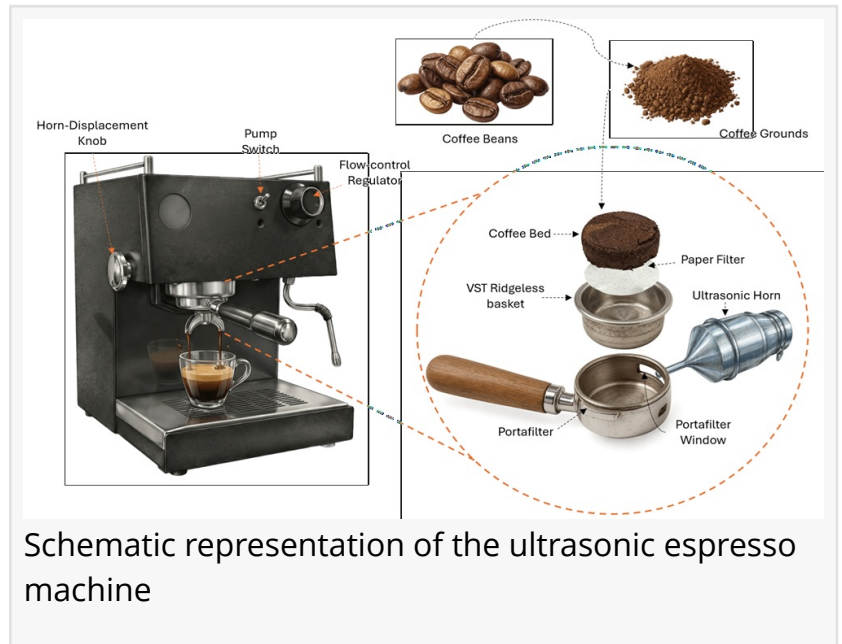


Shaking up the coffee world: Entirely new way of making espresso unveiled

Researchers at UNSW Sydney have harnessed the power of ultrasonic sound waves to make espresso-strength coffee with cold water, cutting energy use by up to 75%.

SYDNEY , AUSTRALIA, June 10, 2026 /EINPresswire.com/ -- That morning coffee kick from a shot of espresso needs boiling water, high pressure and plenty of energy consumption, right?

Now, UNSW researchers have shown that one part of that recipe may not be essential: the hot water.



They have developed a completely new brewing process that uses room-temperature water to create an [espresso-strength](#) coffee with the same rich flavour, body and caffeine kick.

The process harnesses sound waves, and by not having to heat the water it reduces energy consumption by around three quarters. The saving could be especially significant for companies who make coffee-based ready-to-drink products at industrial scale, both in terms of energy use and brewing time.

“

Sound waves can brew espresso with room-temperature water while reducing energy use by up to 75%”

Francisco Trujillo

Dr Francisco Trujillo and his team from UNSW’s School of Chemical Engineering have developed a system that uses ultrasound, high-frequency sound waves that are far above what a human can hear, to help extract the desired flavour,

aroma and concentration from coffee grounds.

Their research, published in the [Journal of Food Engineering](#), included blind taste-testing experiments which showed that their ultrasonic room-temperature version of espresso was undistinguishable from coffee shots brewed in the traditional way.

“We call it an ultrasonic espresso. It’s a different process, but you get the same richness and concentration of a normal espresso in under three minutes,” says Dr Trujillo.

“Traditionally, espresso is by forcing hot water through coffee under pressure. But with ultrasound we can use room-temperature water instead, reducing energy consumption by up to 75%.

“And when we gave our ultrasonic espresso to 100 regular coffee drinkers in a randomised test, they could not tell it apart from a normal espresso.”

Dr Trujillo had previously developed the patented ultrasound system to create cold-brew coffee, which usually takes 12 to 24 hours to produce, in as little as three minutes.

However, cold-brew coffee has a distinctively different flavour to espresso – often described as being much more diluted, smooth and mellow – while also containing around one-fifth the caffeine concentration.

Espresso strength using cold water:

The UNSW team continued their work to adjust the ultrasound system to create an espresso-strength shot without the need for hot water.

The process transformed a traditional filter basket into an ultrasonic reactor to brew the grounded coffee beans. The basket generates high-frequency sound waves that help extract flavour, aroma and body from the coffee grounds.

At the heart of the system is a transducer - a small metal device that generates ultrasound while pressing against the side of the coffee basket holding the ground coffee. The ultrasound causes the basket vibrate rapidly, transmitting vibrations through both the coffee grounds and the water.

The ultrasound creates a phenomenon called acoustic cavitation, which is a rapid formation and collapse of microscopic bubbles in the liquid. When these tiny bubbles collapse near the coffee particles, they act like microscopic scrubbing brushes or jets of liquid, pitting and fracturing the coffee grounds and accelerating the brewing process.

This helps break open the surface of the coffee grounds and allows flavour compounds, oils, and caffeine to move into the water much faster than they normally would at such low temperatures.

The result is a concentrated, flavourful shot of coffee comparable to espresso made with traditional machines, but produced using room-temperature water and much less energy.

“We have been working on a range of parameters to discover how to make the perfect ultrasonic

espresso,” says Dr Trujillo.

“The most important was the brew ratio – that is how much water is used per gram of coffee – because this helps ensure the final drink is concentrated and not too diluted.

“Another important factor is how finely the coffee beans are ground. We found that by grinding finer we could extract the flavour more rapidly.

“We also experimented with how long the sound waves were applied, as this can affect both the concentration and flavour of the coffee. What we found is that between two-and-a-half and three minutes is a sweet spot for producing a balanced cup.”

To test their results, the researchers also carried out a blind sensory evaluation in which participants did not know which coffee they were drinking.

Four drinks were tested: traditional espresso, ultrasound-brewed espresso, traditional filter coffee, and ultrasound-brewed filter coffee. All coffees were prepared fresh, cooled to the same temperature, served in identical coded cups, and presented in a random order to avoid bias.

Around 100 regular coffee drinkers took part. They were not trained experts, but everyday consumers who drink coffee at least once a week.

Each participant rated the coffees on a simple nine-point scale for aroma, flavour, bitterness and overall liking.

Taste testing:

The results were striking. For the espresso shots, there were no significant differences between the traditional and ultrasound versions across any of the taste measures. Most participants could not reliably tell them apart, and there was no clear preference for either method.

For filter coffee, however, the ultrasound-brewed version performed even better: participants significantly preferred it overall, particularly rating its bitterness as more pleasant.

“These findings showed that using ultrasound did not harm taste, and in some cases even improved it, despite brewing at room temperature and without the heat normally associated with coffee making,” says Dr Trujillo.

Although the researchers say their new system could be relatively easily developed into an automatic coffee machine for home users, the biggest opportunity is likely to be for large-scale commercial producers of coffee-based drink.

“There are companies that make coffee products on an industrial scale and we are confident this

ultrasound system can be scaled up to meet their needs, delivering real benefits in terms of reduced processing times and energy use," says Dr Trujillo.

"The 75% energy saving is particularly beneficial at that scale and we are also able to produce the coffee very quickly.

"Because the process produces a concentrated, espresso-strength coffee, it can be used directly to manufacture ready-to-drink products, or shipped as a concentrate and later diluted into a range of drinks, including [cold brew](#) and milk-based coffee drinks."

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