June 25, 2024 before 05:00 PM. Earnest Money Deposit Demand Draft (DD) should be from a Nationalized/ Scheduled Bank in favor of "ICICI Home Finance Company Ltd. - Auction" payable at Bardoli, Amreli, Surat.

The general public is requested to submit their bids higher than the amount being offered by the interested buyer mentioned above. It is hereby informed that in case no bids higher than the amount being offered by the aforementioned interested buyer is received by ICICI HFC, the mortgaged property shall be sold to the said interested buyer as per Rule 8(8)/r/w Rule 9 (1) of the Security Interest (Enforcement) Rules, 2002. For any further clarifications with regards to inspection, terms and conditions of the sale or submission of bids, kindly contact ICICI Home Finance Company Limited on 022-69974300 or our Sales & Marketing Partner **NexXen Solutions Private Limited**.

The Authorized Officer reserves the right to reject any or all the bids without furnishing any further reasons. For detailed terms and conditions of the sale, please visit <https://www.icicifc.com/>

Date : June 08, 2024
Place : Bardoli, Amreli, Surat
Authorized Officer
ICICI Home Finance Company Limited

SYMBOLIC POSSESSION NOTICE

ICICI Bank Branch Office: ICICI Bank Ltd., Office Number 201-B, 2nd Floor, Road No. 1 Plot No.-B3, WIFIT IT Park, Wagle Industrial Estate, Thane, Maharashtra - 400604

The Authorized ICICI Bank Officer under the Securitisation, Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 and in exercise of the powers conferred under section 13(12) read with Rule 3 of the Security Interest (Enforcement) Rules 2002, issued Demand Notices to the borrower(s) mentioned below, to repay the amount mentioned in the Notice within 60 days from the date of receipt of the said Notice.

Having failed to repay the amount, the Notice is issued to the borrower and the public in general that the undersigned has taken symbolic possession of the property described below, by exercising powers conferred on him/her under Section 13(4) of the said Act read with Rule 8 of the said rules on the below-mentioned dates. The borrower in particular and the public in general are hereby cautioned not to deal with the property. Any dealings with the property will be subject to charges of ICICI Bank Limited.

Sr. No.	Name of the Borrower(s)/ Loan Account Number	Description of Property/ Date of Symbolic Possession	Date of Demand Notice/ Amount in Demand (Rs)	Name of Branch
1.	Ashoke Rout & Ashok Rout Huf & Sonium Choubay-LBSUR00005212206	Flat No. J / 101, 1st Floor, Building No. J, Avadh Carolina, Near Agrawal Bhavan and Rajhans Belliza, Dumas Road, Majura, Dumas, R.S No. 797/2, T.P S No. 82, F.P No. 103, Surat- 394550/ June 06, 2024	November 07, 2023 Rs. 40,37,482.00/-	Surat
2.	Aal Vijay Motibhai & Aal Bhavnaben Vijaybhai, Aal Gauriben Motibhai & Aal Sanjaykumar Motibhai-TBSNR00006276175 & LBSNR00006294806	Plot No. 14 Paki South Side, Anandbag Society, 80 Ft Road, Deshalbhag Ni Vav, Revenue Survey No. 2002, Anand Park Society, Wadhawan, Surendra Nagar-363002/ June 04, 2024	January 16, 2024 Rs. 10,34,870/-	Surendra Nagar
3.	Shailesh R Khokhar & Kancharben Rameshbhai Khokhar-LBSUR00005046329	Property 1) Shop No-108, 1st Floor, Apple Square, Astan, Khata No. 763, R.S. No. 315, Block No. 31/B, Bardoli, Surat- 394601. Property 2) Shop No. 112, 1st Floor, Apple Square, Astan, Khata No. 763, R.S. No. 315, Block No. 31/B, Bardoli, Surat- 394601/ June 05, 2024	January 29, 2024 Rs. 18,46,618/-	Surat
4.	Aika Bai Kailash Choudhary & Bhushan Kailash Choudhary-LBVP00006016290	Flat No. A-503, 5th Floor, A- Wing, Srushti Residency, Near Chhtri Police Station, Old R.S. No. 163/1, Block No. 102, Chhtri, Valsad, Vapi- 396191/ June 05, 2024	February 15, 2024 Rs. 14,55,386.99/-	Vapi
5.	Ashwini Trishul Trivedi & Trishul Devlal Trivedi-LBVP00004674298	Flat No. 106, 1st Floor, Shree Sai Complex, Damni Zampa Bus Stop, C.T.S. No. 570, Killa, Pardi, Vapi- 396191/ June 05, 2024	February 26, 2024 Rs. 8,48,008/-	Vapi
6.	Ram Chandra Yadav & Kalavtiben Ramchandra Yadav-LBSUR00005813405	Plot No. 59, Kavya Residency Vibhag B, Opp Swastiki Residency, R.S. No. 232/1, 232/2, 233/1, 233/2, 234/1, 234/2, Block No. 302/B, Near Tapovan School, Kim, Mulad, Surat-395110/ June 05, 2024	February 06, 2024 Rs. 11,97,258/-	Surat
7.	Gondaliya Namuben Chhaganbhai & Gondaliya Sanjaykumar Chhaganbhai-LBSUR00005263316	Flat No. 203, 2nd Floor, Building No. B/3, Shiv Palace, Near HRP Residency, R.S. No. 121/1, Block No. 335, Kathodara, Kamrej, Surat- 395010/ June 05, 2024	February 26, 2024 Rs. 9,97,550/-	Surat

The above-mentioned borrower(s)/guarantor(s) is/are hereby issued a 30 day Notice to repay the amount, else the mortgaged properties will be sold after 30 days from the date of publishing this Notice, as per the provisions under Rules 8 and 9 of Security Interest (Enforcement) Rules 2002.

Date: June 07, 2024
Place: Gujarat
Sincerely Authorised Signatory
For ICICI Bank Ltd.