Research highlights

SOUND BARRIER: ACOUSTIC WAVES BUTTRESS BUBBLES

Bubbles can be made considerably more stable by suspending them in the air using sound waves.

Bubbles play a key part in many industrial processes. However, they are typically unstable and short-lived because of the pressure that gravity exerts on their liquid films. This effect is often suppressed by introducing chemical compounds called surfactants, but these can contribute to environmental pollution. Xiaoliang Ji at Northwestern Polytechnical University in Xi'an, China, and his colleagues devised an approach that does not require surfactants such as soap.

The researchers caused soap bubbles and pure water bubbles to levitate by subjecting them to ultrasonic waves. The soap bubbles survived being punctured by a needle and remained stable for up to 15 minutes. The water bubbles persisted for more than 7 minutes. Such surfactant-free, super-stable bubbles have previously been seen only in microgravity environments, such as those found on the International Space Station.

The team showed that the sound waves applied pressure to both the inner and the outer surfaces of the bubbles' films. This pressure counterbalanced the gravity-induced pressure acting on the films, prolonging the bubbles' lifetimes.

Droplet https://doi.org/mnzh (2024)

HISTORY OF MEDIEVAL MOUNTS — FROM THE HORSE'S MOUTH

Horses were central to life in medieval England as farm labour, in battle and for transport; they also served as status symbols. Alexander Pryor at the University of Exeter, UK, and his colleagues were able to glean information about the international reach of medieval horse-trading networks from an unusual source: a horse cemetery near Westminster, in what is now central London, that was the final resting place of what were probably elite animals owned by elite households.

Using historical records, radiocarbon dating of the animals' skeletons and an analysis of horseshoes found with the remains, the team dated the horses to around 1425–1517. Chemical analysis of teeth from 15 horses revealed that although some of them were probably born and raised in the London area or the nearby chalk uplands, others hailed from farther afield, perhaps Scandinavia or the Western Alps. Both mares and stallions had been moved long distances.

The teeth also revealed early years of sedentary living for some horses, for training and other purposes, before they began their working lives.

Sci. Adv. **10**, eadj5782 (2024)

MADE TO ORDER: FINE-TUNED GLASS THAT GLOWS

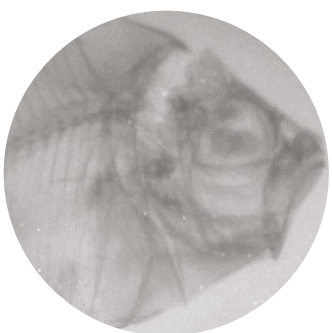
Scientists have created a luminescent glass that can be used to generate high-resolution X-ray images and to produce thin fibres that guide light with high efficiency.

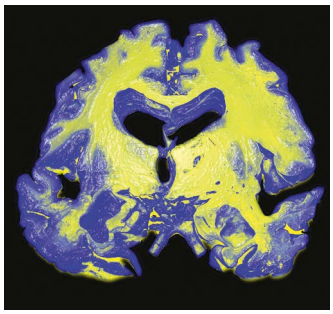
Unlike atoms in crystalline structures, those in glassy materials are not arranged in an orderly fashion, making it hard to fine-tune a glass's properties. Seeking a compound that could form a glass with some internal order, Chunwei Dong at the King Abdullah University of Science and Technology in Thuwal, Saudi Arabia, and his colleagues turned to nanoclusters: discrete groups of atoms that are linked together in fixed shapes.

The authors melted copper-containing nanoclusters into a liquid and cooled it rapidly, yielding a transparent glass that glows bright yellow under ultraviolet light. The glass also emits light when exposed to X-rays, meaning it can be used to produce precise images of the internal structure of an object, such as a fish (pictured). That ability is typically observed in crystalline materials.

The team used tweezers to pull long fibres resembling human hair out of the glass when it was gently warmed, creating glass fibres that efficiently transmit light pulses.

J. Am. Chem. Soc. **146**, 7373–7385 (2024)





ALZHEIMER'S TEST LINKS DISEASE STAGE WITH DEMENTIA RISK

A computer algorithm that analyses molecules in the fluid surrounding the brain and spinal cord can track the progression of Alzheimer's disease (pictured, a brain affected by Alzheimer's).

Brain changes that are linked with Alzheimer's can develop for years before symptoms begin. Gemma Salvadó at Lund University, Sweden, and her colleagues applied an algorithm to measurements of molecules in cerebrospinal fluid collected from 426 people, including 100 with Alzheimer's. They identified five molecules that rise to abnormal levels at different stages of the disease, and do so in a sequence that is consistent from person to person.

The team used these patterns to assign participants to one of six stages. Each correlated with clinical symptoms and brain changes measured during brain scans. People in more advanced stages were at higher risk of dementia, regardless of their cognitive abilities when the study began.

The model promises to be an accessible tool for detecting Alzheimer's early in the progression of the disease, the authors say. It could be used to select participants for clinical trials using a single sample of cerebrospinal fluid, rather than expensive imaging techniques.

Nature Aging https://doi.org/mnzj (2024)

L TO R: HERITAGE IMAGES/GETTY; CHUNWEI DONG, MEHMET BAYINDIR, OSMAN BAKR/KAUST; LIVING ART ENTERPRISES/SPL