

# Tiny bubble study could improve dentists' tools

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People's teeth-chattering experiences in the dentist's chair could be improved by fresh insights into how tiny, powerful bubbles are formed by ultra-fast vibrations, a study suggests.

The physics of how so-called nanobubbles are generated could have a range of clinical and [industrial applications](#), including in dental hygiene devices used to remove plaque, experts say.

Their findings could also inform the development of other technologies—such as devices to selectively target tumor cells—that harness the energy released when the bubbles burst.

## **Bubble formation**

Edinburgh engineers ran complex supercomputer simulations to better understand the underlying mechanisms behind the formation of nanobubbles—which are tens of thousands of times smaller than a pinhead.

The team modeled the movement of individual molecules in a thin layer of [water](#) on a surface vibrating a million times faster than the flapping of a hummingbird's wings.

## **Complex simulations**

Their analysis revealed that nanobubbles can form either when vibrations cause the water to boil, or when the water pressure drops to a point where liquid becomes vapor—a process called cavitation.

Researchers ran their calculations using the ARCHER UK National Supercomputing Service, which is operated by EPCC, the University's high-performance computing facility.

"We now have a better understanding of how vibrations at the smallest scale can be exploited to produce nanobubbles. This work has a broad scope for future research and will help researchers devise new

experiments to shed further light on the generation of nanobubbles," says Saikat Datta, School of Engineering

**More information:** Saikat Datta et al. Acoustothermal Nucleation of Surface Nanobubbles, *Nano Letters* (2021). [DOI: 10.1021/acs.nanolett.0c03895](https://doi.org/10.1021/acs.nanolett.0c03895)

Provided by University of Edinburgh

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